VAPOR PRESSURE LOWERING IN POROUS MEDIA

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By

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ABSTRACT

Water vapor pressure lowering phenomenon in porous media was investigated for a range of temperatures by measuring vapor pressure versus mass of water adsorbed in consolidated sandstone cores and unconsolidated silica sands. Experimental results: showed that the mass of water adsorbed on the rock surface is much more than the amount of pore steam. Experimental results also revealed that the water adsorption is mainly caused by micropores in the porous medium. Measurement of the mass of methane and ethane adsorbed on dry rocks showed that the amount of adsorption is not great in comparison with the pore gas.

Several interesting findings were made in addition to the main objectives of the study. These concerned both experimental results and the apparatus. In regard to experimental results, it was found that adsorption data for the water-sandstone core studies could be normalized with respect to temperature. Although this appears not to have been reported previously, it does agree in principle with findings for solid powders with micropores. Another interesting result was that reanalysis of previous studies of capillarity in sandstone indicates that experimental data were mostly influenced by adsorption. Finally, an interesting by-product result was the development of a capacitance probe for detection of very low water content in a sandstone core or sand pack. It was also found that the probe is sensitive to the amount of methane and ethane adsorption.

TABLE OF CONTENTS

1. Introduction 1
2. Fundamental Theories 3

2.1 Surface Tension 3

2.1.1 The Origin of Surface Tension 3
2.1.2 Temperature and Surface Tension 6
2.1.3 Effect of Size on Surface Tension 10
2.1.4 Surface Tension and Liquid-Gas Density Difference 11

2.2 Capillarity 12
2.3 Vapor Pressure Lowering Due to Capillarity 16
2.4 Limitations of Applying the Kelvin Equation 20
2.5 Surface Adsorption 23

2.5.1 The Origin of Surface Adsorption 23
2.5.2 Vapor Pressure Lowering Due to Surface Adsorption 25

2.6 Physical Modeling of Surface Adsorption 26

2.6.1 Kinetic Theory of Surface Adsorption 27
2.6.2 Langmuir Theory of Surface Adsorption 33
2.6.3 "BET" Theory of Surface Adsorption 34
2.6.4 Mathematical Nature of the BET Equation 35
2.6.5 Criticisms of the BET Theory 36

2.7 Surface Adsorption in Porous Media 38

2.7.1 The classification of Proous Media 38
2.7.2 Physical Adsorption of Gases in Macro-pores 39
2.7.3 Physical Adsorption of Gases in Micro-pores 39
2.7.4 Physical Adsorption of Gases in Meso-pores 40

2.8 Thermodynamics of Adsorption 43

2.8.1 Equilibrium Pressure and Temperature 45
2.8.2 Heat of Adsorption 48
2.8.3 Entropy of Adsorption Phase 49

3. Statement of Problem 50

4. Apparatus and Procedure 55

4.1 Apparatus 55

4.1.1 General Description 55
4.1.2 Thermometer 58
4.1.3 Pressure Transducer 60
4.1.4 Capacitance Probe 64

4.2 Core Samples 72
4.3 Procedures 72

5. Results and Discussion 76

5.1 Nitrogen Adsorption at 77.3°K 76
5.2 Methane and Ethane Adsorption at Room Temperature 92
5.3 Water Adsorption at Elevated Temperatures 93
5.4 Surface Area 178
5.5 Capacitance Probe 190
5.6 Material Balance and Energy Balance Equations 207

6. Conclusion 208

Nomenclature 209
References 210
Appendix A 213
Appendix B 245
Appendix C 262

LIST OF FIGURES

FIGURES

2.1	Analog Configuration for Molecules in the Liquid Phase and at the Interface	4
2.2	Surface Tension of Water vs. Temperature	7
2.3	Kinds of Gas-Liquid Interfaces	13
2.4	Analog Configuration to Explain the Surface Tension	14
2.5	An Ideal Model of a Porous Medium Containing Both Gas and Liquid in a Porous Medium	19
2.6	Layer-by-Layer Model for Surface Adsorption	28
2.7	The Relation Between the Amount of Adsorption and Relative Pressure at Inflection Point	37
2.8	The Ink Bottle Hypothesis for Hysteresis	41
2.9	A Typical Adsorption-Desorption Isotherm of a Porous Medium	42
2.10	The Three Phase Model of Contact Angle	44
3.1	BET Analysis of Experimental Data Presented by Calhoun, et. al., in 1949	52
4.1	Schematic Diagram of Experimental Apparatus for Adsorption Experiment (Adsorbate has Boiling Temperature Lower Than Room Temperature)	56
4.2	Schematic Diagram of Experimental Apparatus for Adsorption Experiment (Adsorbate has Boiling Temperature Higher Than Room Temperature)	57
4.3	Coreholder	59
4.4	Resistance Measurement (a) Two-Terminal Method (b) Four-Terminal Method	61
4.5	Schematic Diagram of Pressure Transducer for Elevated Temperatures	63
4.6	Schematic Diagram for Capacitance Probe (old version)	66
4.7	Schematic Diagram for Capacitance Probe (new version)	68

FIGURES

4.8	Capacitance Measurement by Using a Bridge with a Guard Terminal	69
4.9	Capacitance Measurement by Using a Modified Wheatston Bridge	71
5.1–5.14	Nitrogen Adsorption Isotherms at 77.3°K	77–90
5.15–5.19	Methane Adsorption Isotherms at Room Temperatures	94–98
5.20–5.24	Ethane Adsorption Isotherm at Room Temperatures	99–103
5.25–5.86	Water Adsorption Isotherms at Elevated Temperatures Between 100°C and 200°C	105–166
5.87–5.96	Characteristic Curves of Water Adsorption on Rock Samples	167–176
5.97–5.104	Isosteric Heats of Water Adsorption on Rock Samples	179–186
5.105	Entropy of Adsorbed Water at Temperatures Between 100°C and 200°C	187
5.106–5.121	Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures	191–206

LIST OF TABLES

TABLE		
2.1	The Surface Tension of Simple Fluids by Equation 2.3	9
2.2	The Numerical Value of I(P,T) and ln(P_o/P) at Temperatures Between 100°C and 200°C	22
3.1	BET Analysis of the Experimental Results of Calhoun, et. al.	53
4.1	Properties of Core Samples	73
5.1	Surface Area of Core Samples	190

1. INTRODUCTION

If a container is evacuated and partially filled with a liquid, then, at temperature T, the equilibrium pressure P_o can be measured. This pressure P_o is called the saturated vapor pressure. The phase diagram for a particular pure liquid can be constructed by using sets of (T, P_o), where P_o is a function of T only.

"Vapor pressure lowering" refers to the fact that under some conditions, the equilibrium vapor pressure P may be less than P_o. This means that the liquid-vapor P-T relationship may depend on other factors. Solution of salts or gases in a pure liquid will cause this result. More importantly, this phenomenon can also be seen when water is contained in a porous medium.

From the viewpoint of petroleum engineering, an investigation of vapor pressure lowering is important in understanding the behavior of geothermal steam reservoirs. Traditionally, it has been considered that superheated steam and rock are the only two components in a dry steam geothermal reservoir. From the fundamental physical properties of fluid and rocks, however, there should exist a certain amount of liquid in addition to steam. If the quantity of the additional liquid compared to the quantity of superheated steam is significant, material balance computations should consider this fact.

Capillarity has been thought to be the main factor causing vapor pressure lowering in porous medium. However, in the course of this study, it became apparent that surface adsorption was the most important factor causing vapor pressure lowering in dry steam geothermal reservoirs.

For this study, adsorption isotherms were obtained for several fluids and consolidated sandstones over a range of temperatures. Only pure fluids were used in the laboratory in order to reduce the number of variables. For the following discussion, "liquids" refers to simple liquids, excluding solutions and other mixtures, and all discussions are limited to pure "liquids."

2. FUNDAMENTAL THEORIES

Many factors can cause vapor pressure lowering for pure liquids in porous media. The most important are capillarity and surface adsorption. Capillarity originates from surface tension and describes the relationship between a liquid phase and a gas phase for a single component fluid in a capillary tube. Surface adsorption is the result of interaction between molecules of the solid surface and the gas molecules in the pore space. The difference between capillarity and surface adsorption is that capillarity considers only surface tension forces and surface adsorption considers forces of attraction between the liquid and the solid surface.

The following sections will discuss both capillarity and surface adsorption. The discussion will start with surface tension and then consider capillarity and limitations, and then consider adsorption from the standpoint of kinetic theory,

2-1 Surface Tension

In this section, the origin of surface tension will be discussed from a molecular scale, and then some factors important to surface tension will be considered.

2-1-1 The Origin of Surface Tension

In the interior of the liquid phase, each molecule is completely surrounded by others, and therefore subject to attraction in all directions. Over a long enough period of time (compared to molecular vibration), the attraction on any molecule is uniform in all directions. At the liquid-gas interface, however, conditions are different. Figure 2.1

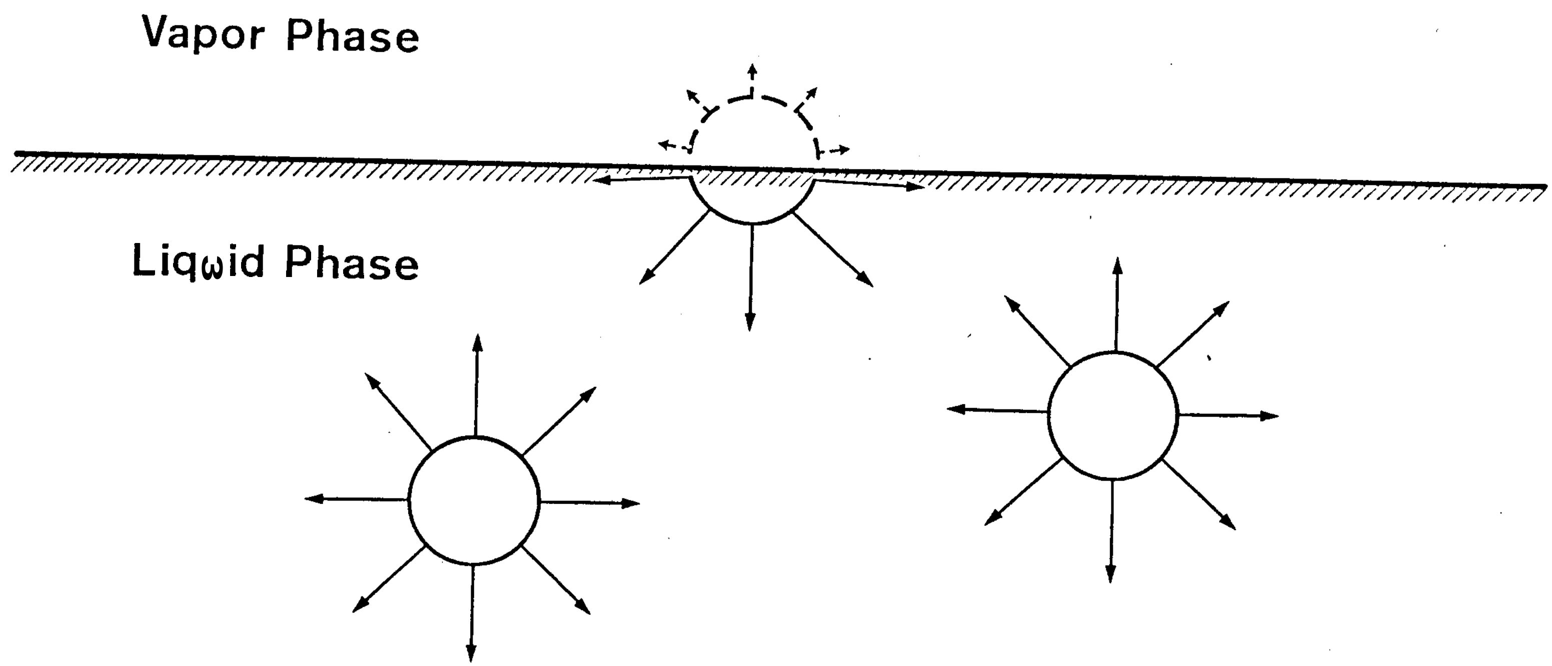


Figure 2 1   Analog Configuration for Molecules in the Liquid Phase and at the Interface shows that the molecules at the surface are attracted toward the liquid phase interior and horizontally by neighbor molecules. However, there is not enough attractive force from the gas phase to balance the attractive force from the liquid phase, because molecular density in the gas phase is lower than in the liquid phase. Hence, each surface molecule is subject to a net attractive force toward the liquid phase, and the attractive force is perpendicular to the surface. The region in which molecules undergo an unbalanced force toward the liquid phase is called the interfacial region.

The attractive force causes the surface to diminish in area, because surface molecules move away from the interfacial region more rapidly than others move toward the interfacial region. The number of molecules at the interfacial region decreases until the maximum possible number of molecules is in the interior. This means that the surface area becomes the smallest possible for a given volume.

The fact that the liquid surface contracts shows that there is free energy associated with it. Work must be done to extend the surface. Extending the surface is equivalent to bringing molecules from the interior of the liquid to the interfacial region. If the interfacial region has the same nature and structure everywhere, the work. done in extending the surface will be finite.

The free energy in the interfacial region is of fundamental importance. In solving many problems related to the final configuration of the surface equilibrium, the surface free energy is replaced by a hypothetical tension acting in all directions parallel to the surface with a magnitude equal to the surface free energy. This is generally known as surface tension. Such a surface tension has the same dimensions as a surface free energy, (mass/time^2), and the same numerical magnitude. The concept of surface tension can always be used in considering the properties of surfaces which depend only on the existence of the surface free energy.

In the proceeding model, surface free energy is considered to depend on the temperature of the liquid, the density difference between the liquid and gas phases, and the size of the liquid phase. All these properties will be discussed in the following:

2-1-2 Temperature and Surface Tension

The higher the temperature, the less important are the forces of molecular attraction. This means that the molecules in the liquid phase tend to overcome the unbalanced inward attractive force, or the surface area increases more easily. That is, the surface free energy decreases when temperature increases. At the critical temperature, the gas phase is identical to the liquid phase. One can say that no surface tension exists at the liquid-gas interface, or the surface tension is equal to zero.

Figure 2.2 presents the surface tension of water as a function of temperature. The surface tension changes from 80 dynes/cm at $-22^{\circ}C$ to zero at the critical temperature[1-4]. For most materials, the relation between surface tension and temperature is nearly linear. A reasonable approximation can be written as

$$\gamma_o = \alpha' (T_c - T) \tag{2.1}$$

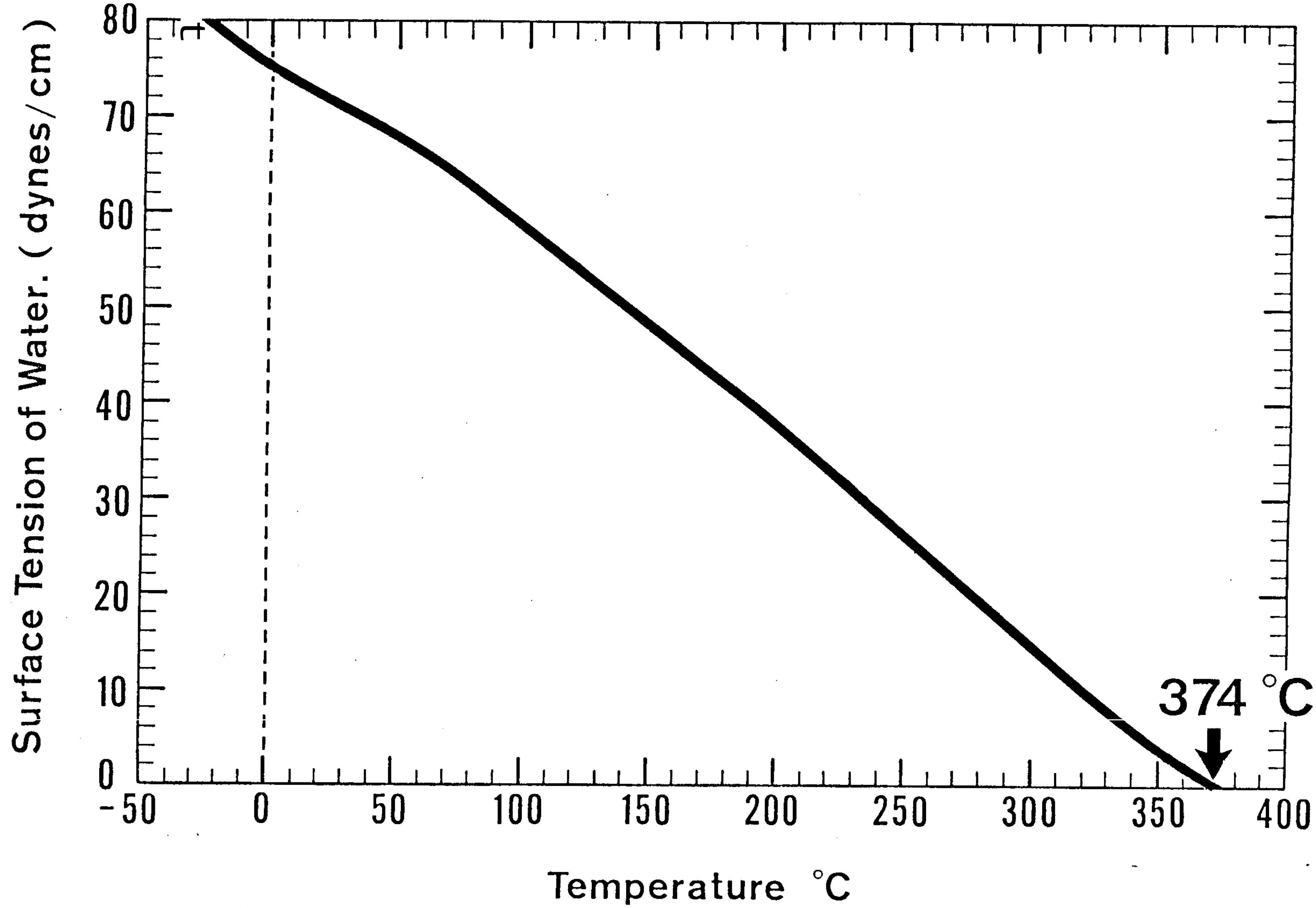


Figure 2.2 Surface Tension of Water vs. Temperature

where α' is a constant, independent of temperature, Equation 2.1 works well only when the temperature T is much less than critical temperature T_c. When the temperature is in the vicinity of T_c, for some liquids, Equation 2.1 should be rewritten as:

$$\gamma_o = \beta' (T_c - T_x - T) \tag{2.2}$$

where β' is a constant, independent of temperature,

T_x is a constant for a particular fluid. Another approximation was developed by Van der Waals from the theory of corresponding states[5]:

$$\gamma_o = G \left(1 - \frac{T}{T_c}\right)^{n'} \tag{2.3}$$

where G is a constant characteristic of the liquid and n' is a constant, which ideally should be independent of temperature and the fluid. The theoretical value of n' is 11/9. This equation applies for some simple fluids, like nitrogen, oxygen, and methane. The experimental values of n' for most of the simple fluids fall between 1.1 and 1.3. Table 2.1 gives n' values of some simple fluids[6].

The temperature coefficient of surface tension. as approximated by Equation 2.3 thus becomes:

$$\frac{d\gamma_o}{dT} - \frac{n'}{T_c} G \left(1 - \frac{T}{T_c}\right)^{n' - 1} \tag{2.4}$$

Equation 2.4 shows that the temperature coefficient of surface tension is a function of temperature. Thus, Equation 2.3 may match experimental re-

Table 2.1: The Surface Tension of Simple Fluids by Equation 2.3

Fluid	Tc(^{o}K)	G	n'	Standard Deviation of Fit
N_2	126.26	28.42	1.232	0.02
A_r	150.72	37.78	1.277	0.02
CO	132.92	27.77	1.126	0.03
CH_4	190.66	39.05	1.221	0.02
H_e	5.19	0.5252	1.039	0.001
H_2	33.19	5.523	1.112	0.002
N_e	44.38	15.20	1.216	0.02
F_2	144	39.50	1.202	0.10
O_2	158.78	38.14	1.217	0.02

sults better than Equation 2.1 or Equation 2.2.

From Equations 2.1 through 2.3, the temperature coefficient of surface tension is always negative for all substances. However, positive temperature coefficients have been observed in some experiments. This anomaly occurs mainly with metals and, presumably, is caused by impurities.

2-1-3 Effect of Size on Surface Tension

In the physical picture of surface tension, the interfacial region is defined as the region where molecules receive an unbalanced force pulling them inward toward the liquid phase. The parameter in question is the thickness of the interfacial region. The thickness must be a finite value, and should be only a few times more than the molecular size, since, if the thickness is greater than a few times the size of a molecule, the total force can be averaged to become zero. The exact value of the thickness of the interface is not known. However, for water at 20°C, the thickness of the interfacial region has been estimated to be in the range of 2 to 7 Å. One can be sure that the thickness decreases with increasing temperature, because when the temperature reaches critical temperature, the thickness of the interfacial region will be zero.

If there is a droplet of liquid with a radius less than the thickness of the interfacial region, it is obvious that the surface tension of this droplet is different from that of a droplet with radius larger than the thickness of the interfacial region. Thus, when a liquid droplet is small enough, the surface tension changes with size of the liquid droplet.

In 1949, Tolman[7-9] made some theoretical studies of the relation between surface tension and radius of curvature by using the idea of Gibb's superficial density. In 1950, Koenig[10] followed a similar procedure to modify Tolman's calculation. The following equation is the Tolman–Koenig equation:

$$\ln \frac{\gamma}{\gamma_o} = \int_{\infty}^{r} \frac{(2\delta/r')\left[1 + (\delta/r') + 1/3\,(\delta/r')^2 + \cdots\right]}{1 + (2\delta/r')\left[1 + (\delta/r') + 1/3\,(\delta/r')^2 + \cdots\right]}\, dr' \tag{2.5}$$

where γ is the surface tension for a liquid droplet with radius of curvature r. δ is a constant for a particular fluid at a particular temperature.

A first order approximation of Equation 2.5 can be written as:

$$\frac{\gamma}{\gamma_o} = \frac{1}{1 + (2\delta/r)} \tag{2.6}$$

Since the thickness of the interfacial region is only a few times the size of a molecule, the value of δ is on the order of 10^{-8} cm. The exact value of δ is too small to be obtained precisely from an experiment. We turn now to consideration of the effect of phase density on surface tension.

2-1-4 Surface Tension and Liquid–Gas Density Difference

From a physical picture of surface tension, surface tension originates from the density difference between the liquid phase and the gas phase. Thus, the larger the density difference, the larger the value of the surface tension. At the critical temperature, the density difference between the liquid and gas phases is zero, and the surface tension also equals zero.

Both the density of fluids and surface tension of fluids are functions of temperature. As temperature changes, both density difference and surface tension change simultaneously in the same direction. Generally, the relation between density and surface tension is included in the relation between temperature and surface tension.

2-2 Capillarity

The most important consequence of the existence of surface free energy is the foundation of the classical theory of capillarity which is responsible for most of the methods used in measuring surface tension. Capillarity plays an important role in determining the interactions between a porous medium, and the fluid in the porous medium.[11, 12]

As shown in Figure 2.3, there are three different kinds of liquid-gas interfaces. At the same temperature, each kind of interface has a different equilibrium vapor pressure. The equilibrium vapor pressure at a convex liquid surface, as shown in Figure 2.3-a, is larger than the equilibrium vapor pressure at a flat liquid-gas interface, as shown in Figure 2.3-b, since there is less unbalanced force *to* pull the molecules at the interfacial region inward to the liquid phase. Similarly, the equilibrium vapor pressure at a concave liquid surface as shown in Figure 2.3-c is less than the equilibrium vapor pressure at a flat liquid-gas interface.

The equilibrium vapor pressure of a curved liquid-gas interface can be obtained mathematically. In Figure 2.4, ABCD is a small area of the surface with sides at right angles. Suppose the surface ABCD is displaced parallel to itself away from the concave side by an infinitesimal

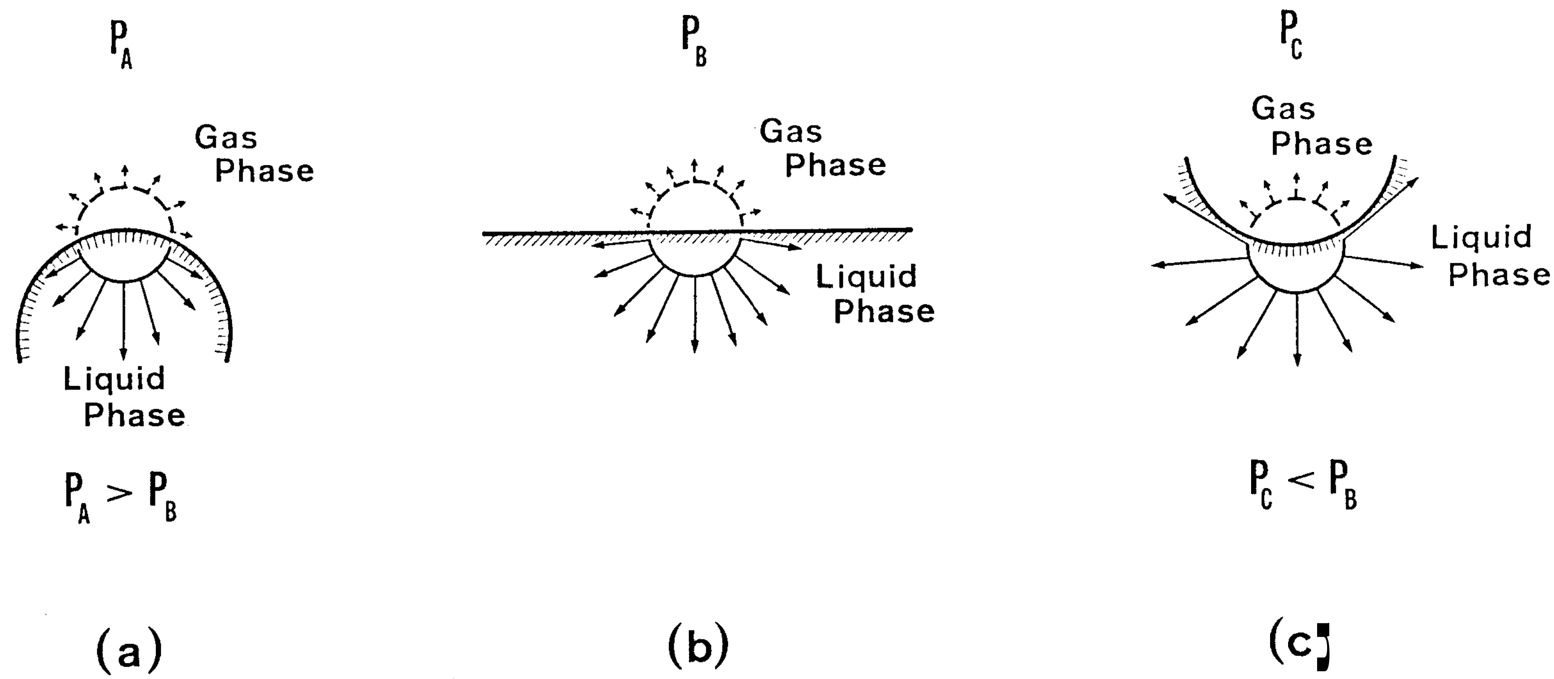


Figure 2.3 Kinds of Gas-Liquid Interfaces

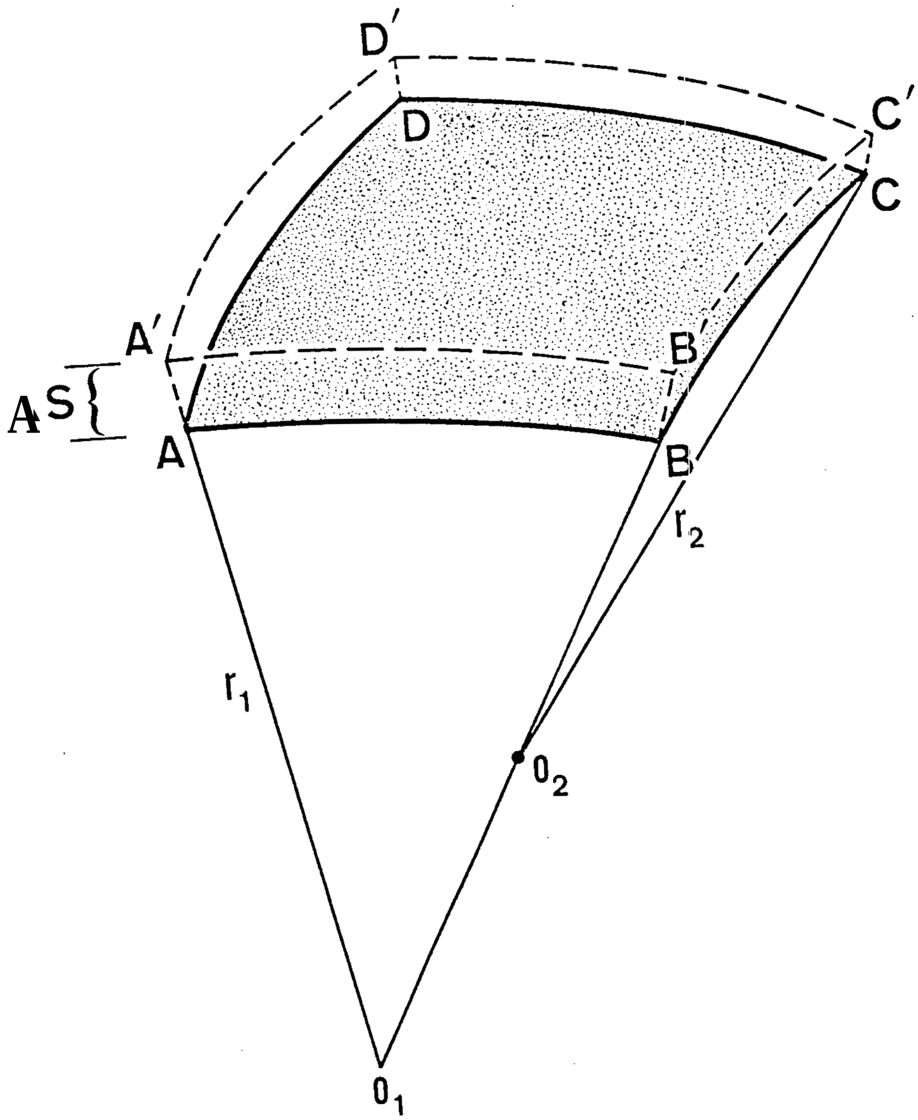


Figure *2.4* Analog **Configuration to** Explain **the Surface Tension**

distance, AS. The new surface A'B'C'D' has an area

$$A'B'C'D' = (AB + \frac{AB}{r_1} \Delta S)(BC + \frac{BC}{r_2} AS) \qquad (2.7)$$

where r_1 and r_2 are two principle radii. Neglecting the second under tems:

$$A'B'C'D' = ABCD \, (1 + \frac{AS}{r_1} + \frac{AS}{r_2}) \qquad (2.8)$$

The free energy needed to create the surface area is:

$$Y \cdot ABCD \cdot \Delta S \quad (\frac{1}{r_1} + \frac{1}{r_2}) \qquad (2.9)$$

if the pressure of the concave side is P_1 and the 'convex side is P_2'
The work done by a pressure difference is:

$$(P_2 - P_1) \cdot AS \cdot ABCD \qquad (2.10)$$

By conservation of energy, Equations 2.10 and 2.9 can be combined:

$$(P_2 - P_1) \cdot AS \cdot ABCD = -\gamma \cdot ABCD \cdot AS \; (\frac{1}{r_1} + \frac{1}{r_2}) \qquad (2.11)$$

or

$$P_1 - P_2 = \gamma \, (\frac{1}{r_1} + \frac{1}{r_2}) \qquad (2.12)$$

Equation 2.12 is the fundamental equation of capillarity, and is known as the Laplace equation. It describes vapor pressure at curved liquid-gas interfaces. In Equation 2.12, $(P_1 - P_2)$ is defined as capillary pressure, P_c. Thus:

$$P_c = \gamma \left(\frac{1}{r_1} + \frac{1}{r_2}\right) \tag{2.13}$$

For convenience, the mean radius of a curved interface is defined as:

$$r_M = \frac{2r_1r_2}{r_1+r_2} \tag{2.14}$$

Thus, Equation 2.13 can be written as:

$$P_c = \frac{2\gamma}{r_M} \tag{2.15}$$

In the equation, the radius of curvature can be either positive or negative. If the liquid surface is convex, the radius of curvature is positive. If the liquid surface is concave, the radius of curvature is negative. The pressure difference is always derived by subtracting the pressure in the liquid phase from the pressure in the gas phase.

The assumption of the Laplace equation, Equation 2.15, is the "infinite subdivisibility of the liquid." This assumption is valid for most macroscopic cases. For example, a droplet of water with radius 30 Å contains about 3500 water molecules.

2-3 Vapor Pressure Lowering Due to Capillarity

From the Laplace equation, the pressure difference between the liquid and gas phases can be obtained. However, the exact value of the equilibrium vapor pressure is not known. If the system is large enough to apply thermodynamics, the equilibrium vapor pressure can be related to thermodynamic quantities.

The chemical potential of the liquid, vapor, and interfacial regions can be represented by μ_ℓ, μ_v, and μ_s, respectively. At equilibrium:

$$\mu_\ell = \mu_v = \mu_s \tag{2.16}$$

Applying the Laplace equation:

$$d(P_v - P_\ell) = -d\left(\frac{2\gamma}{r_M}\right) \tag{2.17}$$

where P_v and P_ℓ are the pressures in the gas and liquid phases. Differentiating Equation 2.16 yields:

$$d\mu_\ell = d\mu_v = d\mu_s \tag{2.18}$$

According to the Gibbs-Duhem equation:[13]

$$S_\ell dT + V_\ell dP_\ell + d\mu_\ell = 0 \tag{2.19}$$

and

$$S_v dT + V_v dP_v + d\mu_v = 0 \tag{2.20}$$

where S_ℓ and S_v are molar entropies of liquid and gas phases.

V_ℓ and V_v are molar volumes of liquid and gas phases. Under isothermal condition, $dT = 0$, combining Equations 2.18-2.20 leads to:

$$V_\ell dP_\ell = V_v dP_v \tag{2.21}$$

Substituting Equation 2.21 into Equation 2.17:

$$d\left(\frac{2\gamma}{r_M}\right) = -\frac{V_\ell - V_v}{V_\ell} dP_v \qquad (2.22)$$

Assuming that: (1) the molar volume of the gas phase is much larger than the molar volume of the liquid phase, and (2) the vapor behaves as an ideal gas, then Equation 2.22 can be rewritten as:

$$d\left(\frac{2\gamma}{r_M}\right) = \frac{V_v}{V_\ell} dP_v = \frac{RT}{V_\ell}\frac{dP_v}{P_v} \qquad (2.23)$$

Integrating Equation 2.23, one obtains:

$$\frac{2\gamma}{r_M} = \frac{RT}{V_\ell} \ln\frac{P_o}{P} \qquad (2.24)$$

or $$\ln\frac{P_o}{P} = \frac{2\gamma V_\ell}{RT}\frac{1}{r_M} \qquad (2.25)$$

where P_o is the saturation vapor pressure for a flat interface, P is the saturation vapor pressure for a curved interface with mean radius of curvature r_M.

Equation 2.25 is known as the Kelvin equation. This is the capillary effect that has been thought to be the most important reason for vapor pressure lowering in porous media. In a porous medium, when the liquid saturation is very low, there would be a concave water-gas interface, Figure 2.5. This kind of concave liquid surface would lead to vapor pressure lowering in a porous medium.

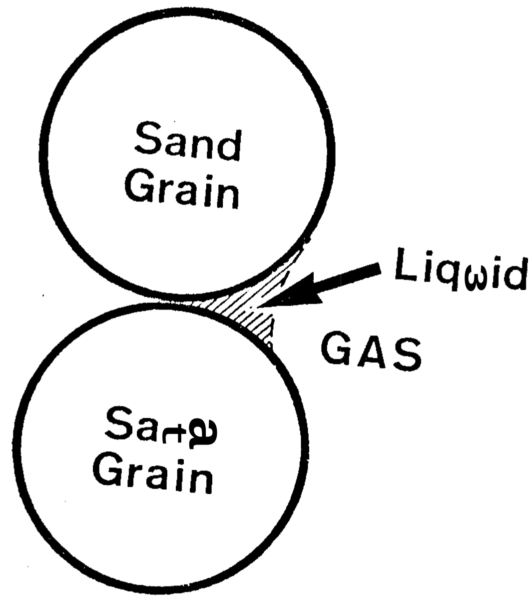


Figure 2.5 An Ideal Model of a Porous Medium Containing Both Gas and Liquid in a Porous Medium

2-4 Limitations of Applying the Kelvin Equation

It is essential to know the limitations of capillary theory to permit proper application of the theory. The following discussion will start from the assumptions involved in deriving the Kelvin equation, and proceed to consideration of the limitations of applying the Kelvin equation.

The Laplace equation assumes that surface tension is a constant. This assumption is only true when the radius of curvature is larger than the thickness of the interfacial region; otherwise, the value of surface tension should be corrected by applying Equation 2.6 or Equation 2.5. It has been verified that the Kelvin equation should be corrected when the mean radius of curvature is less than 40 Å.[14]

In deriving the Kelvin equation, it was assumed that the molar volume of the gas phase should be much larger than the molar volume of the liquid phase, and that the gas phase was an ideal gas. For water in the temperature range between 100°C and 200°C, the density of steam is always less than one percent of the liquid water. However, steam does not behave like an ideal gas between 100°C and 200°C. The gas law compressibility factor, Z, for steam in the temperature range between 100°C and 200°C can change by 15 percent (from 1.0 to 0.85). In this case, the procedures used to derive the Kelvin equation must be modified. Equation 2.23 avoids the ideal gas assumption:

$$d\left(\frac{2\gamma}{r_M}\right) = \frac{V_v}{V_\ell}\, dP_v \qquad (2.23)$$

Applying the real gas law:

$$P_v V_v = ZRT \tag{2.26}$$

Equation 2.23 can be rewritten as:

$$d\left(\frac{2\gamma}{r_M}\right) = \frac{RT}{V_\ell}\frac{Z}{P_v}\, dP_v \tag{2.27}$$

By integrating Equation 2.27, one obtains:

$$\int_{\frac{2\gamma}{r_M}}^{\frac{2\gamma}{w}=0} d\left(\frac{2\gamma}{r_M}\right) = \int_{P}^{P_o} \frac{RT}{V_\ell}\frac{Z}{P_v}\, dP_v \tag{2.28}$$

Substituting Equation 2.6 into the left-hand side yields:

$$\int_{\frac{2\gamma}{r_M+2\delta}}^{0} d\left(\frac{2\gamma_o}{r_M+2\delta}\right) = \frac{RT}{V_\ell}\int_{P}^{P_o} Z\,\frac{dP_v}{P_v} \tag{2.29}$$

$$\frac{2\gamma_o}{r_M+2\delta} = \frac{2\gamma}{r_M} = -\frac{RT}{V_\ell}\int_{P}^{P_o} \frac{Z}{P_v}\, dP_v \tag{2.30}$$

Equation 2.30 can be used to modify the Kelvin equation, Equation 2.25. The integration of the right-hand side of Equation 2.30 can be defined as $I(P,T)$

$$I(P,T) = \int_{P}^{P_o} \frac{Z}{P_v}\, dP_v \tag{2.31}$$

Table 2.2 gives numerical values for $\ln(P_o/P)$ and $I(P,T)$ for steam for comparison.

Table 2.2 The Numerical Value of $I(P,T) = \int_{P}^{P_o} \frac{Z}{P'} dP'$ and $\ln(P_o/P)$ at Temperatures Between 100°C and 200°C

VAPOR PRESSURE(ATM.)		1.000	1.414	1.959	2.665	3.565	4.696	6.097	7.813	9.890	12.3[illegible]9	15.334
TEMPERATURE (°C)		100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0
P/PO	LN PO/P	I(P)	I(P)	I(P)	I(P)	I(P)	I(P)	I(P)	I(P)	I(P)	I(P)	I(P)
0.9500	0.0513	0.0505	0.0503	0.0501	0.0498	0.0495	0.0491	0.0487	0.0483	0.0478	0.0472	0.0466
0.9000	0.1054	0.1038	0.103[illegible]	0.1029	0.1[illegible]24	0.1017	0.1010	0.1[illegible]02	0.0993	0.0953	0.0972	0.0960
0.8500	0.1625	0.1602	0.1596	0.1589	0.1580	0.1571	0.1566	0.1549	0.1535	0.1520	0.1504	0.1485
0.8000	0.2231	0.2200	0.2192	0.2183	0.21[illegible]2	0.2159	0.2145	0.2129	0.2112	0.2092	0.2070	0.2046
0.7500	0.2877	0.2838	0.282[illegible]	0.2816	0.2803	0.2787	0.2769	0.2750	0.2728	0.2703	0.2676	0.2646
0.7000	0.3567	0.3520	0.3508	0.3494	0.34[illegible]	0.3459	0.3438	0.3415	0.3355	0.3359	0.3326	0.3291
0.6500	0.4308	0.4253	0.4239	0.4223	0.4204	0.4183	0.4[illegible]	0.4131	0.4100	0.4060	0.4029	0.3988
0.6000	0.5108	0.5046	0.5030	0.5011	0.4990	0.4963	0.4938	0.4907	0.4872	0.4833	0.4790	0.4744
0.5500	0.5978	0.5908	0.5890	0.5870	0.5840	0.5618	0.5787	0.5752	0.5713	0.5670	0.5622	0.5570
0.5000	0.6931	0.6854	0.6834	0.6[illegible]11	0.67[illegible]4	0.67[illegible]4	0.6719	0.6681	0.6638	0.6[illegible]90	0.6537	0.6480
0.4500	0.7985	0.[illegible]900	0.78[illegible]	0.7853	0.7823	0.7[illegible]90	0.7[illegible]2	0.7710	0.7663	0.7611	0.7553	0.[illegible]491
0.4000	0.9163	0.9070	0.9046	0.9018	0.8987	0.8950	0.8909	0.8864	0.8[illegible]12	0.8[illegible]6	0.8694	0.8626
0.3500	1.0498	1.0398	1.0372	1.0342	1.0308	1.0265	1.0224	1.0173	1.0120	1.0059	0.0992	0.9919
0.3000	1.2040	1.1951	1.1904	1.1872	1.1835	1.1793	1.1[illegible]	1.1692	1.1[illegible]33	1.1[illegible]68	1.1[illegible]97	1.1418
0.2500	1.3863	1.37[illegible]	1.3717	1.3683	1.3644	1.3599	1.3548	1.3492	1.3429	1.3359	1.3283	1.3200
0.2000	1.6094	1.5971	1.5939	1.5903	1.5861	1.5813	1.5759	1.5699	1.5633	1.5559	1.5478	1.5390
0.1500	1.8971	1.8840	1.8807	1.8[illegible]	1.8723	1.8673	1.8616	1.8552	1.8482	1.8404	1.8319	1.8226
0.[illegible]00	2.3026	2.2887	2.2852	2.2811	2.2764	2.2711	2.2651	2.2584	2.2[illegible]06	2.2427	2.2338	2.22[illegible]0
0.0500	2.9957	2.9811	2.97[illegible]	2.9731	2.9681	2.9625	2.9562	2.9[illegible]92	2.9414	2.9325	2.923[illegible]	2.9131

The most important assumption in the Kelvin equation is that the system is large enough to apply thermodynamic principles. Thermodynamic principles can be applied to macroscopic systems. But the criteria for the minimum size necessary for a system to qualify as macroscopic has not been discovered. A droplet of water with a diameter of 20 Å contains about 140 molecules. This is not a very large number. It is not clear that such a small water droplet can be modelled thermodynamically. We turn now to consideration of surface adsorption.

2-5 Surface Adsorption

Surface adsorption is caused by short range interaction forces between molecules of the solid surface and gas molecules. There are two kinds of surface adsorption: one is chemical adsorption, the other is physical adsorption. The distinction between physical and chemical adsorption cannot be difined sharply. Generally speaking, chemical adsorption has a much higher heat of adsorption and happens at lower pressures than physical adsorption, which has a lower heat of adsorption and happens at higher pressures and is more interesting.

2-5-1 The Origin of Surface Adsorption

At the interface of the adsorbate and adsorbent, there are many kinds of short-range interaction forces that bring about surface adsorption. In all of the short-range forces there are some basic components which are genrally thought to be important. Each component will be discussed briefly in the following:

(1) Repulsive forces: There arise from the interaction of the electron

clouds of the atoms.

(2) Dipole-Dipole interaction: If molecules have a permanent dipole moment, then there is interaction energy caused by dipole-dipole interaction when the dipoles are not restricted by chemical bonds. The average interaction energy is:

$$E = \frac{2m_1^2 m_2^2}{3KTr^6} \tag{2.32}$$

where m_1, m_2 are dipole moments of the molecules,

r is the distance between two dipoles,

K is the Boltzman constant.

(3) Coulomb interaction force: The surface of an ionic compound can be modelled as a two-dimensional network of ions. When the distance between gas molecules and the molecules of the surface is small enough, a coulomb interaction force will exist.

(4) Induction force: This occurs when a molecule having a permanent dipole moment interacts with an external electric field. The external field can be produced by the presence of moments of molecules or by the charge distribution in the solid.

(5) Nonpolar dispersion forces: These are the so-called Van der Waals forces. The most important dispersion force is the London dispersion force which arises between mutually-induced, in phase components during the oscillation of electron clouds. In other words, the London dispersion force is the interaction of instantaneous dipole-dipole, dipole-quadrupole, quadrupole-quadrupole, etc, interactions.

(6) Exchange forces: When an atom comes close to the surface of a

solid, there may be an exchange of electrons resulting in a chemical bond. This force is much more complicated and less understood than the previously discussed forces.

All described forces plus the long-range electrostatic force[15] associated with the equalization of electrochemical potential of the free electrons, atomic diffuseness of the interface, strain energy associated with dislocations at the interface, and so on, are important to surface adsorption,

2-5-2 <u>Vapor Pressure Lowering Due to Surface Adsorption</u>

If a container with volume V is filled with n moles of gas at temperature T, the pressure in the container can be calculated by applying the real gas law: $P' = ZRT \cdot n/V$, provided the interaction between the molecules of the solid wall and the molecules of gas can be neglected. However, the exact pressure which includes the interaction between the molecules of the solid wall and the molecules of gas, can be calculated as follows:

$$P = ZRTd_1 = P' - \frac{\tilde{A} \cdot \delta_s}{V} (d_2 - d_1) \cdot ZRT \qquad (2.33)$$

where P is the pressure in the container

P' is the pressure calculated by applying real gas law

$\tilde{A}$ is the total surface area inside the container

δ_s is the range of surface forces

d_1 is the density of gas molecules not affected by surface forces

d_2 is the average density of gas molecules which are affected by surface forces

From Equation 2.33, it may be found that the exact pressure P is smaller than the pressure obtained from the real gas law P', with the difference being $(ZRT \cdot \tilde{A} \ \delta_s(d_2 - d_1)/V)$.

In most cases, $A \cdot \delta_s/V$ is a very small quantity because δ is on the order of a few angstrom and $V/\tilde{A}$ is on the order of a few centimeters or more. Thus, the difference between P and P' is negligible in comparison with P. However, if a porous medium with large surface area and small pore volume is in the container, the difference between P and P', which is $ZRT \cdot \tilde{A} \cdot \delta_s \ (d_2 - d_1)/V$, cannot be neglected, because the porous medium has a large surface area $\tilde{A}$ which makes the term $\tilde{A} \cdot \delta/V$ large. Thus, the vapor pressure in a porous medium is significantly less than the pressure calculated from the real gas law. It appears that surface adsorption is an important factor which causes vapor pressure lowering in a porous medium. A discussion of the fundamental physics of surface adsorption will be introduced in the following sections.

2-6 Physical Modelling of Surface Adsorption

The subject of adsorption may be approached by many different physical modellings. The most successful and popular one is the kinetic theory. The focal point of kinetic theory is the interchange of molecules between the gas phase and the adsorbed film. In this section, kinetic theory will be discussed from assumptions to results. Also, the criticisms of the theory will be considered.

2-6-1 Kinetic Theory of Surface Adsorption

Following a path established by Langmuir in 1916,[16] and Brunauer, Emmett, and Teller in 1938,[17] an equation which describes surface adsorption can be obtained. This equation requires certain assumptions discussed in the following:

(1) The surface of a solid can be considered energetically as a two-dimensional array of identical sites. Each site is capable of adsorbing only one gas molecule and has the same physical properties. In other words, the surface of a solid is homogeneous.

(2) A molecule of the gas phase will be adsorbed and remain on striking an empty adsorption site.

(3) When a gas molecule strikes a spot already occupied, the second gas molecule will be adsorbed and form a second layer. If there are already two layers, then a third layer will be formed, and so on. Figure 2.6 is a schematic diagram of a surface and the adsorbed molecules.

(4) At any adsorption site, there is a maximum of n layers.

(5) The adsorbed gas molecules will stay at the adsorption site for a period of time and then rejoin the gas phase. If more than one layer of gas molecules has been adsorbed, only one layer will evaporate at a tine;

(6) All layers above the first layer have the same physical properties.

By applying all of these assumptions, a derivation can be obtained.

Let the number of gas molecules arriving from the gas phase per unit time to a unit area of free exposed surface be NP, where N is a constant at a particular temperature, a P is the pressure of the gas phase.

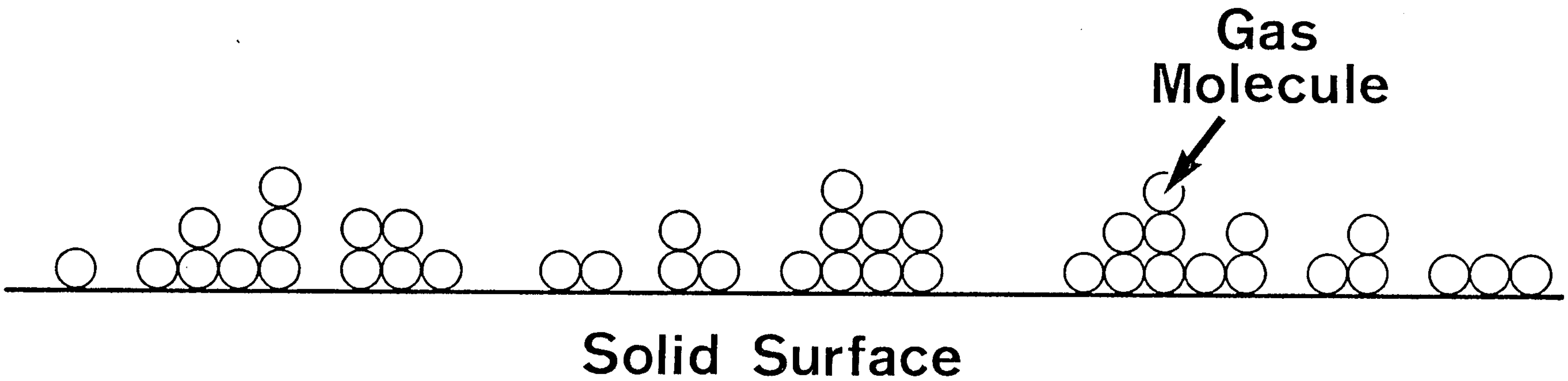


Figure 2.6 Layer-on-Layer Model for Surface Adsorption

Then the rate of condensation to the ith layer is:

$$N_{a_i} = NPa_i\Theta_{i-1} \tag{2.34}$$

where a_i is the coefficient of condensation for the ith layer.

Θ_i is the fraction of surface which is covered by i layers of gas molecules.

i is a positive integer between 1 and n.

The rate of evaporation from the ith layer is:

$$N_{d_i} = X_m \Theta_i b_i \tag{2.35}$$

where X_m is the number of adsorption sites per unit area, b_i is the coefficient of evaporation for the ith layer.

if the system is in equilibrium, the rate of adsorption and the rate of evaporation are the same; that is, $Na_i = Nd_i$. Equations 2.33 and 2.34 can be written as:

$$NPa_i\Theta_{i-1} = X_m\Theta_i b_i \tag{2.36}$$

or

$$\frac{\Theta_i}{\Theta_{i-1}} = \frac{NPa_i}{X_m b_i} \tag{2.37}$$

From the sixth assumption, all layers above the first layer have the same physical properties:

$$b_2 = b_3 = b_4 ---------- = b_n = b \tag{2.38}$$

$$a_2 = a_3 = a_4 ---------- = a_n = a \tag{2.39}$$

Thus, Equation 2.35 can be divided into two parts, one is i = 1, the other is i = 2, 3, 4,-----n. Assuming

$$\alpha = \frac{\Theta_1}{\Theta_o} = \frac{NPa_1}{X_m b_1} \tag{2.40}$$

$$\beta = \frac{\Theta_2}{\Theta_1} = \frac{\Theta_1}{\Theta_2} = \text{-------} = \frac{\Theta_n}{\Theta_{n-1}} = \frac{NPa}{X_m b} = \frac{\alpha}{C} \tag{2.41}$$

where C is a constant for a particular fluid at a particular temperature. Then, from Equations 2.40 and 2.41

$$\Theta_i = \alpha\,\beta^{i-1}\Theta_o = C\beta^i\Theta_o \tag{2.42}$$

The total amount of adsorption, X, can be written as:

$$X = X_m\,(\Theta_1 + 2\Theta_2 + 3\Theta_3 + \text{-----} + n\Theta_n) \tag{2.43}$$

Substituting Equation 2.42 into Equation 2.43 gives:

$$X = X_m C\,(\beta + 2\beta^2 + 3\beta^3 + \text{----} + n\beta^n)\Theta_o = X_m C \sum_{i=1}^{n} i\beta^i \tag{2.44}$$

The Summation term in Equation 2.44 can be calculated:

$$\sum_{i-1}^{n} i\beta^{i} = \frac{d}{d\beta}\left(\sum_{i-2}^{n+1} \beta^{i}\right) - \sum_{i-1}^{n} \beta^{i}$$

$$= \frac{d}{d\beta}\left[\frac{\beta^{2}(1-\beta^{n})}{1-\beta}\right] - \frac{\beta-\beta^{n+1}}{1-\beta}$$

$$= \frac{\beta-(n+1)\beta^{n+1} - n\beta^{n+2}}{(1-\beta)^{2}} \qquad (2.45)$$

Thus, Equation 2.44 can be written as:

$$X = X_m C \Theta_o \frac{\beta - (n+1)\beta^{n+1} - n\beta^{n+2}}{(1-\beta)^{2}} \qquad (2.46)$$

Another fact is that:

$$\Theta_0 + \Theta_1 + \Theta_2 + \text{------} + \Theta_n = 1 \qquad (2.47)$$

Substituting Equation 2.42 into Equation 2.47:

$$0_o\,(1 + C\beta + C\beta^{2} + \text{-----} + C\beta^{n}) = 1 \qquad (2.48)$$

From Equation 2.48:

$$\Theta_o + C\,\Theta_0 \frac{\beta - \beta^{n+l}}{1-\beta} \qquad (2.49)$$

One can obtain:

$$\Theta_o = \frac{1}{1 + C\frac{\beta-\beta^{n+1}}{1-\beta}} = \frac{1-\beta}{1+(C-1)\beta - C\beta^{n+1}} \tag{2.50}$$

By substituting Equation 2.50 into Equation 2.45:

$$\frac{X}{X_m} = \frac{C\beta}{1-\beta}\,\frac{1-(n+1)\beta^n + n\beta^{n+1}}{1+(C-1)\beta - C\beta^{n+1}} \tag{2.51}$$

Equation 2.51 contains four parameters, β, C, X_m, and n. The parameter β has an interesting physical meaning, and will be discussed here.

When the equilibrium vapor pressure P equals the saturation vapor pressure of a flat interface, all the adsorption sites have infinite layers of adsorbed gas molecules; thus, $\beta = 1$. From the definition of β in Equation 2.41, one obtains:

$$\frac{NP_o a}{X_m b} = 1 \tag{2.52}$$

Substituting Equation 2.52 into Equation 2.41;

$$\beta = P/P_o \tag{2.53}$$

Equation 2.53 shows that β is the relative vapor pressure, which can be obtained by experiment.

In an adsorption experiment, X, the quantity adsorbed, and β, the relative pressure, can be obtained. By substituting experimental data into Equation 2.51 and performing a least squares fit, X_m, n, and C may be obtained. As defined earlier, X_m is the number of adsorption sites per unit area. If every site is occupied by one gas molecule, the quantity of gas adsorbed will be equal to the quantity of monolayer adsorption per unit area. More physical properties of the adsorbate can be obtained by comparing the adsorption isotherms at different temperatures and these will be discussed later.

2-6-2 Langmuir Theory of Surface Adsorption

In *1916*, Langmuir[16] first applied kinetic theory to surface adsorption. His assumptions were similar to those mentioned in section *2-6-1;* the only difference was that at each adsorption site, only one gas molecule could be adsorbed. If a site was already occupied, then nothing would happen to the second arriving molecule. Based on Langmuir's assumption, Equation *2.41* does not result. Thus, Equaton *2.51* cannot be applied by simply substituting n = 1. Equations *2.40*, *2.47*, and *2.43* then become:

$$\Theta/\Theta_o - \alpha P = \frac{NPa_1}{X_m b_1} \qquad (2.40')$$

$$\Theta_1 = 1 - \Theta_o \qquad (2.47')$$

$$X = X_m \Theta_1 \qquad (2.43')$$

By substituting Equations *2.40'* and *2.47'* into Equation *2.43'*:

$$\frac{X}{X_m} = \Theta_1 = \frac{\alpha P}{1 + \alpha P} \qquad (2.54)$$

When the quantity adsorbed is much less than the quantity for a monolayer coverage, that is Θ_1 is much less than 1.0, Equation 2.52 can be simplified to:

$$\frac{X}{X_m} = \alpha P \tag{2.55}$$

Neither Equation 2.54 nor Equation 2.55 is very useful because they can only be applied to monolayer adsorption. In most realistic cases, adsorption is not monolayer. Nevertheless, they provided a reasonable way to solve adsorption problems.

2-6-3 "BET" Theory of Surface Adsorption

In 1938, Brunauer, Emmett, and Teller'' (BET) extended Langmuir's idea to multiple layer adsorption. Their assumptions are the same as those mentioned in Section 2-6-1, except that $n = \infty$ in the fourth assumption. If $n = \infty$ is applied to Equation 2.51, then:

$$\frac{X}{X_m} = \frac{C\beta}{(1 - \beta)(1 + C\beta - \beta)} \tag{2.56}$$

Because β, the relative vapor pressure, is always less than 1.0, β^n and β^{n+1} in Equation 2.51 are zero. Equation 2.56 is the famous BET equation for adsorption, and is widely used to analyze experimental results in the range, $0.05 < \beta < 0.35$.

When the relative pressure of the adsorption system is less than 0.35, Equation 2.56 is generally within acceptible limits of error for Equation 2.51, because the adsorption layers are not very thick in this range. Equation 2.56 is used for analyzing experimental data in the range $0.1 < \beta < 0.35$ because of the ease of application.

2-6-4 Mathematical Nature of the BET Equation

Equation 2.56, the BET equation, can be rearranged into a more convenient form:

$$\frac{\beta}{X(1-\beta)} = \frac{1}{CX_m} + \frac{C-1}{CX_m}\beta \tag{2.57}$$

X, the quantity of adsorption, and β, the relative pressure, can be obtained directly by experiment. If $\frac{\beta}{X(1-\beta)}$ is graphed against B, a straight line with slope $(C-1)/CX_m$ and y intercept $1/CX_m$ can be obtained. From the known values of slope and intercept, both C and X_m can be obtained.

Furthermore, Equation 2.56 can be used another way to find the point of inflection:

$$\frac{X}{X_m} = \frac{1}{(1-\beta)} - \frac{1}{1+(C-1)\beta} \tag{2.58}$$

Differentiating Equation 2.58 twice with respect to β gives:

$$\frac{d^2}{d\beta^2}\left(\frac{X}{X_m}\right) = 2c\left\{\frac{(C-1)^2B^3 + 3(C-1)\beta + (2-C)}{(1-\beta)^3\,[1+(C-1)\beta]^3}\right\} \tag{2.59}$$

The point of inflection can be obtained by assuming $\frac{d^2}{d\beta^2}\left(\frac{X}{X_m}\right) = 0.$ thus, the value of B at the inflection point F can be written as:

$$\beta_F = \frac{(C-1)^{2/3} - 1}{(C-1) + (C-1)^{2/3}} \tag{2.60}$$

,

and $$\left(\frac{X}{X_m}\right)_F = \frac{1}{C} \left[(C-1)^{1/3} + 1 \right] \left[(C-1)^{2/3} - 1 \right] \qquad (2.61)$$

Figure 2.7 represents the relation between β_F and $\left(\frac{X}{X_m}\right)_F$. From the figure and Equations 2.60 and 2.61, when the value of C is less than 2, β_F is always negative, and no inflection point exists in the adsorption isotherm. When the value of C is more than 6, the value of X/X_m at the inflection point will be between 0.85 and 1.15; that is, the point of inflection will almost coincide with the quantity of monolayer adsorption.

2-6-5 Criticisms of the BET Theory

The assumptions for BET theory have been mentioned in Section 2-6-1. Those assumptions are highly idealized and deserve further discussion.

In assumption (1), the solid surface is assumed to be energetically uniform; that is, all adsorption sites are identical energetically. But most solid surfaces are heterogeneous. This was suggested by Brunauer, Emmett, and Teller[17] as the reason for the failure of the BET equation, Equation 2.56, to fit experimental data at very low vapor pressures.

Assumptions (5) and (6) have been heavily criticized for neglecting the horizontal interaction between molecules of the adsorbed layer. This is probably one of the reasons that the BET equation cannot be applied when the relative pressure is more than 0.35.

Assumption (6) has also been questioned as to whether molecules in all layers above the first are identical. It is possible that the adsorption potential diminishes gradually as the distance from the surface increases. Some stepwise adsorption isotherms do show an adsorption

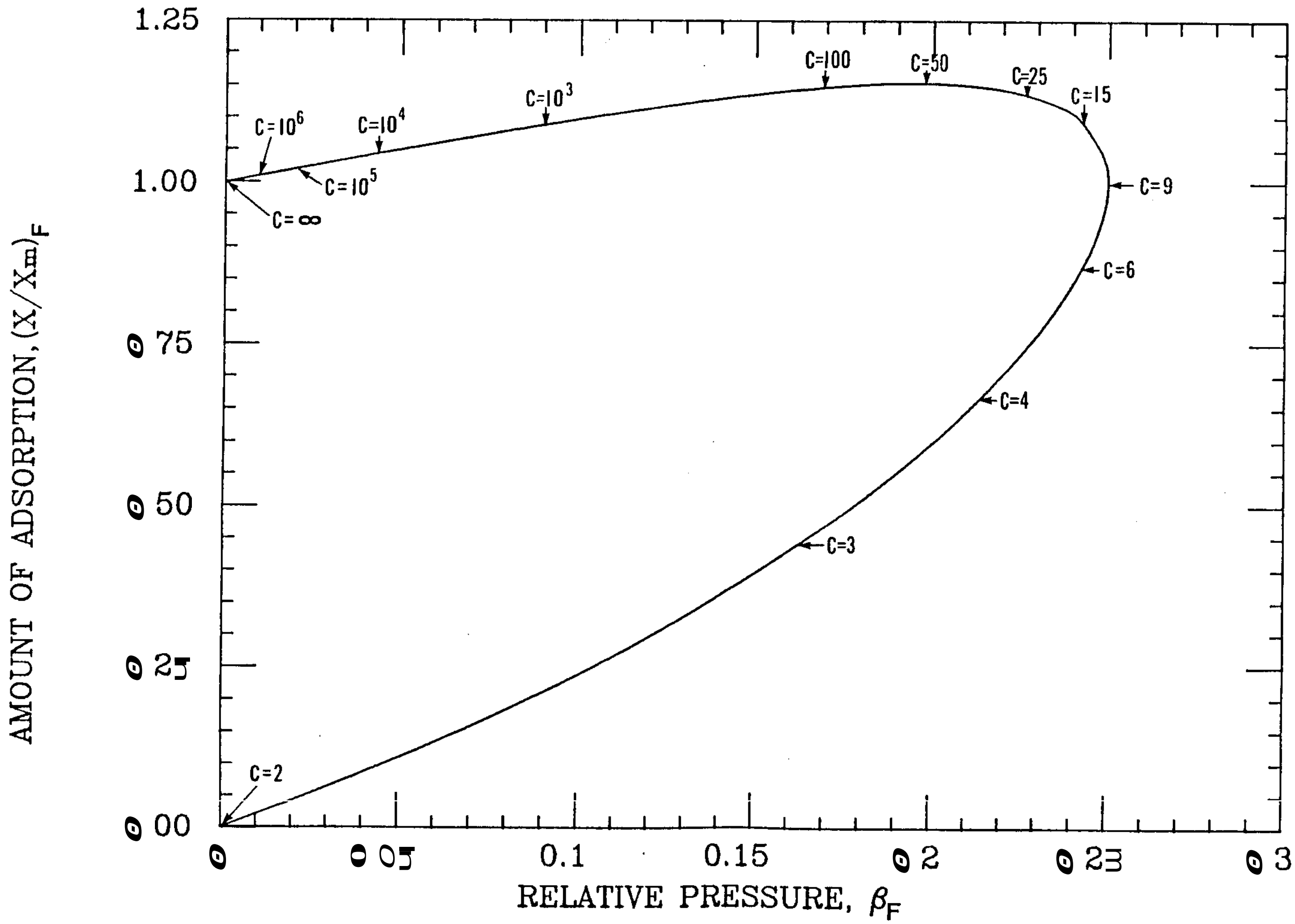


Figure 2.7 The Relation Between the Amount of Adsorption and Relative Pressure at Inflection Point

potential change above this first layer of adsorption.

Even though the BET theory has been heavily criticized, it does match many experimental results very well and thus has been accepted and widely used. The details of adsorption in a porous medium will be discussed in Sections 2-7 and 2-8.

2-7 Surface Adsorption in Porous Media

Adsorption on a nonporous, nonswelling adsorbent and in a porous medium are two different cases of physical adsorption. The work of Brunauer, Emmett, and Teller[17] concerns adsorption on a nonporous, nonswelling adsorbent. Adsorption in a porous media, however, is beyond the framework of their investigations. A discussion of adsorption in porous media will be presented in the following sections.

2-7-1 The Classification of Porous Media

In order to distinguish pores with different sizes which have different physical adsorption properties, in 1972, IUPAC (International Union of Pure and Applied Chemistry)[18] classified pores into three catagories. Pores in which capillary condensation is insignificant were classified as "macropores." In general, "macropores" have a radius more than 5002. Pores with a radius less than 202 were classified as "micropores." In "micropores," capillary condensation does not occur. Pores that do not belong to these two catagoreis were classified as "mesopores." Capillary condensation is important in the "mesopores."

In fact, the above classification is not absolute because pores can have irregular shapes, and the classification also depends on the physical properties of both the adsorbate and adsorbent. The adsorption phenomena in different kinds of pores will be discussed in the following sections.

2-7-2 Physical Adsorption of Gases in Macropores

The surface adsorption (physical adsorption) phenomena in macropores is similar to that on nonporous surfaces because the pore size is large enough to be treated as infinite pore radius,, The curvature of the surface practically does not affect the adsorption process in the absence of capillary condensation. The adsorption phenomena can be described by the kinetic theory discussed in Section 2-6. The most important parameter describing physical adsoprtion in macropores is the adsorbent surface area.

2-7-3 Physical Adsorption of Gases in Micropores

Micropores are those pores with very small pore radius. For adsorption in micropores (or microporous adsorbents), the surface area of the adsorbent is not vital. The notion of a geometrical surface is only a macroscopic concept; and if the micropores were characterized as voids in a solid which have dimensions commensurate with the size of the adsorbate molecules, the concept of "surface area" can no longer be used for determining adsorption equilibrium.

The pictorial models used to explain adsorption in micropores and macropores are different. In the model for macropores, the layer-by-layer coverage of the adsorbent surface as described in Section 2-6 is pertinent. In the model for micropores, the concept of "volume filling" of micropores, is used since the size of the micropores is so small that the adsorbate cannot be regarded as a separate phase.

The adsorbate in micropores in the adsorption force field is similar to a liquid in a strongly compressed state with a hydrostatic pressure on the order of a few hundred atmospheres. For temperatures much lower than the critical temperature, the compressibility of liquid is negligible. When the temperature approaches the critical temperature, however, the density of the liquid phase drops and the compressibility increases sharply. The density of bulk liquid and the adsorbed liquid can be very different.

It was found from experiments that the characteristic curve of the potential function $A = RT \ln(P_o/P)$ versus the quantity adsorbed is temperature invariant, if the adsorption is due to micropores.[19, 20]

2-7-4 Physical Adsorption of Gases in Mesopores

As previously mentioned, capillary condensation is an important phenomenon in mesopore adsorption only. One of the most significant results of capillary condensation is hysteresis. Hysteresis has been found in many adsorption isotherms. There are many factors which can cause hysteresis, but capillary condensation does provide a simple explanation.

Hysteresis has been thought to be due to irregularly shaped pores. Figure 2.8 presents the "ink bottle" hypothesis that Kraemer[21] and McBain[22] proposed to explain hysteresis phenomenona. However, as Everett[23] pointed out, the analogy of a pore as a narrow necked bottle is rather idealized. Pores are more likely to be a series of interconnected pore spaces rather than a discrete bottle. A "bottle" would be a dead-end pore. Figure 2.9 shows the adsorption-disorption cycle of a porous

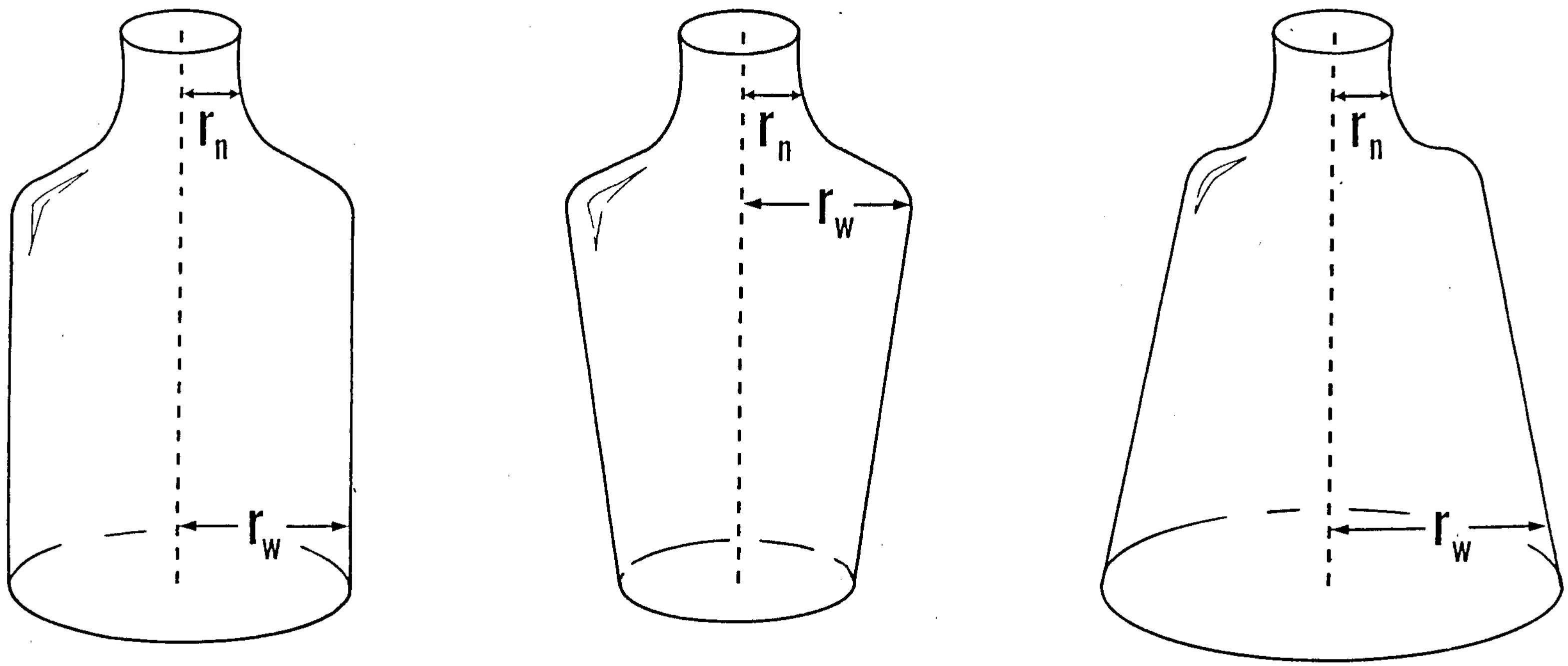


Figure 2.8 The Ink Bottle Hypothesis for Hysteresis

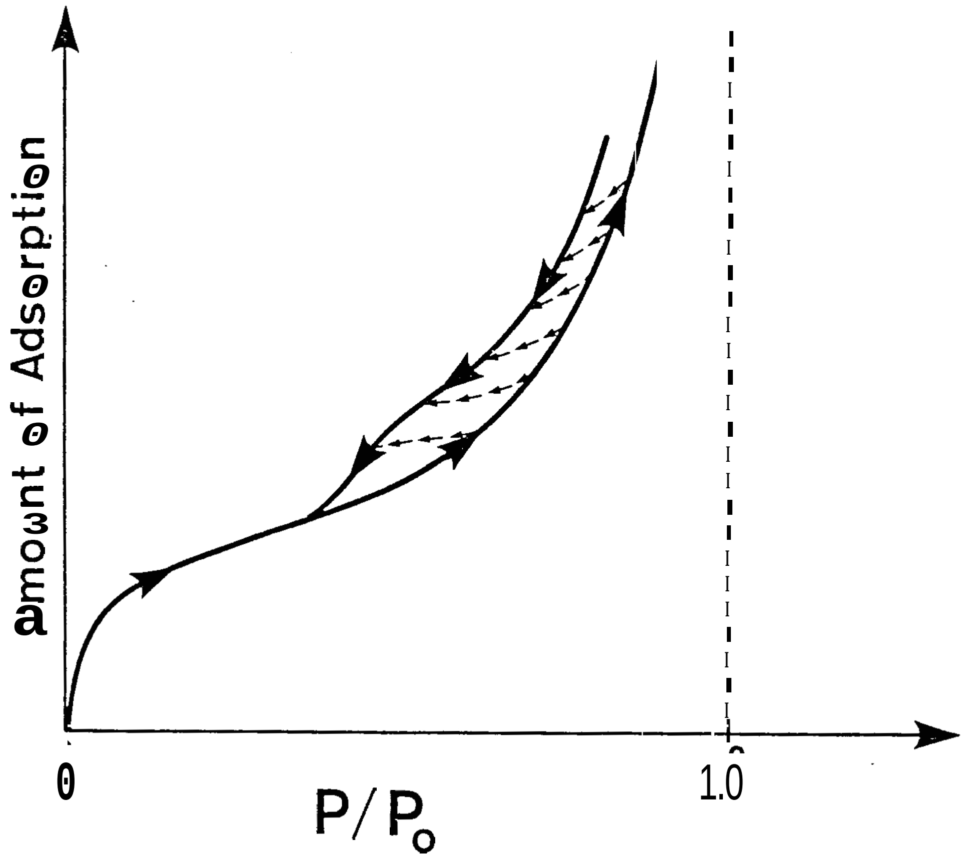


Figure 2.9 A Typical Adsorption-Desorption Isctherm of a Porous Medium

medium with mesopores.

Blake and Haynes[24] discussed hysteresis extensively, proposing that surface roughness, surface heterogenity and nonequilibrium distribution within the adsorbed film should be considered. Due to all these factors, the concept of a three-phase model for explaining contact angle (Figure 2.10) is only valid for a macroscopic and ideal. case. In reality, it should be more precise to speak of a three-phase zone. The variation in surface features might make calculations very difficult and reproducibility unlikely. It is hoped that these differences between macroscopic and actual pores are not too extreme.

2-8 Thermodynamics of Adsorption

Thermodynamics and statistical thermodynamics are used to treat adsorption phenomena. As a simplifying assumption:, the adsorbent can be considered as inert; that is, the adsorbate and adsorbent can be treated as a one component system. In other words:, the thermodynamic properties of the adsorbent are seen as unaffected by the presence of adsorbed molecules, and the physical properties of the adsorbent are seen as unaffected by temperature and pressure. This assumption might not be completely true. However, it would not be contrary to the facts in many cases.

The easiest way to handle thermodynamics is to use molar quantities, like molar entropy, molar volume, molar enthalpy, and so on, and all other properties are then related to these molar quantities. In the following discussion, all thermodynamic quantities are molar quantities. The molar entropy, molar volume, and molar enthalpy of the ad-

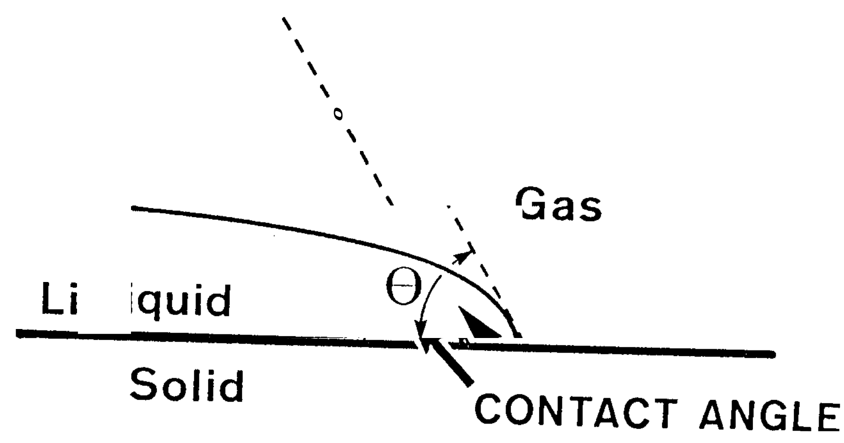


Figure 2 10 The Three Phase Model of Contact Angle sorbed molecules can be defined as:

$$\overline{S}_{ad} = \left[\frac{\partial (N_{ad} S_{ad})}{\partial N_{ad}}\right]_{T,P} \tag{2.62}$$

$$\overline{V}_{ad} = \left[\frac{\partial (N_{ad} V_{ad})}{\partial N_{ad}}\right]_{T,P} \tag{2.63}$$

$$\overline{H}_{ad} = \left[\frac{\partial (N_{ad} H_{ad})}{\partial N_{ad}}\right]_{T,P} \tag{2.64}$$

where S_{ad}, V_{ad}, and H_{ad} are the molar entropy, molar volume, and molar enthalpy of the adsorbed molecules, respectively.

S_{ad}, V_{ad}, and H_{ad} are the average molar entropy, molar volume, and molar enthalpy of the adsorbed molecules, respectively.

N_{ad} is the quantity of adsorbed gas molecules.

2-8-1 Equilibrium Pressure and Temperature

When temperature and vapor pressure are in equilibrium, the chemical potential of adsorbed gas and unadsorbed gas have the same value, thus:

$$\mu_g = \mu_{ad} \tag{2.65}$$

where μ_g and μ_{ad} are chemical potentials for unadsorbed and adsorbed gas, respectively.

From the definition of Gibb's free energy:

$$d\mu_g = -S_g\, dT + V_g\, dP \tag{2.66}$$

$$d\mu_{ad} = -S_{ad}\, dT - \overline{V}_{ad}\, dP + \frac{\partial \mu ad}{\partial N_{ad}}\, d\, N_{ad} \tag{2.67}$$

When a system, which is composed of adsorbed and unadsorbed gas and is at equilibrium, is displaced reversibly to a new temperature, if the system is still at equilibrium, one would have:

$$d\mu_g = d\mu_{ad} \tag{2.68}$$

or $$-S_g\, dT + V_g\, dP = -\overline{S}_{ad} dT + \overline{V}_{ad} dP + \frac{\partial \mu ad}{\partial N_{ad}}\, dN_{ad} \tag{2.69}$$

If the quantity of adsorbed molecules is not changed, that is $dN_{ad} = 0$, then the result would be:

$$-S_g\, dT + V_g\, DP = -\overline{S}_{ad} dT + \overline{V}_{ad} dP \tag{2.70}$$

or $$\left(\frac{\partial P}{\partial T}\right)_{N_{ad}} = \frac{S_g - \overline{S}_{ad}}{V_g - \overline{V}_{ad}} = \frac{H_g - \overline{H}_{ad}}{T(V_g - \overline{V}_{ad})} = \frac{q_{st}}{T(V_g - \overline{V}_{ad}} \tag{2.71}$$

where q_{st} is the isosteric heat of adsorption, which is defined as $Hg - \overline{H}_{ad}$.

Since $\overline{V}_{ad}$, the molar volume of adsorbed molecules, is similar to the molar volume of liquid phase, in most cases. $V_{ad} << V_g$. Thus, Equation 2.71 becomes:

$$\left(\frac{\partial P}{\partial T}\right)_{N_{ad}} = \frac{q_{st}}{V_g T} = \frac{q_{st} P}{ZRT^2} \tag{2.72}$$

Since Z is a function of P and T, Equation 2.72 can only be solved by numerical methods. Let $Z = Z(T_1, P_1) + Z(T_2, P_2) /2$, where (T_1, P_1) are the initial temperature and pressure, and (T_2, P_2) are the final temperature and pressure. Equation 2.72 can be written as:

$$\left(\frac{\partial P}{\partial T}\right)_{N_{ad}} = \frac{q_{st}}{ZR} \left(\frac{P}{T^2}\right) \tag{2.73}$$

Here, Z can be considered as a constant since its values increase with temperature increase and decrease with pressure increase and normally $P_1 > P_2$ when $T_1 > T_2$. Separating variables and integrating Equation 2.73 from state 1 to state 2 gives:

$$\ln \left(\frac{P_2}{P_1}\right)_{N_{ad}} = \frac{q_{st}}{ZR} \left(\frac{1}{T_1} - \frac{1}{T_2}\right) \tag{2.74}$$

Equation 2.74 provides the relationship between temperature and equilibrium pressure when the quantity of adsorption is not changed. If a series of adsorption isotherms at different temperatures were obtained from experiment from a plot of ln P versus 1/T, the slope of the line would provide the isoteric heat of adsorption. Adsorption isotherms at those temperatures not obtained from experiment could be obtained by interpolating Equation 2.74.

2-8-2 Heat of Adsorption

The heat of adsorption is different from the isoteric heat, q_{st}, which was shown in Section 2-9-1. The definition of the heat of adsorption is:

$$q_{ad} = \left(\frac{\Delta q}{\Delta N_{ad}}\right)_{\Delta N_{ad} \to 0} \tag{2.75}$$

Sometimes the heat of adsorption is called the differential heat of adsorption.

There are two kinds of heat of adsorption: one is the isothermal heat of adsorption, the other is the adiabatic heat of adsorption. The isothermal heat of adsorption can be written as:

$$\begin{aligned}(q_{ad})_T &= V_g \left(\frac{\partial P}{\partial N_{ad}}\right)_T + RT + E_g - \bar{E}_{ad} \\ &= q_{st} + V_g \left(\frac{\partial P}{\partial N_{ad}}\right)_T\end{aligned} \tag{2.76}$$

where E_{ad} is the average molar interval energy for the adsorbed gas molecules.

The adiabatic heat of adsorption can be written as:

$$\begin{aligned}(q_{ad})_S &= V_g \left(\frac{\partial P}{\partial N_{ad}}\right)_S + RT + E_g - \bar{E}_{ad} \\ &= q_{st} + V_g \left(\frac{\partial P}{\partial N_{ad}}\right)_S\end{aligned} \tag{2.77}$$

Equations 2.76 and 2.77 are differential forms of the heat of adsorption. Integral forms of the heat of adsorption can be obtained by integrating both sides of Equation 2.76 and 2.77 with respect to the quantity of adsorption.

2-8-3 Entropy of Adsorption Phase

The molar entropy of the adsorbed gas can be calculated from the entropy of a known reference. The most convenient reference is the entropy of the unadsorbed gas with vapor pressure equal to the saturated vapor over a flat interface at the same temperature.

At a particular temperature T, if the molar entropy of the saturated vapor over flat interface is S_g, then the molar entropy of the adsorbed gas at equilibrium pressure P can be obtained by adding other terms to S_g.

$$\bar{S}_{ad} - S_g - \frac{}{N_{ad}} \int_0^{N_{ad}} \frac{(q_{ad})_T}{T} dn' + \frac{R}{N_{ad}} \int_0^{N_{ad}} \int_P^{Po} \frac{ZdP'}{P'} dn' \qquad (2.78)$$

Equation 2.78 can also be written as:

$$\frac{}{T} \; ' \; N \int \int \frac{ZdP'}{} \qquad (2.79)$$

The state of the adsorption phase can be described by the combination of entropy and enthalpy of the adsorbed molecules.

The preceeding discussion is a brief review of both capillary and adsorption theory in porous media. The object of this study will be discussed in the next section.

3. STATEMENT OF PROBLEM

In 1949 Calhoun, et. al.,[25] presented results concerning the capillary pressure of water in porous media at 97°F (36.1°C). Data were analyzed by using the Kelvin equation, Equation 2.25.

At 87°F, the saturation vapor pressure of water at a flat interface is 44.81 mmHg (0.8667 psia). Thus, the assumptions for the Kelvin equation which are that the gas phase can be viewed as an ideal gas and that the molar volume of the gas phase is large in comparison with the molar volume of the adsorbed phase, are well satisfied. Therefore, the Kelvin equation is applicable in their analysis. However, from the following discussion on the minimum value of the relative pressure, P/P_o, one can see that the vapor pressure lowering phenomena which were observed by Calhoun and his coworker must result from something other than capillarity, and likely result from surface adsorption.

Assuming that a water molecule is a sphere with a mean radius of 2Å, a water molecule cannot enter capillary tubes with a radius less than 28. Thus, 2Å can be considered as the lower limit of the radius of capillary tubes in which capillary condensation is possible. In fact, the lower limit for capillary condensation should 'be several times larger than 2Å. By applyong 2Å as the lower limit of capillary condensation in the Kelvin equation, one can calculate t'he minimum possible value of the relative pressure due to capillary condensation as follows:

At 97°F, the molar volume of liquid water is 18.1138 $\frac{cm^3}{mole}$, the surface tension for a flat interface is about 70 dynes/cm. Thus, the surface tension of a droplet at 97°F with a 2Å radius can be obtained by applying Equation 2.6, which is

$$\frac{\gamma}{\gamma_o} = \frac{1}{1 + \frac{2\delta}{r_M}} \tag{2.6}$$

Furthermore, the value δ for water, estimated by Tolman,[19] is about 1.03Å. Substituting all the known data into the Kelvin equation, Equation 2.25 yields:

$$\ln \frac{P_o}{P} = \frac{2 \times 18.1138 \times \frac{70}{1+\frac{2.06}{2}}}{8.31 \times 10^7 \times 309.1} \times \frac{1}{2 \times 10^{-8}} \tag{3.1}$$

or

$$P/P_o = 0.08474$$

Thus, the relative pressure obtained in Equation 3.1 can be considered as the theoretical lower limit for vapor pressure lowering due to capillarity, Columns 2 and 3 of Table 3.1 show the experimental values of P/P_o and water saturation obtained by Calhoun, et al. Because the P/P_o values are generally less than 0.08474, it appears that they measured something other than capillary condensation.

Further analysis of the data presented by Calhoun, et al., were made. Columns 3 and 4 of Table 3.1 and Figure 3.1 show the results obtained from their data by applying BET analysis. It was found that cores with different properties have similar adsorption characteristics. This is a more solid proof that the vapor pressure lowering which Calhoun, et al., observed was caused by surface adsorption rather than capillarity.[26]

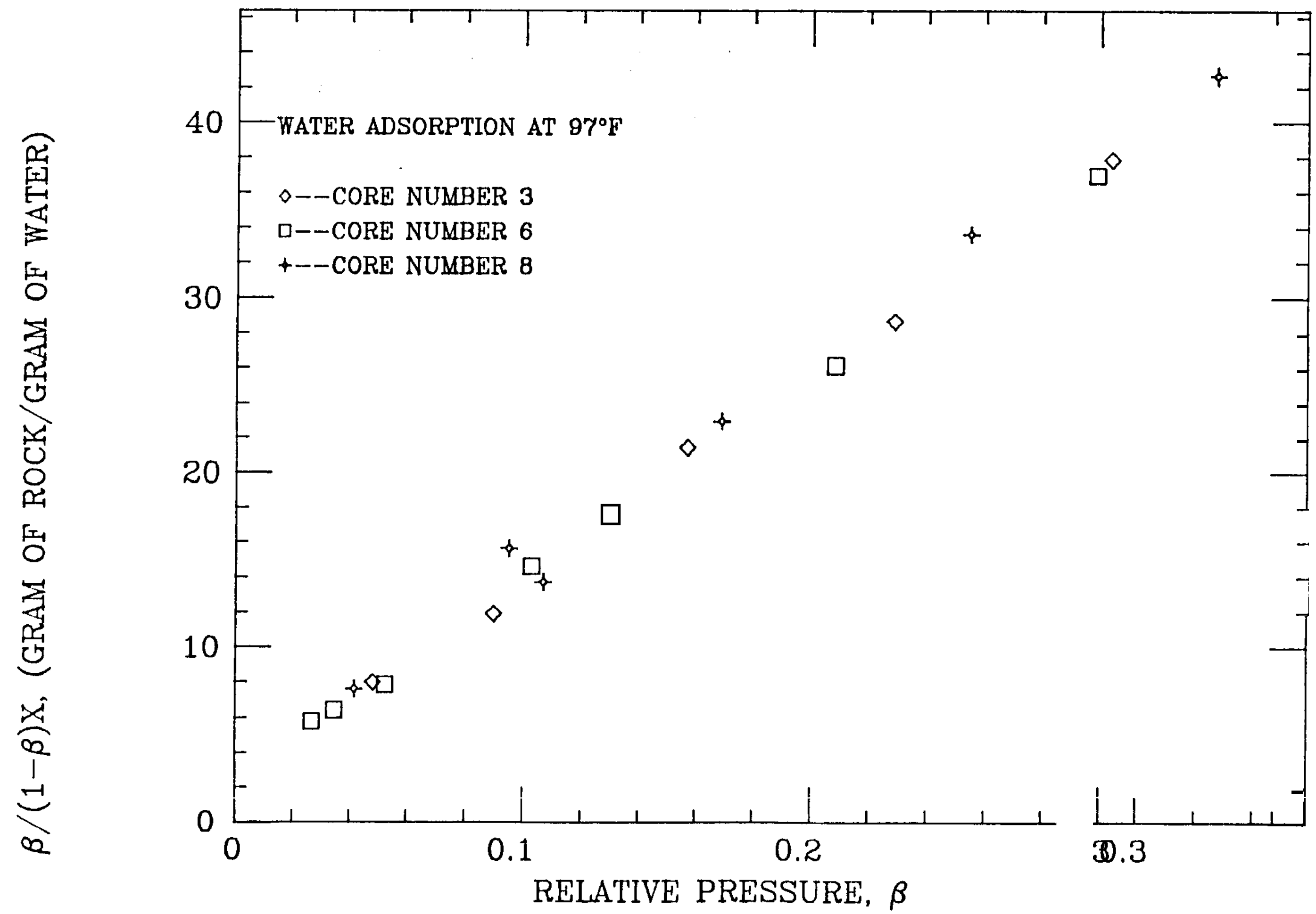


Figure 3.1 BET Analysis of Experimental Data Presented by Calhoun, et. al., in 1949

Table 3.1 BET Analysis of the Experimental Results of Calhoun, et al

Core Number	Relative Pressure β	Water Saturation (S_w)	$\frac{\beta}{(1-\beta)\ S_w}$	$\frac{\beta}{(1-\beta)\ X}$
3	0.304	0.0744	5.872	37.9
3	0.229	0.0668	4.446	28.71
3	0.157	0.0560	3.326	21.47
3	0.090	0.0533	1.856	11.98
3	0.048	0.0407	1.239	8.00
6	0.299	0.079	5.400	36.98
6	0.2085	0.069	3.818	26.15
6	0.13	0.058	2.576	17.64
6	0.013	0.0536	2.142	14.67
6	0.0522	0.0479	1.150	7.875
6	0.0346	0.0382	0.9383	6.425
6	0.0268	0.0325	0.8473	5.803
8	0.34	0.0676	7.621	42.72
8	0.255	0.057	6.004	33.66
8	0.169	0.0496	4.100	22.98
8	0.107	0.0487	2.460	13.79
8	0.095	0.0375	2.799	15.69
8	0.0415	0.0319	1.357	7.608

The problem of vapor pressure lowering has been investigated since 1966 in the Stanford University Petroleum Engineering Department. Cady (1969)[27] and Bilhartz (1971)[28] reached the conclusion that vapor pressure lowering was not significant in unconsolidated silicate sands. Both Strobel (1973)[29] and Chicoine (1975)[30] observed vapor pressure lowering in consolidated sandstones. However, their experiments were complicated, difficult to reproduce, and hard to verify whether capillarity or surface adsorption was the dominant factor. Therefore, improvements in experimental techniques and instruments were made to increase the accuracy and reliability of the experimental results. The purpose of the experimental work was to identify the causes of vapor pressure lowering in porous media by obtaining adsorption isotherms. These are the result of graphing the quantity of fluid adsorbed versus equilibrium vapor pressure at a fixed temperature. The details of the instrumentation and experimental procedures will be discussed in the following sections.

4. APPARATUS AND PROCEDURES

Two sets of apparatus were constructed. Both were designed to measure the adsorption isotherms of fluids. One, however, was for fluids with boiling temperature lower than room temperature (Figure 4.1), the other was for fluids with boiling temperature greater than room temperature (Figure 4.2). A few special instruments were fabricated for the circumstances of this experiment.

4-1 Apparatus

The general features of the apparatus and main components are discussed in the following sections.

4-1-1 General Descriptions

Figures 4.1 and 4.2 are simple schematic diagrams of the experimental apparatus. In principal, these two sets of equipment are the same. The only difference is that one is left in the room (Figure 4.1), while the other is put in an air bath (Figure 4.2).

In Figure 4.1 (or 4.2), the core holder contains the rock sample, and the sampling bottle is for the purpose of measuring the quantity of fluid flowing into or out of the core holder. The vacuum pump has two stages. The first stage is a mechanical pump!, the second stage is a mercury diffusion pump.

The sampling bottle is a bottle made of stainless steel with a known volume. If the temperature and pressure of the bottle is known, then the quantity of gas in the bottle can be computed. From the measure-

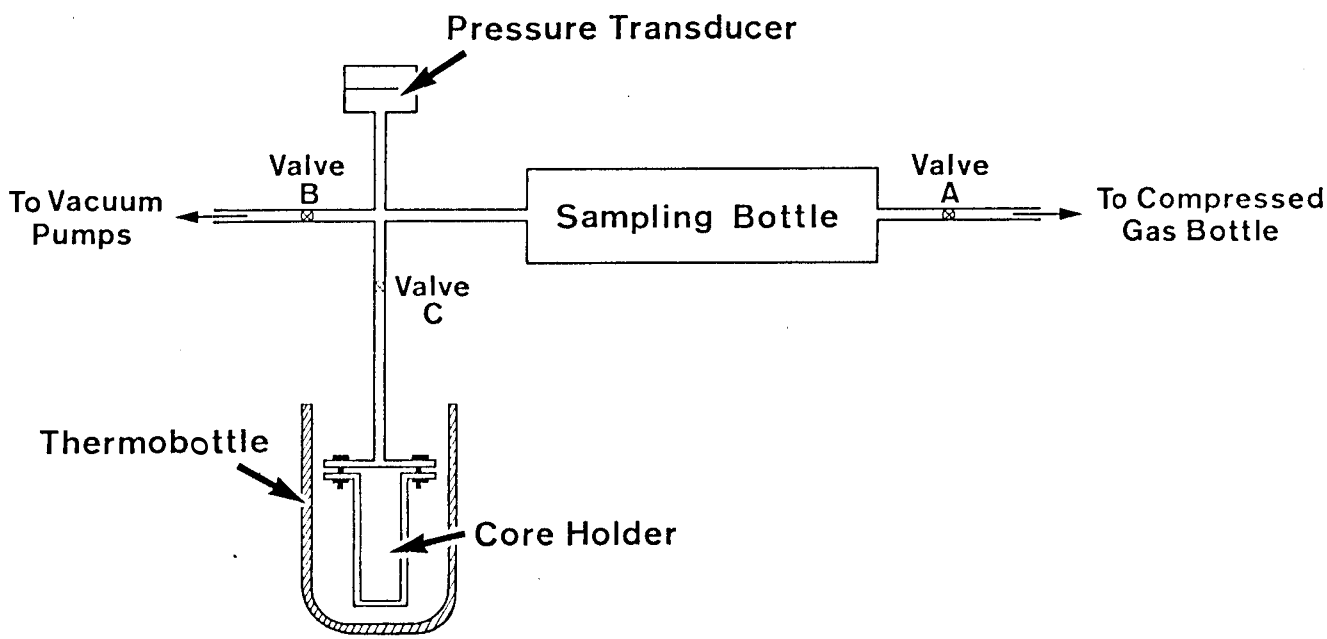


Figure 4.1 Schematic Diagram of Experimental Apparatus for Adsorption Experiment (Adsorbate has Boiling Temperature Lower Than Room Temperature)

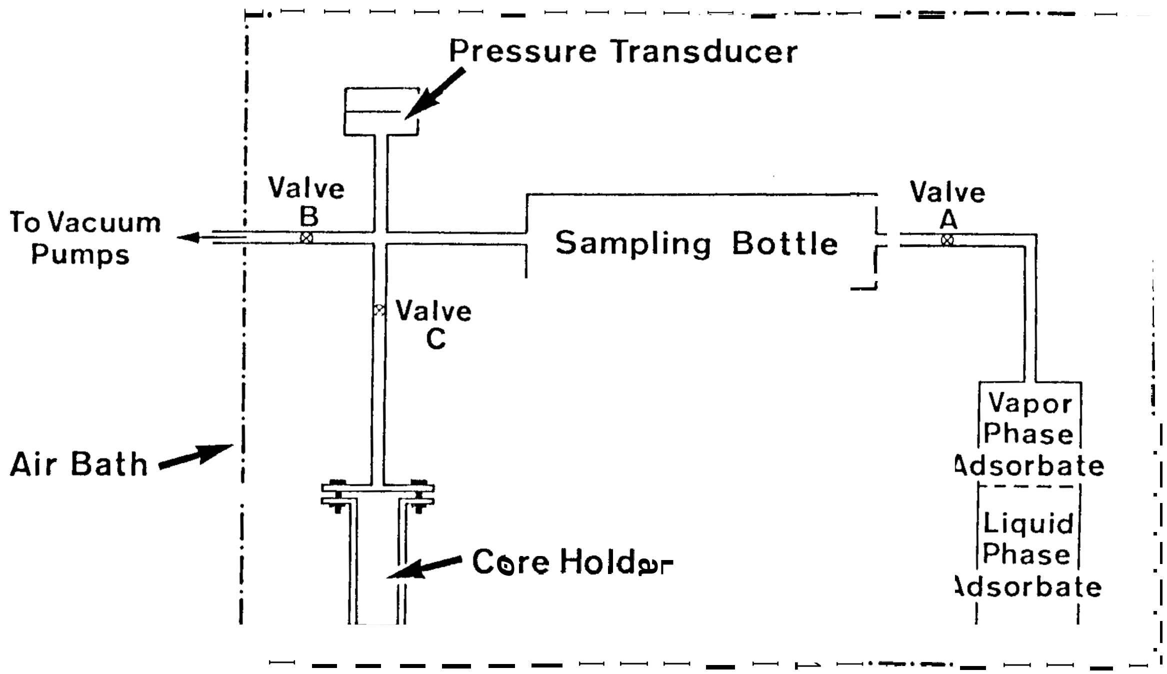


Figure 4.2 Schematic Diagram of Experimental Apparatus for Adsorption Experiment (Adsorbate has Boiling Temperature Higher Than Room Temperature)

ment of the initial temperature, initial pressure, final temperature, and final pressure, the quantity of gas flowing into or out of the core holder can be obtained.

The core holder is shown in Figure 4.3. It: is an empty bottle with a flange and a cap. The inner dimension fits the cores. A flat sheet copper gasket was used to seal the flange instead of a plastic O-ring, because an O-ring could not seal well through the whole experimental temperature range, $-195^{o}C$ to $200^{o}C$, for the long periods of time needed for this experiment.

A capacitance probe for measuring the quantity of water adsorbed on the rock samples was designed and tested. The thermometer, pressure transducers, and the capacitance probe will be discussed in the following sections.

4-1-2 Thermometer

The temperature of the air bath is a critical factor in the experiment because when the temperature is near $200^{o}C$, each centigrade degree of temperature change can change the saturation vapor pressure o water with a flat interface up to 2.5 percent.

Thermocouples may have an error on the order of $2^{o}C$. A calibrated thermocouple has better accuracy, but it should be calibrated at least once a week to keep its accuracy. Thus, platinum resistance thermometers were used in the experiment for accuracy in temperature measurement.

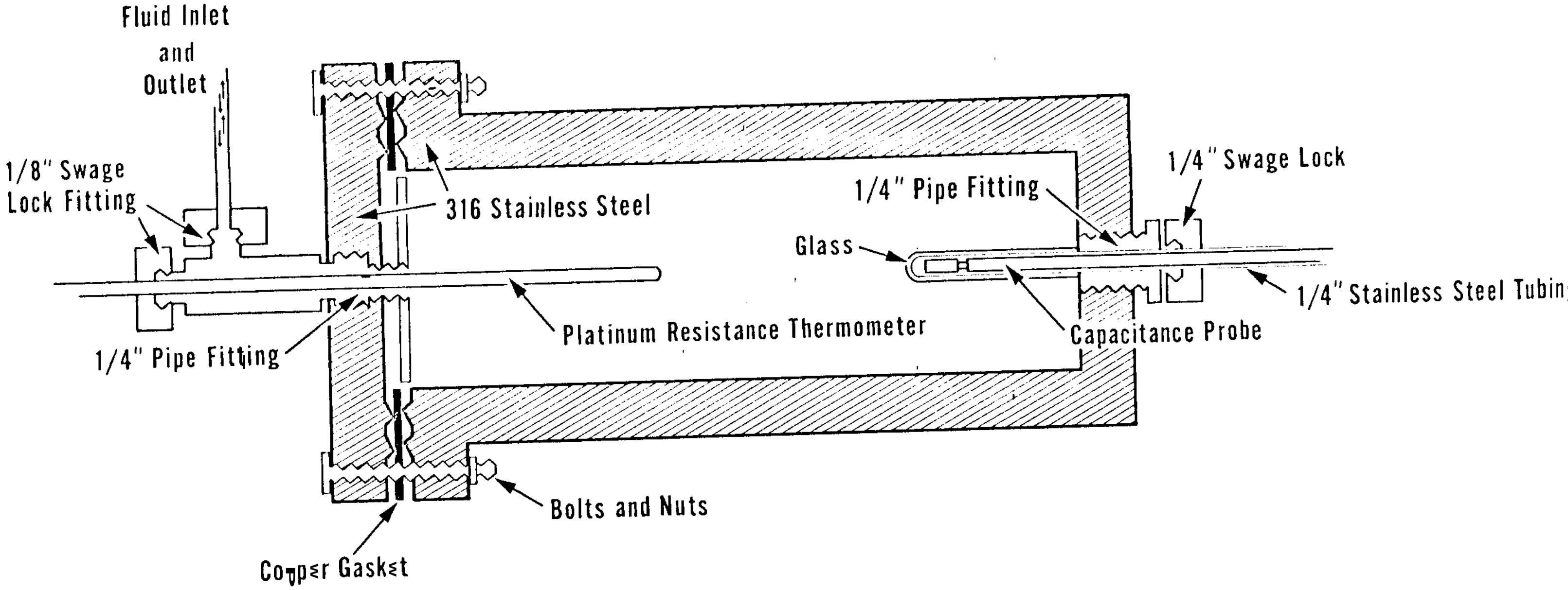


Figure 4.3 Coreholder

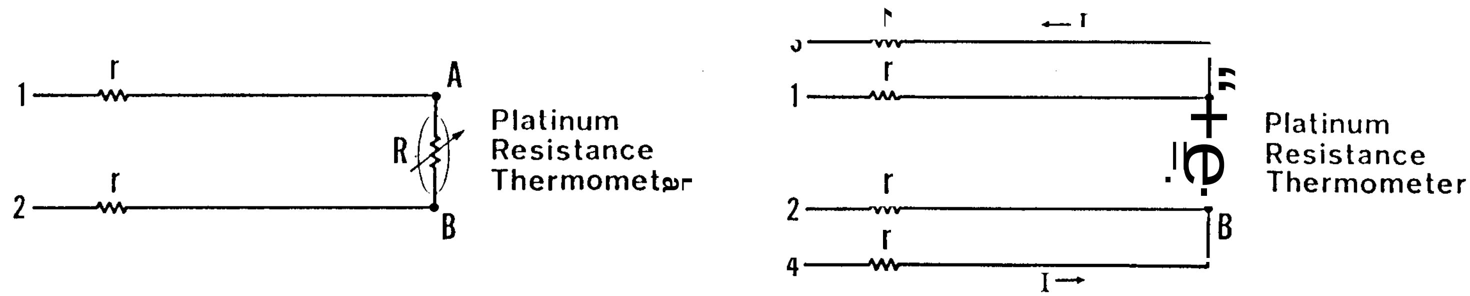
The principle of the platinum resistance thermometer is that the resistivity of platinum changes with temperature. Actually, most materials have a similar property, but platinum has been chosen as a temperature standard. The advantage of the platinum resistance thermometer is that the resistance is a function of temperature only and no cold junction or other compensation device is needed.

A four terminal measurement technique was used to measure the resistance in the experiment. This is probably the most accurate method of resistance measurement. Figure 4.4(a) shows the two-terminal measurement. If an ohmmeter is connected to Terminals 1 and 2, the result of the measurement will be $R + 2r$, where R and r are resistances from the thermometer and wires respectively. Even if r is much smaller than R, it is impossible to exclude r and obtain an accurate value for the resistance R. If two other Terminals, 3 and 4, are added, as in Figure 4.4(b), and a known current I flows between Terminals 3 and 4, and the voltage between A and B, V_{AB}, is measured through Terminals 1 and 2, then R can be obtained with accuracy by dividing V_{AB} by I.

In this experiment, the current I was supplied by a constant current power supply and monitored by a digital multimeter. Voltage V_{AB} was measured by a digital voltmeter. The current I was 100μA. The total power dissipated is on the order of 1μw. Thus, the temperature reading changes due to self heating were on the order of 10^{-4}°C.

4-1-3 Pressure Transducers

A reluctance type plate pressure transducer was used for the apparatus at room temperature (Figure 4.1). If the vapor pressure of



(a) Two-Terminal Method

(b) Four Terminal Method

Figure 4.4 Resistance Measurement (a) Two-Terminal Method
(b) Four-Terminal Method

the adsorbate is more than 300 psi at the experiment temperature, a tube type Heise Gauge was used. For the apparatus in the air bath (Figure 4.2), the pressure transducer was positioned in the air bath, because the quantity of water adsorbed on the rock surface was very small and the water condensed in the transducer cavity and tube connecting the experimental system and pressure transducer was not negligible. The maximum quantity adsorbed on the rock was estimated on the order of 1.0 gm.

A commercial pressure transducer, which was claimed to be able to withstand temperatures as high as 600°F was tested, but did not work properly. It was necessary to place the transducer outside the air bath and use a hydraulic fluid to transmit pressure signals from a diaphragm detector inside the air bath. Figure 4.5 is a schematic diagram of this arrangement. The pressure signal was transmitted through a stainless steel diaphragm with a thickness of 0.003 inches soldered at the center of a stainless steel cylinder. One side of the diaphragm was connected to the experimental system in the air bath; the other side was connected to a reluctance type plate pressure transducer outside of the air bath. The tube which connected the diaphragm to the transducer was filled with Dow Corning 705 Diffusion Pump Fluid, which served as the hydraulic fluid. The reservoir R in Figure 4.5 was also filled with the hydraulic fluid. The hydraulic fluid should have two important properties:

(1) The ability to withstand long periods of heating without degradation.

(2) The boiling point should be higher than the maximum experimental temperature.

The first requirement guarantees long-term stability of the pressure transmission; the second requirement prevents the formation of bubbles

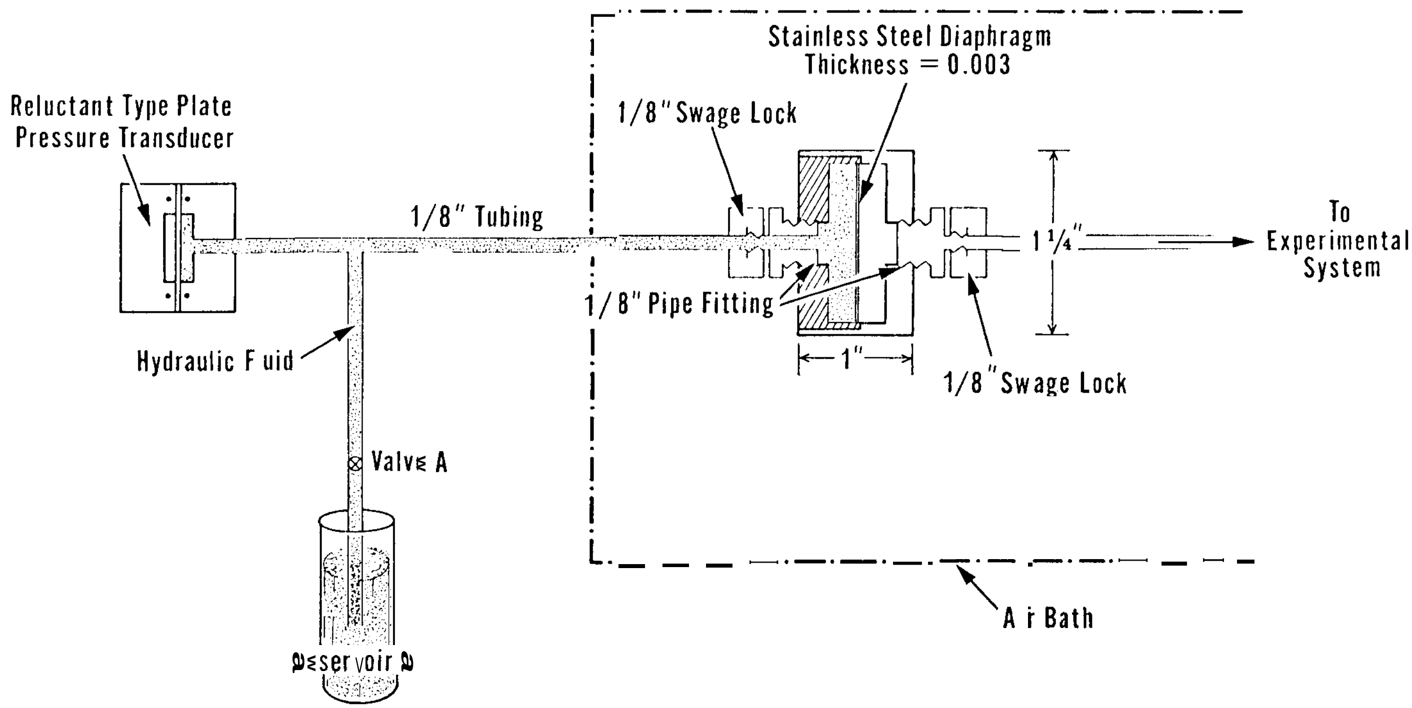


Figure 4.5 Schematic Diagram of Pressure Transducer for Elevated Temperatures

due to vaporization of the hydraulic fluid. Most liquids cannot meet the first requirement.

When the air bath begins to heat, Valve A in Figure *4.5* should be opened to bleed hydraulic fluid until the temperature in the air bath is stable and the hydraulic fluid is thoroughly heated. Valve A is then closed, and the pressure of the system can be measured by using the plate pressure transducer outside the air bath. When the temperature of the air bath is changed from one experimental temperature to another, Valve A must be opened until a new stable condition is reached.

When the pressure in the experimental system increases, the diaphragm will be displaced toward the hydraulic fluid side because of the low compressibility of hydraulic fluids. Thus, the pressure of the system can be transmitted by the hydraulic fluid to the plate transducer.

The pressure measurement was sensitive to room temperature fluctuations. The room temperature was controlled by using a temperature controller with a ventilation fan, but it was not very satisfactory.

It was found that the method of measuring pressure was independent of the air bath temperature in the experiment. This eliminates the need for calibrating the pressure transducer at different air bath temperatures.

4-1-4 Capacitance Probe

Since a porous medium with different water saturations has different dielectric properties, the dielectric constant can be measured and used for detecting the water saturation of a porous medium. Capacitance measurement can be used to find the dielectric constant; thus, capacitance probes have been used for measuring water saturation in a porous medium.[31-36] The range of water saturation from 0–100 percent was the focus of interest of most of those studies. In this study, the range of low water saturation at which vapor pressure lowering exists is the focus of interest.

When the water saturation is in the range of interest, the thickness of the adsorption layer on the rock surface changes with the quantity of adsorption. Since the mobility of the adsorbed molecules depends on the thickness of the adsorption layer, the dielectric constant of rock should change with the quantity adsorbed. According to fundamental physics, this dielectric constant should be frequency dependent. When the frequency is low, the probe will be more sensitive to low water saturation;[37, 38] thus, a low frequency (100 KHz) was used for this study.

The probe is a modification of the one which Chen[39] described in his dissertation, and will be briefly discussed below. The schematic diagram of the probe which Chen used is shown in Figure *4.6*. The probe is a conducting cylinder with a metal wire at the center. The control wire is connected to Electrode 1 and the conducting cylinder serves as Electrode 2. The electric field lines are distorted at the gap between Electrode 1 and Electrode 2. When the dielectric constant of the environment changes, the capacitance between Electrode 1 and Electrode 2 also changes.

The most serious disadvantage of Chen's probe is that there is a large residual capacitance between Electrodes 1 and 2. This residual capacitance comes from the central wire and the conducting cylinder. The residual capacitance was measured in the laboratory, and is on the

OLD VERSION

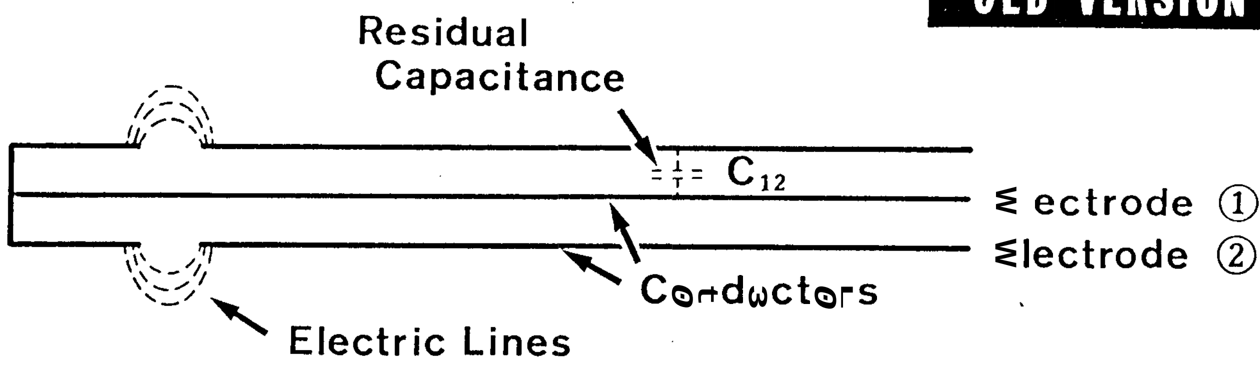


Figure 4.6 Schematic Diagram for Capacitance Probe (old version)

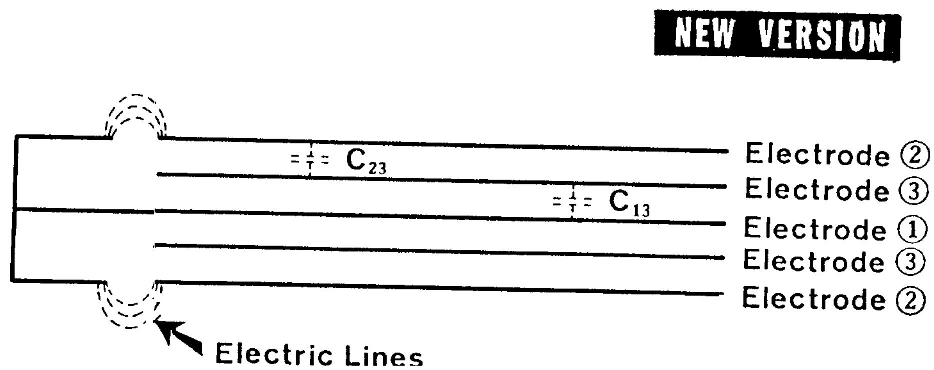
order of 70 pF. The change of capacitance due to the environment was also measured, When the dielectric constant of the environment changes from 1 to about 80, the capacitance between Electrodes 1 and 2 changes about 2 pF. It is obvious the difficulty in obtaining an accurate result is a matter of probe design. Thus, efforts were made to improve the probe structure in order to obtain a better result.

Figure 4.7 is a schematic diagram of a new, improved capacitance probe. From Figure 4.7, it can be found that one more electrode (electrode 3) was added. The purpose of adding the third electrode is to eliminate the residual capacitance so that a better resolution can be obtained. This modification is based on the general theory of shielding, which will be discussed in the following.

Figure 4.8(a) shows the schematic circuit diagram of a bridge to measure the capacitance. The bridge uses a transformer instead of two arms used in the Wheatstone bridge. As shown in Figure 4.8(a), the two Electrodes 1 and 2 are connected to Terminals 1 and 2. The shielding sheath of the coaxial cables, which connect both terminals to the Electrodes 1 and 2 of the capacitance probe, are grounded to the same ground point of the bridge.

Figure 4.8(b) is the equivalent circuit of the circuit in Fig- 4.8(a). C_{1g} and C_{2g} are capacitances between Terminals 1 and 2 and ground. When the bridge is balanced, Terminal 2 has the same potential as ground potential, Thus, C_{2g} does not affect the capacitance between Electrode 1 and Electrode 2, C_x.

Figure 4.8(c) is an equivalent circuit of the circuit in Fig- 4.8(b). From Figure 4.8(c), it is obvious that capacitance C_{1g} will not



Electrode ① Connect to Terminal H.
② Connect to Terminal L.
③ Connect to Terminal G.

Figure 4.7 Schematic Diagram for Capacitance Probe (new version)

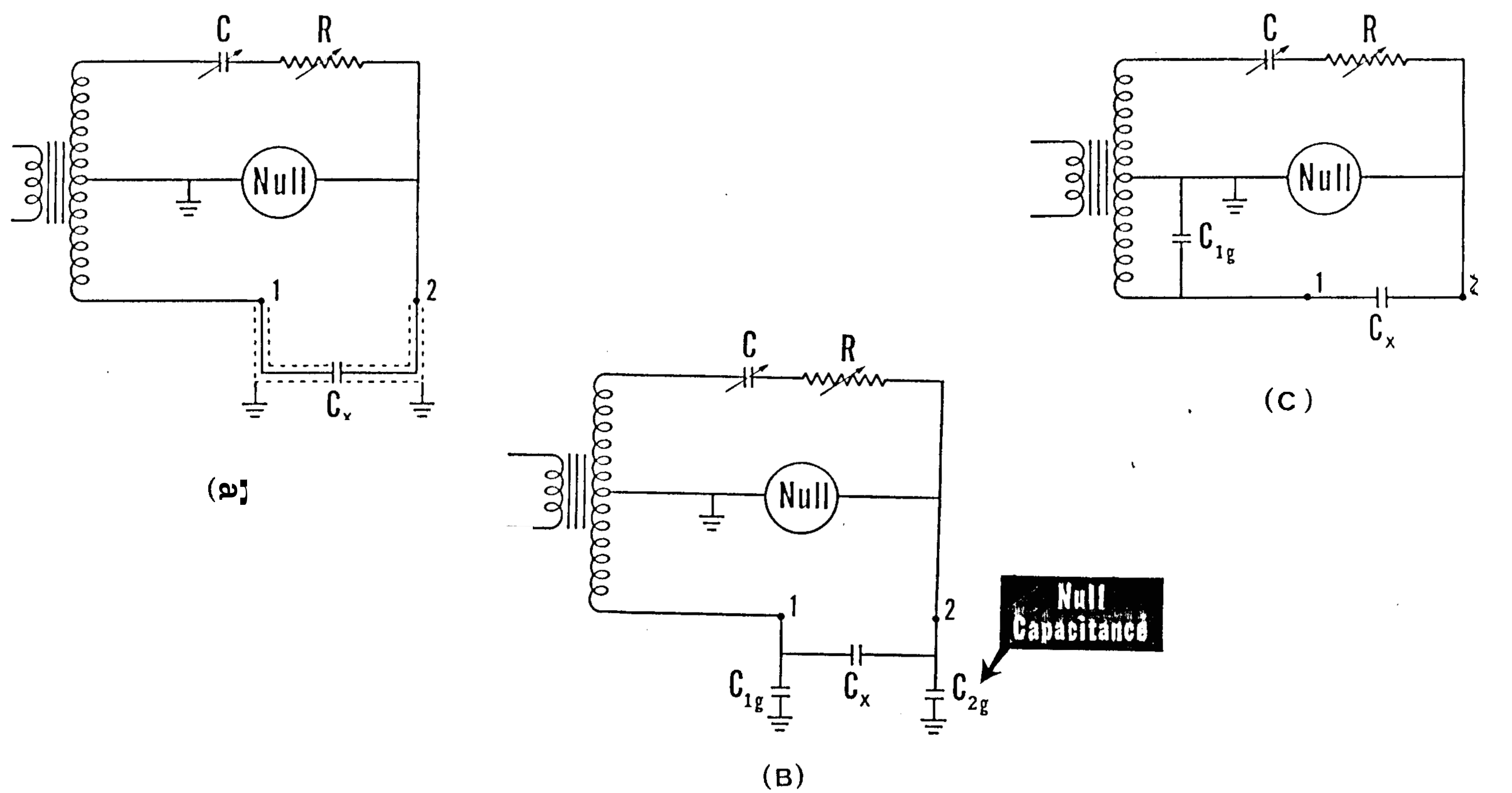


Figure 4.8 Capacitance Measurement by Using a Bridge with a Guard Terminal

affect the bridge balance, and C_x is the only capacitance which should be measured without residual capacitance. Thus, the residual capacitance was reduced.

The third terminal of the capacitance probe, used in this investigation, should be connected to the ground point of the bridge. When this is done, the readings obtained from the bridge show that only the capacitance at the gap plus a small quantity (on the order of 1.0 pF) of residual capacitance was measured.

For a traditional Wheatstone bridge, Figure 4.9(a), it is impossible to have three terminals. To make it equivalent to a three terminal bridge, one must consider a more general idea of shielding. Figure 4.9(b) is a modification of the Wheatstone bridge. The shielding sheath of the coaxial cables and Terminal 3 of the capacitance probe should be connected to Terminal 3 of the bridge in Figure 4.9(b).

Figure 4.9(c) is the equivalent of the circuit in Figure 4.9(b). Since Terminals 1 and 3 have the same potential when the bridge is balanced, C_{13} will not affect the measurement. Figure 4.9(d) is the equivalent of the circuit in Figure 4.9(c), since C_{23} is changed by the voltage follower. C_{23} will not affect the balance point of the bridge. Thus, the bridge reading shows the capacitance C_x with a small amount of residual capacitance only.

Because high sensitivity in the low water saturation zone is of interest, 100 KHZ was chosen as the frequency of measurement. The results showed that the capacitance probe is a very useful tool in water saturation detection. It was also found that the capacitance probe is sensitive to the adsorption of methane and ethane on a rock surface.

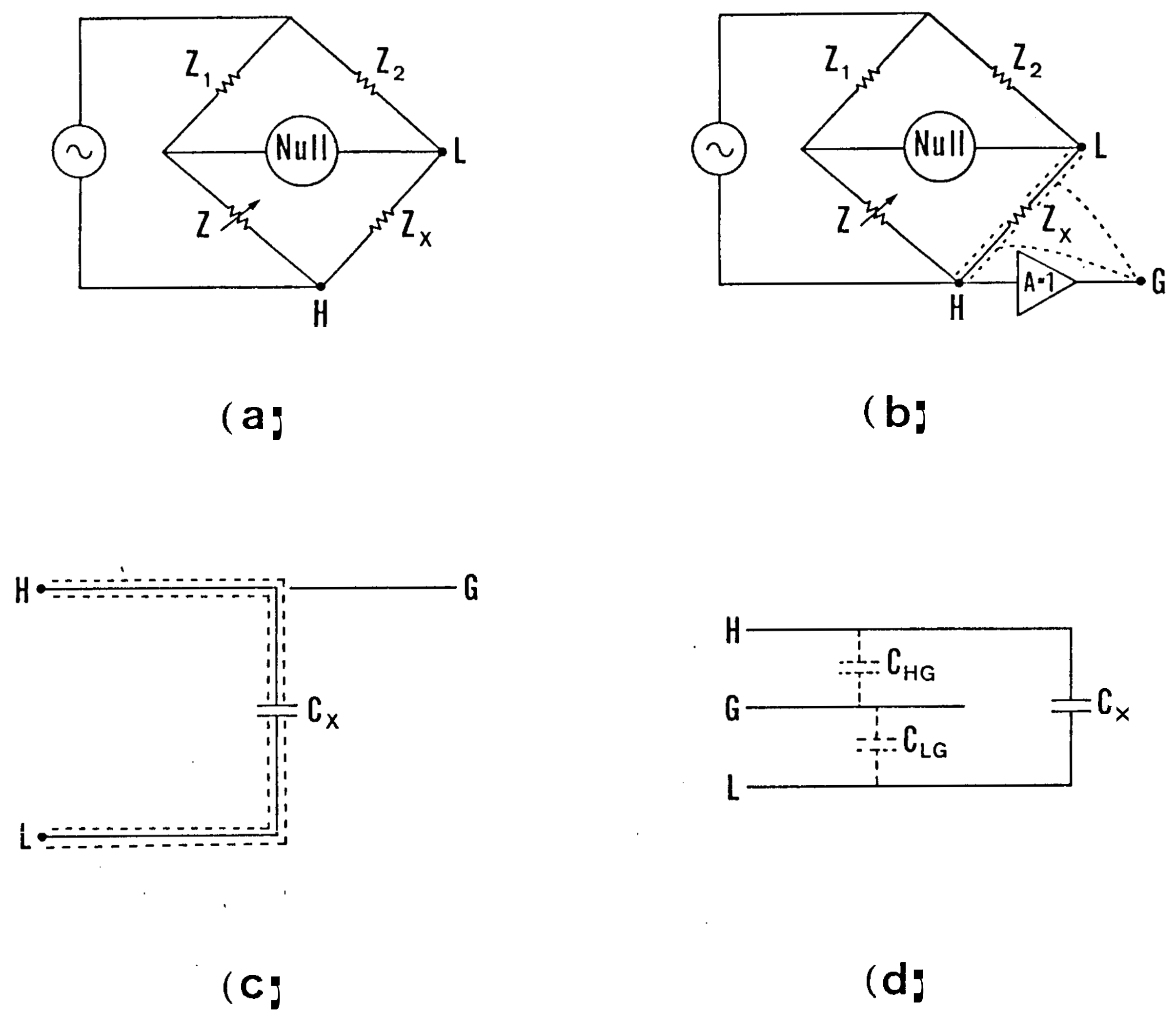


Figure 4.9 Capacitance Measurement by Using a Modified Wheatstoo Bridge

4-2 Core Samples

Several core samples were used in this work. Three of them were Berea sandstones with different permeabilities and porosities. Two cores were field core samples from Southern California. They had very low permeability; one core was a clean unconsolidated silica sand with a grain size of 60 to 65 mesh. The properties of all cores are listed in Table 4.1.

4-3 Procedures

The procedures for obtaining adsorption isotherms for different adsorbates are the same, and will be described by using Figure 4.1 (or Figure 4.2) as follows:

(1) Before performing the experiment, the volume of the sampling bottle was measured.

(2) The sample was placed in the core holder. Valves A, B, and C were opened; thus, the whole system was evacuated. Several hours were required for outgassing.

(3) After outgassing the whole system, Valves B and C were closed to isolate the sampling bottle and core holder.

(4) The sampling bottle was filled with a particular gas and the pressure P_1 measured. Thus, the amount of gas in the sampling bottle was obtained.

(5) Then Valve A was closed, and Valve C opened. Thus, the core holder and sampling bottle were connected together, After the whole system reached equilibrium, the equilibrium pressure P_2 was measured and

Table 4 1: Properties of Core Samples

	Porosity (%)	Permeability (md)	Remark
Berea Sandstone Number 1	20 6	184 3	
Berea Sandstone Number 2	24 6	804 8	
Berea Sandstone Number 3	22 7	590 6	
Field Core Number 3	18 05		Well MGS 20-13 9552 ft. 9 in. to 9553 ft 3 in.
Field Core Number 5	18.5		Well MGS 20-13 9562 ft. 10 in to 9563 ft 7 in.
Unconsolidated Silicate Sands			60-65 mesh

Valve C closed. From the values of P_1 and P_2, the quantity of gas flow into the core holder was calculated.

(6) Steps (4) and (5) were repeated for another set of pressures P_1 and P_2, until P_2 reached the highest pressure desired.

(7) Valve B was opened to reduce the pressure of the sampling bottle to P_3, then Valve B was closed and Valve C opened, until the whole system was in equilibrium. Then the equilibrium pressure P_4 was recorded and Valve C closed. From P_3 and P_4 the quantity of gas flowing from the core holder to the sampling bottle was calculated.

(8) Step (7) was repeated for another set of pressures P_3 and P_4, until P_4 was low enough (normally when the relative pressure was less than 0.05). Then the experiment was terminated.

From this procedure, the quantity of gas entering the core holder and the corresponding equilibrium pressure were obtained.

If one assumes that helium will not be adsorbed on the rock surface, and if one uses helium gas as the adsorbate, then the dead volume, which is the void space in the core holder and the core pore volume, can be obtained. The dead volume can be calculated by the following formula:

$$V_d = V_1 \frac{P_1 - P_2}{P_2 - P_2'} \tag{4.1}$$

where V_1 is the volume of the sampling bottle

P_1 is the pressure in the sampling bottle

P_2 is the equilibrium pressure after connecting the sampling bottle and the core holder

P_2' is the equilibrium pressure before connecting the sampling bottle and the core holder.

If the dead volume V_d is known from helium adsorption, the quantity of gas in the core holder and the corresponding equilibrium pressure can be obtained from an experiment. Since the surface area of core holder is small in comparision with that of core, the amount of gas adsorbed on the core holder is negligible. Then the amount of gas which was adsorbed on the rock surface can be calculated. Adsorption isotherms can be constructed by knowing the quantity adsorbed and the corresponding equilibrium pressure. We turn now to a discussion of the results of this study.

5. RESULTS AND DISCUSSION

Measurement of the adsorption of water molecules on a rock surface at elevated temperatures is the main objective of this study. Other adsorbates at different conditions were also studied,, All of the experimental results will be given in the appendices and are discussed in the following.

5-1 Nitrogen Adsorption at 77.3°K

At 77.3°K, the saturation vapor pressure of liquid nitrogen with a flat liquid-vapor interface is one atmosphere of pressure. Nitrogen adsorption at 77.3°K is one of the standard methods for investigating the surface area of a porous medium. Figures 5.1-5.14 are the nitrogen adsoprtion isotherms for different rock samples at 77.3°K. Numerical expermiental results are given in Appendix A.

In the adsorption isotherms for Berea sandstone samples, Figure 5.1-5.8, a hysteresis loop was observed in each adsorption isotherm. The hysteresis phenomenon is always found when the relative pressure, P/P_o, is more than 0.4-0.44. In the isotherms for field cores, Figures 5.11-5.14, hysteresis loops are not as significant. But:, with careful inspection, one can find that hysteresis did occur at about the same relative pressure. Hysteresis loops in adsorption isotherms for unconsolidated silica sand, Figures 5.9-5.10, are very hard to recognize because the specific surface area of the silica sands is so small that the data are not very precise.

In the nitrogen adsorption isotherms, the closure points are always

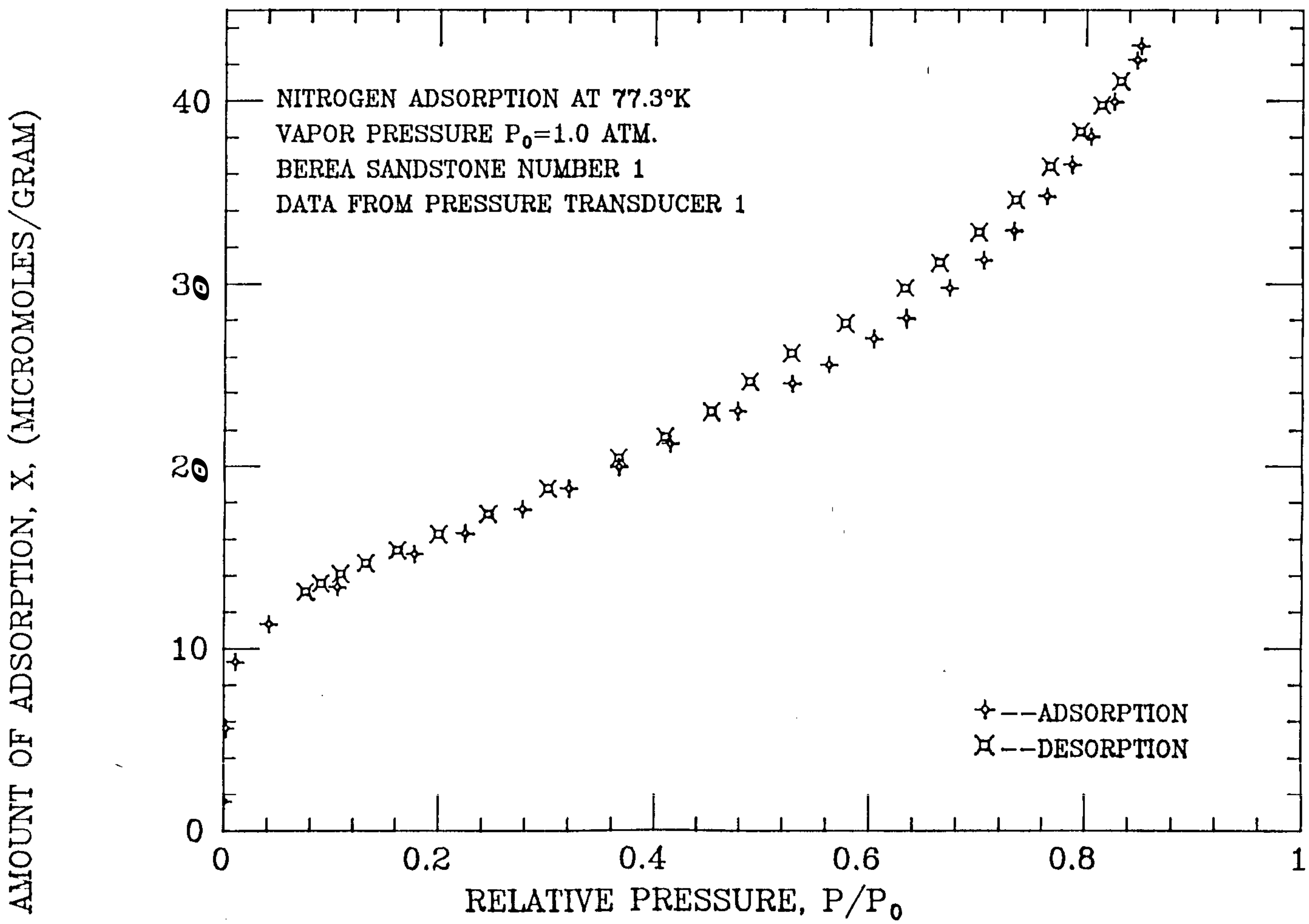


Figure 5.1 Nitrogen Adsorption Isotherm at 7⁻ 3°K

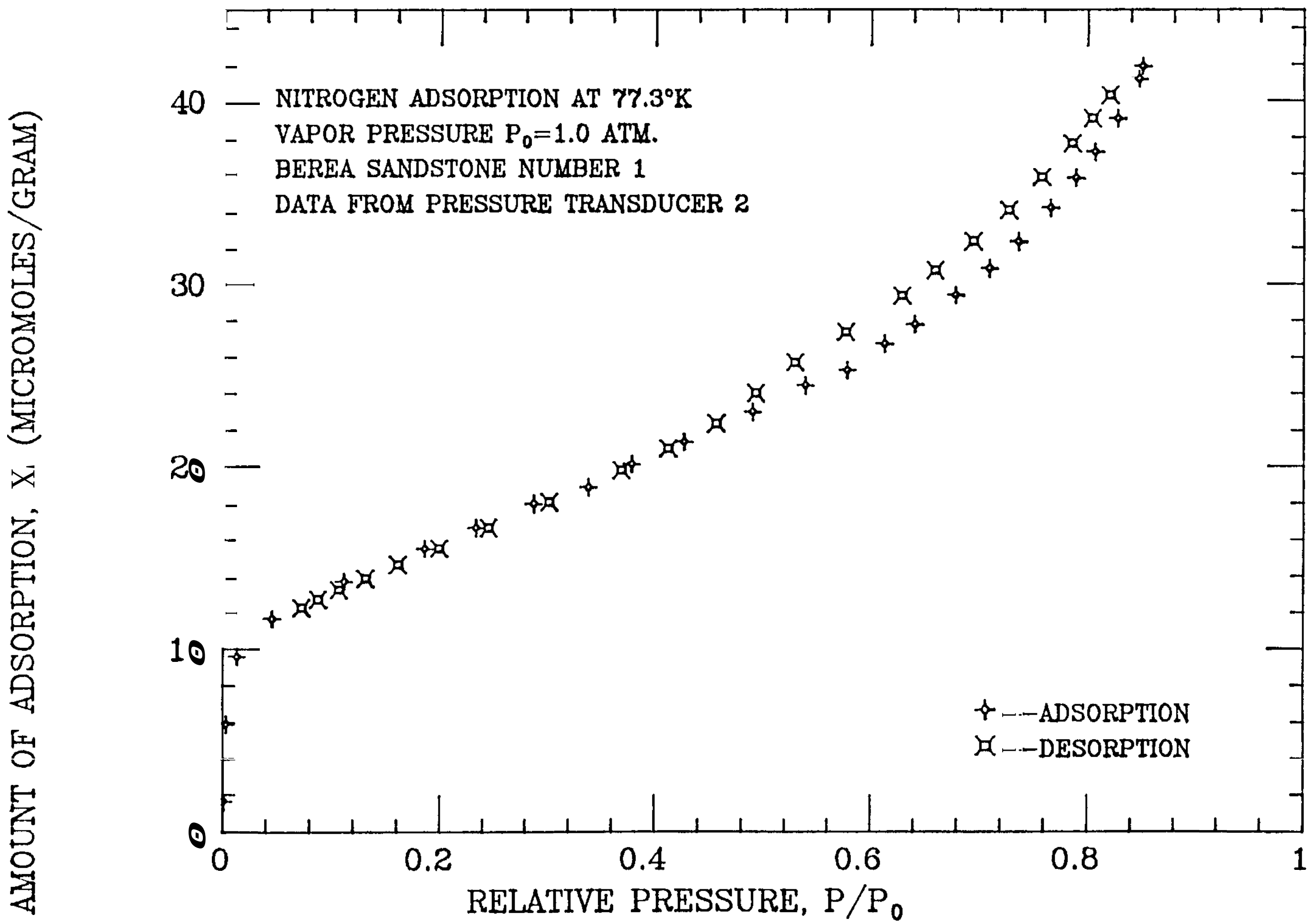


Figure 5.2 Nitrogen Adsorption Isotherm at 77 3°K

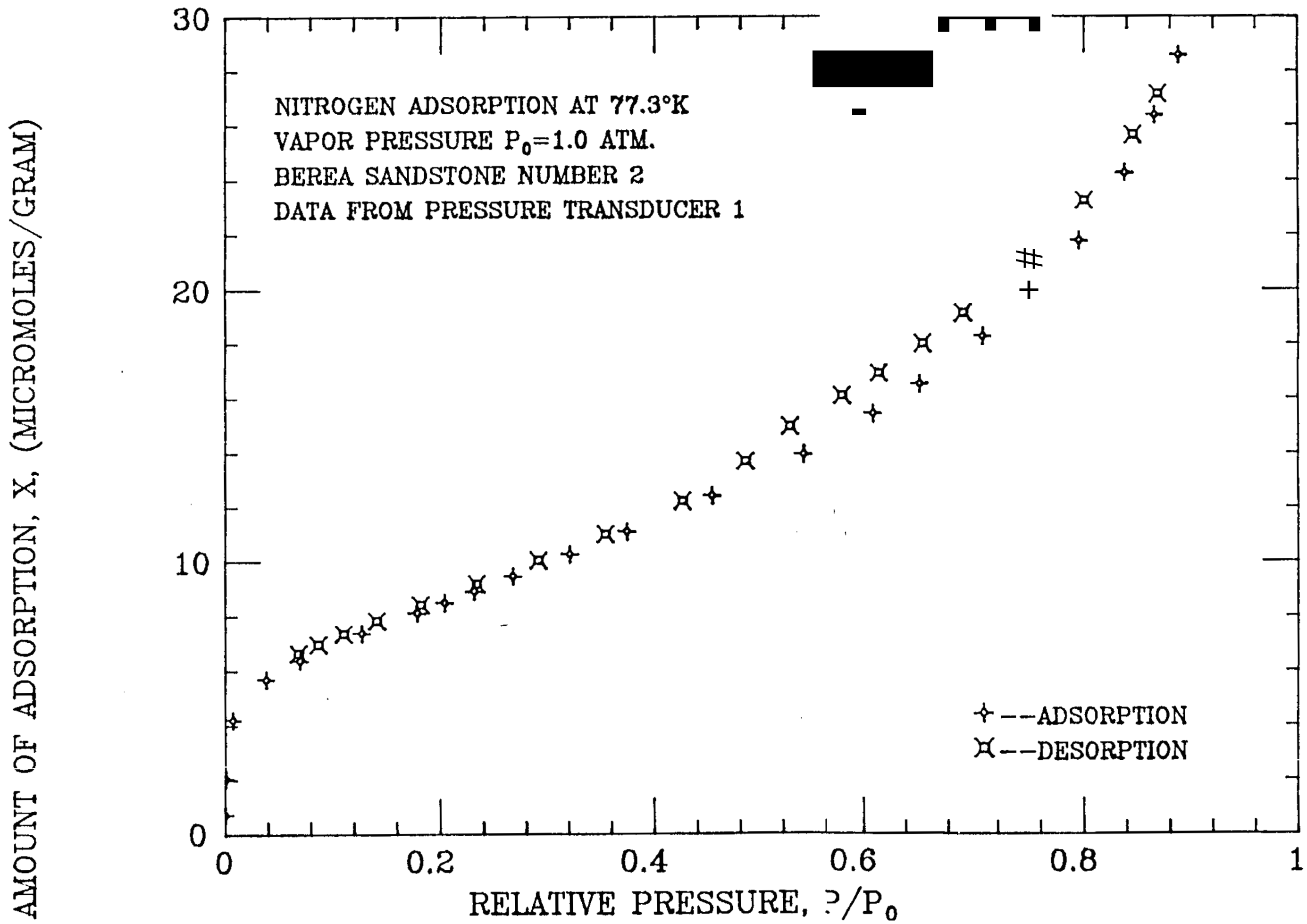


Figure 5.3 Nitrogen Adsorption Isotherm at 77.3°K

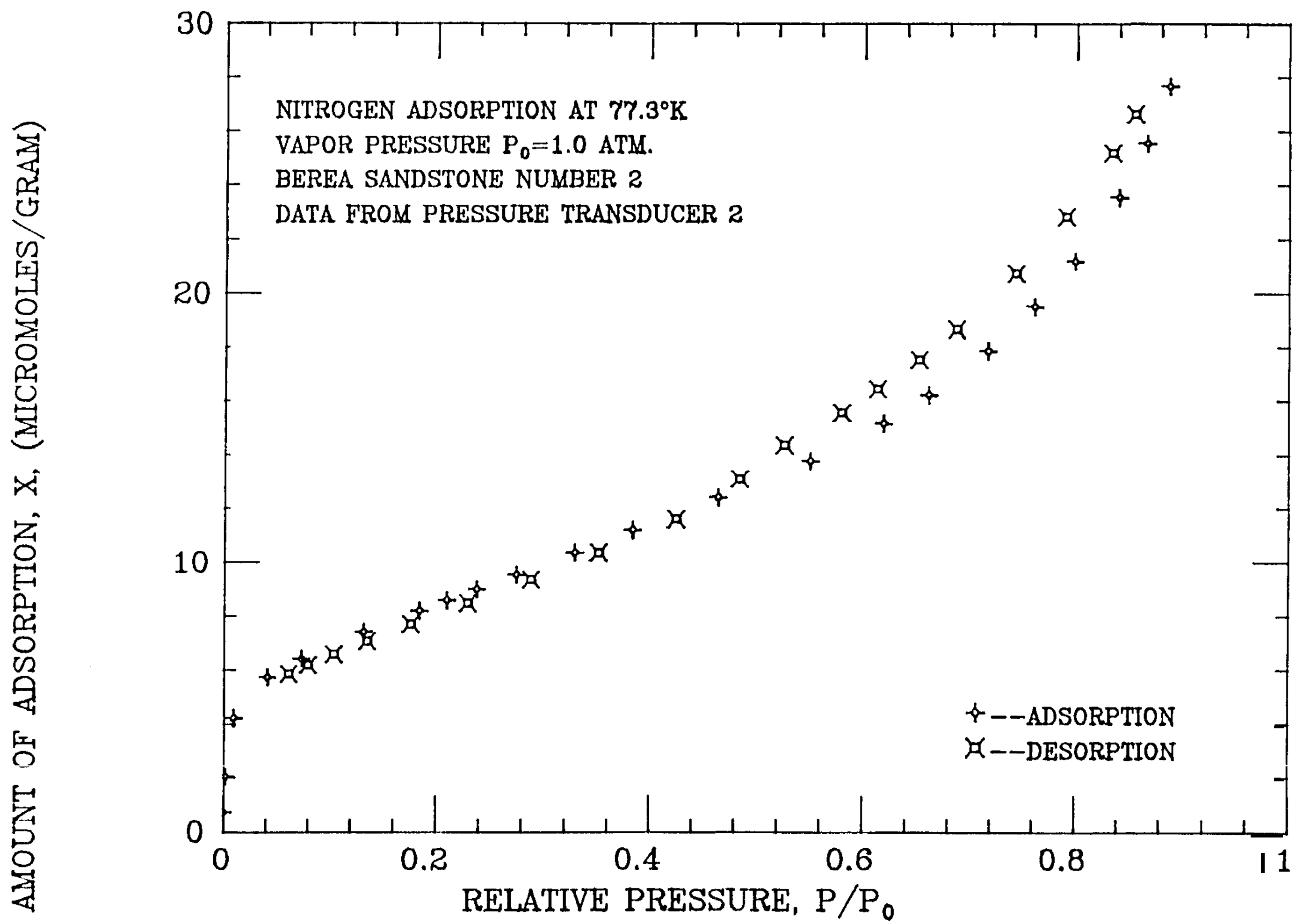


Figure 5.4 Nitrogen Adsorption Isotherm at 77.3°K

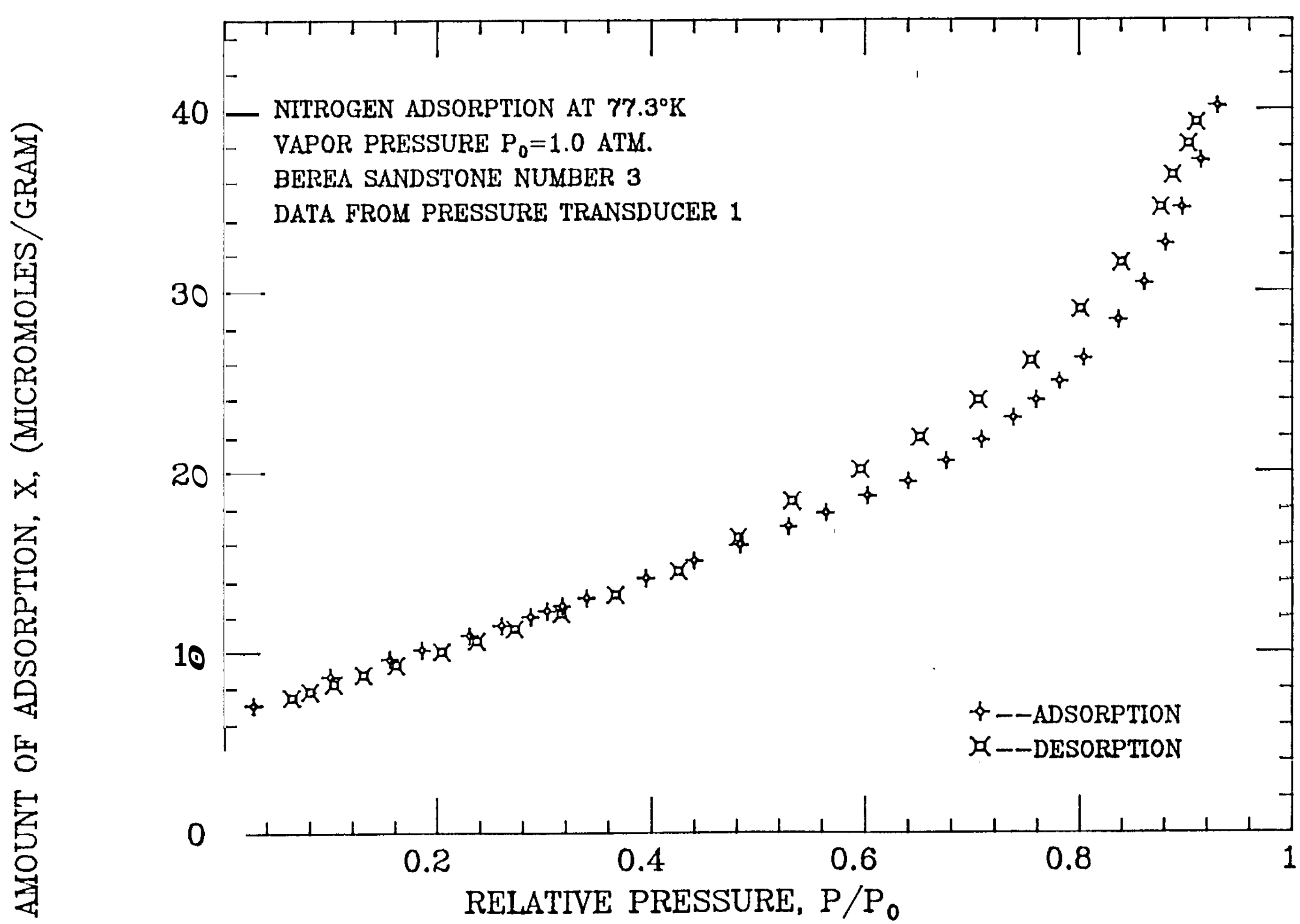


Figure 5.5 Nitrogen Adsorption Isotherm at 77.3°K

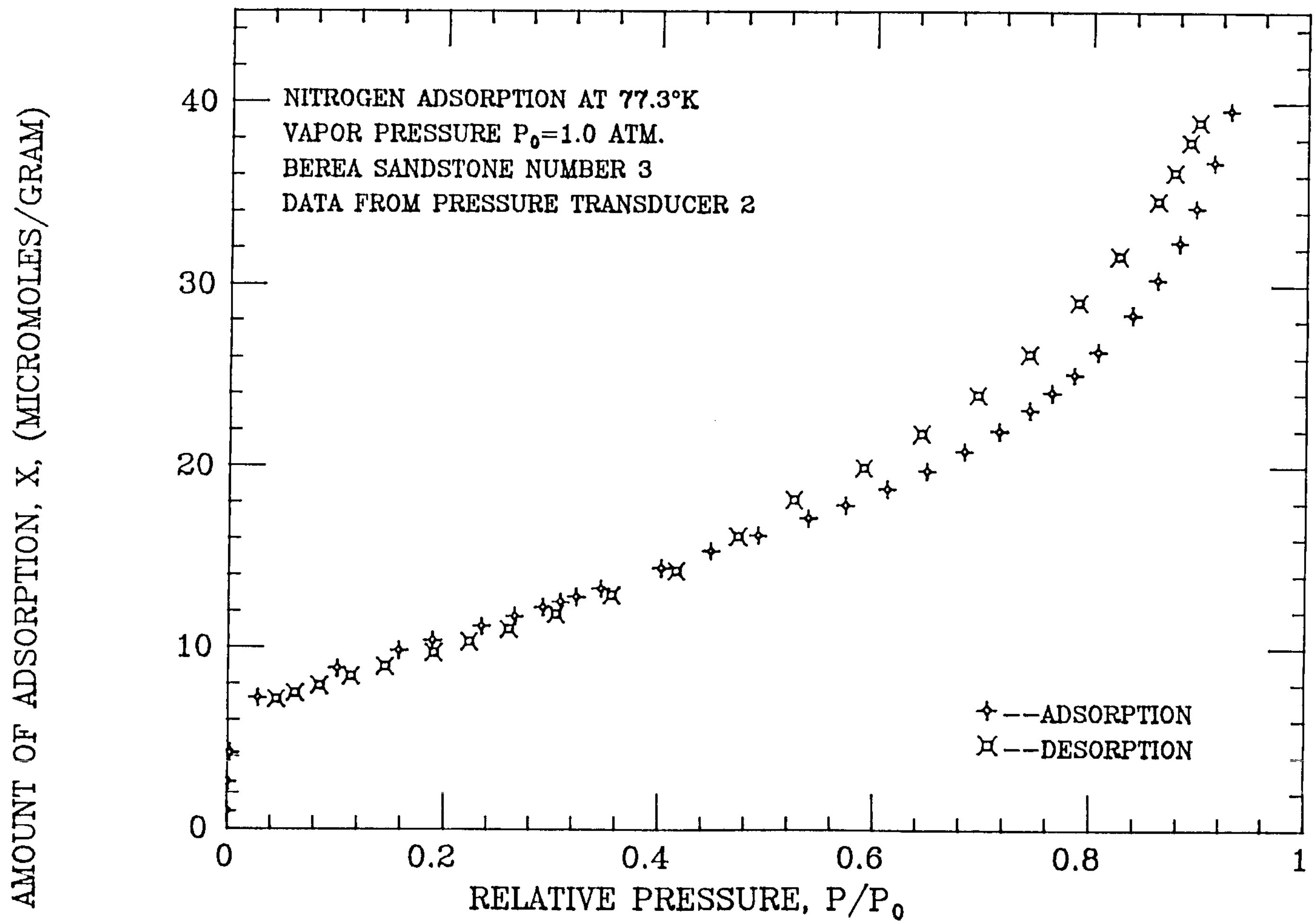


Figure 5.6 Nitrogen Adsorption Isotherm at 77.3°K

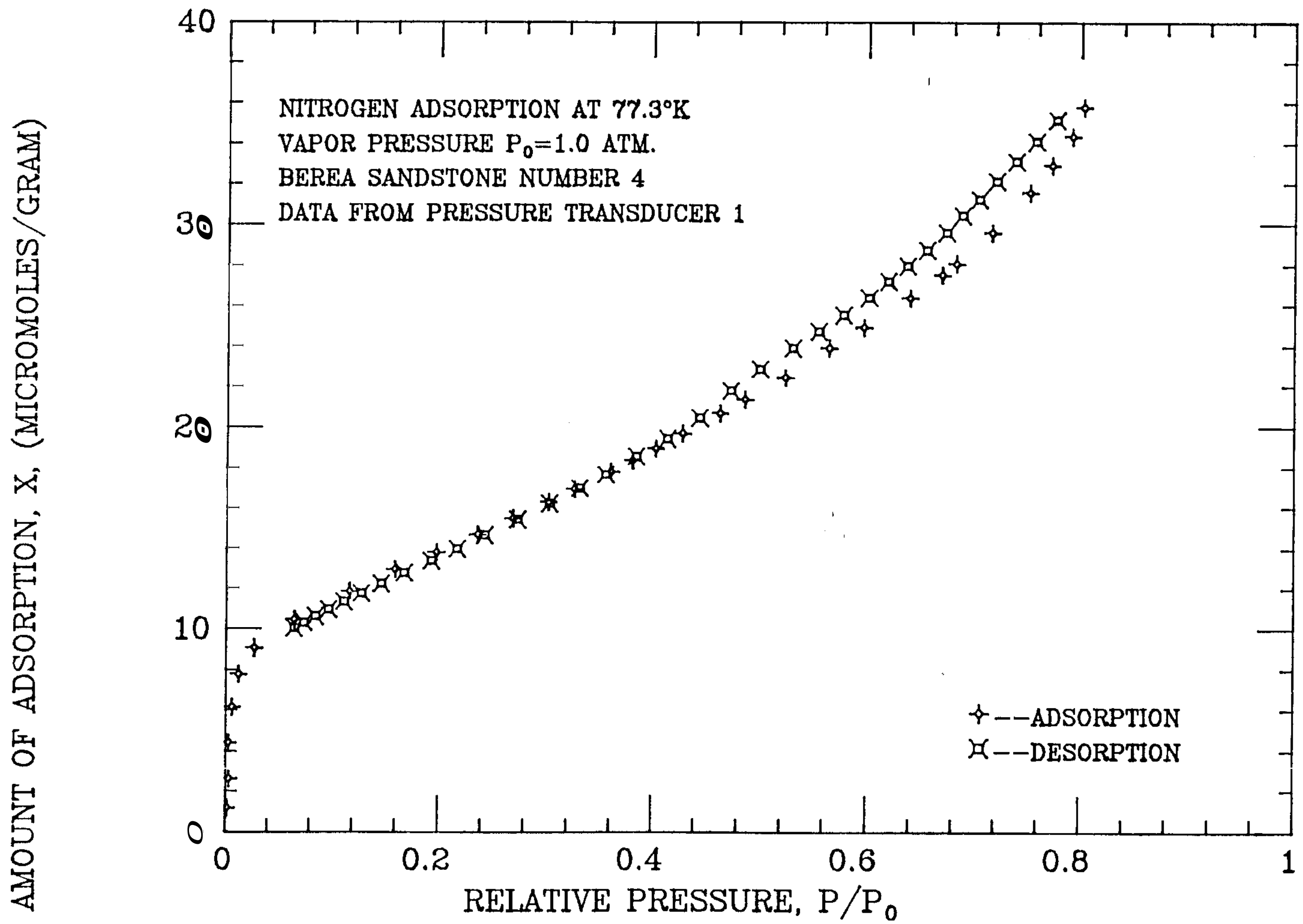


Figure 5 7 Nitrogen Adsorption Isotherm at 77 3°K

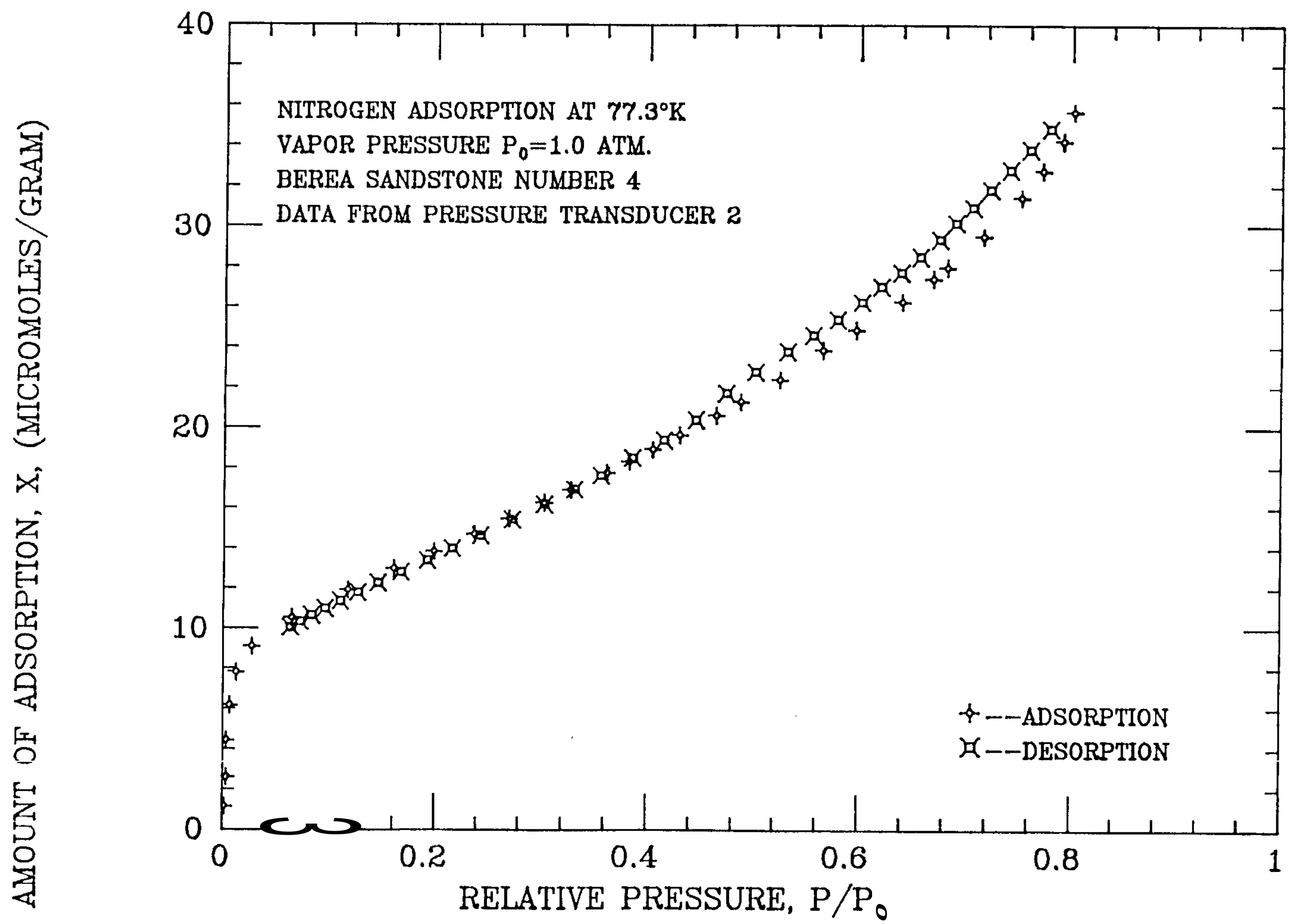


Figure 5.8 Nitrogen Adsorption Isotherm at 77.3°K

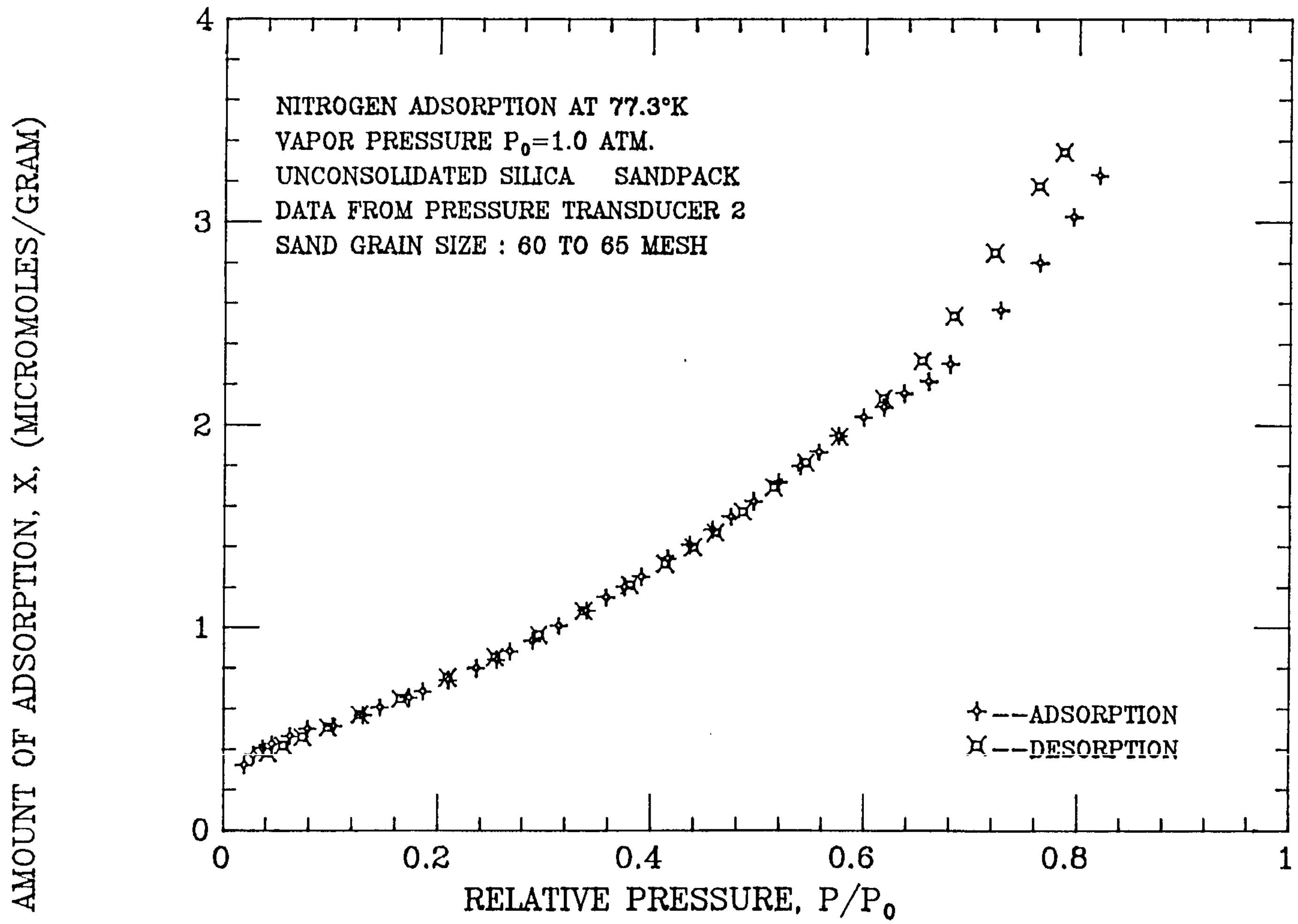


Figure 5.9 Nitrogen Adsorption Isotherm at 77.3^{o}K

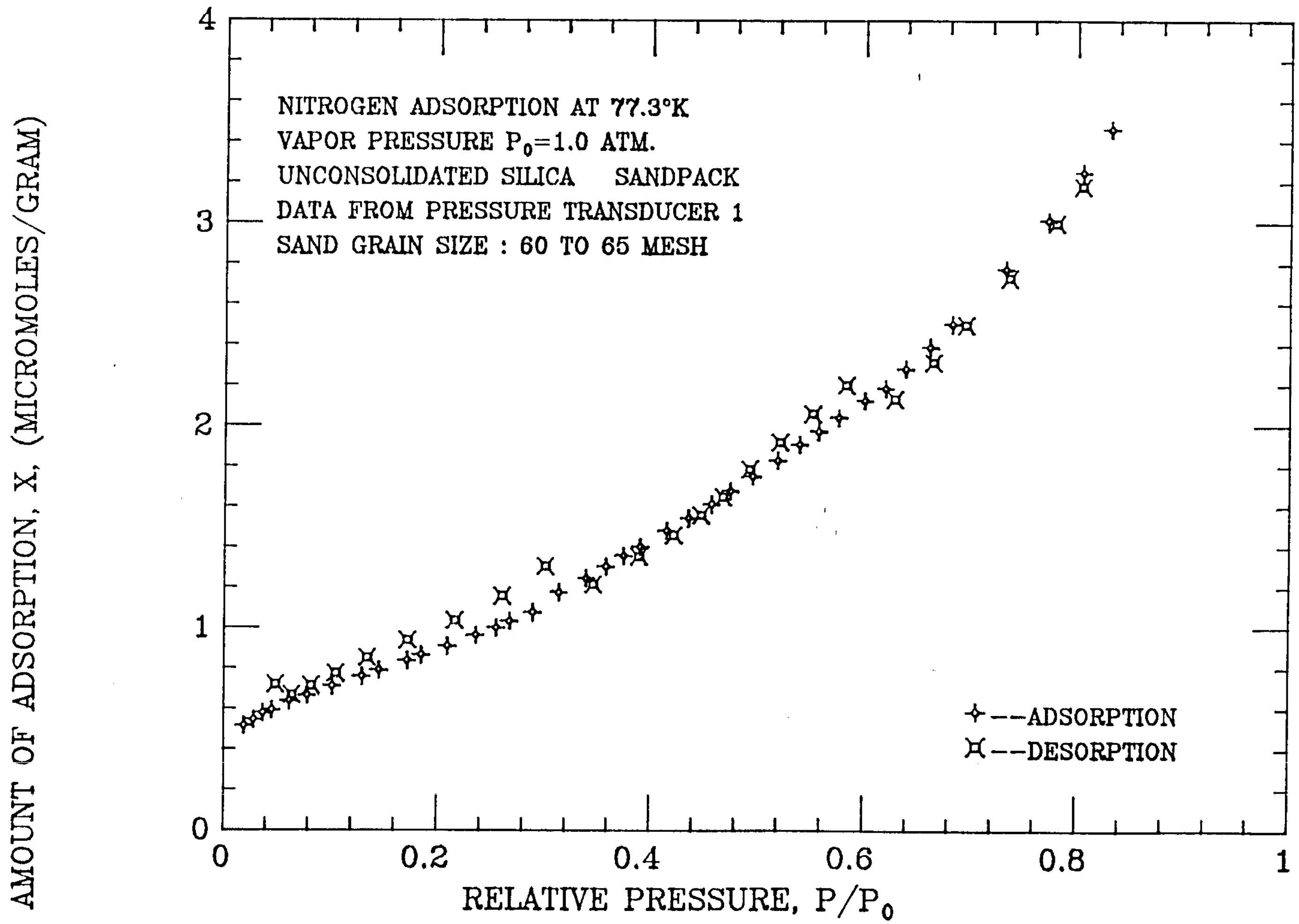


Figure 5.10 Nitrogen Adsorption Isotherm at 77.3^{O}K

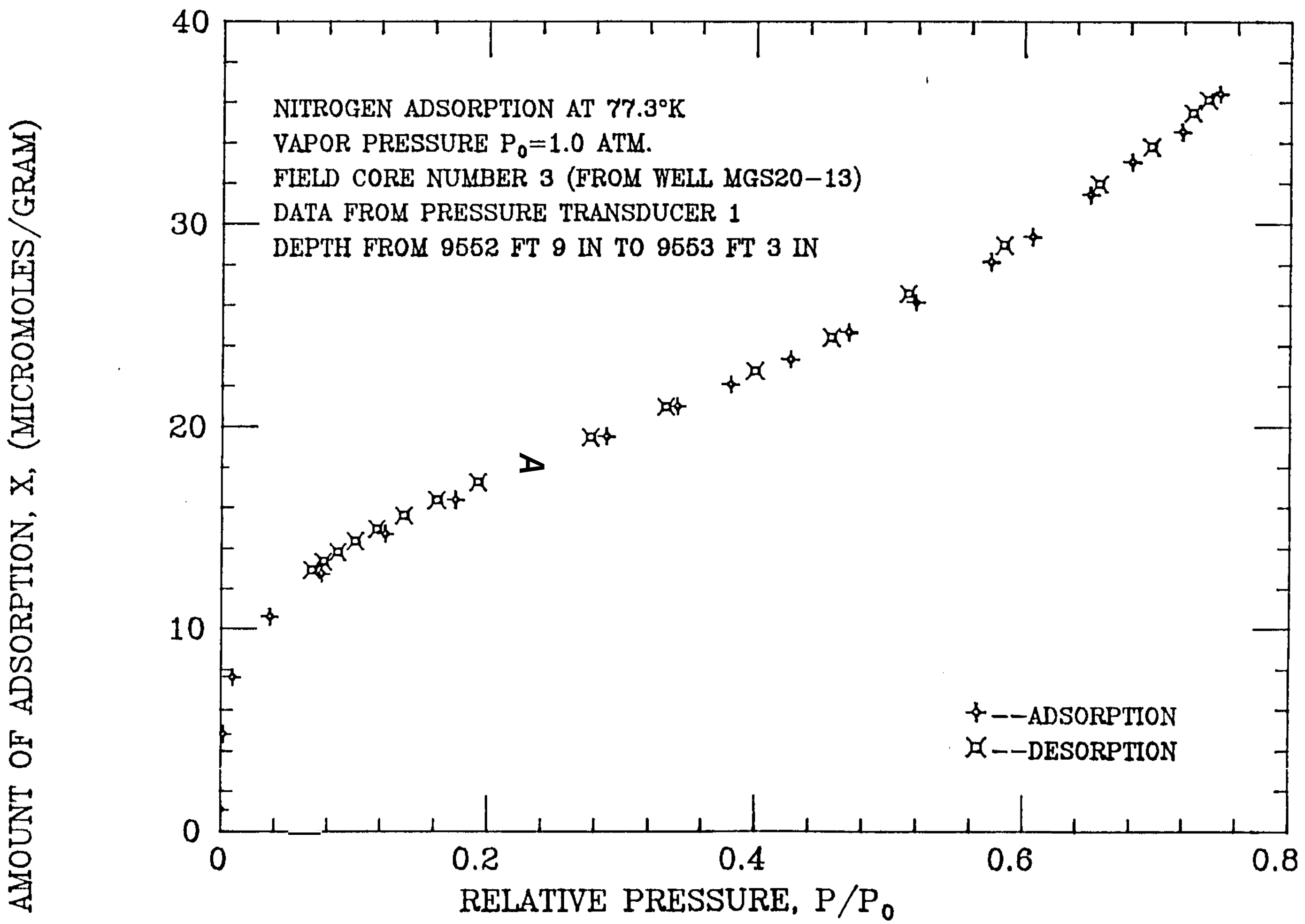


Figure 5.11 Nitrogen Adsorption Isotherm at 77.3°K

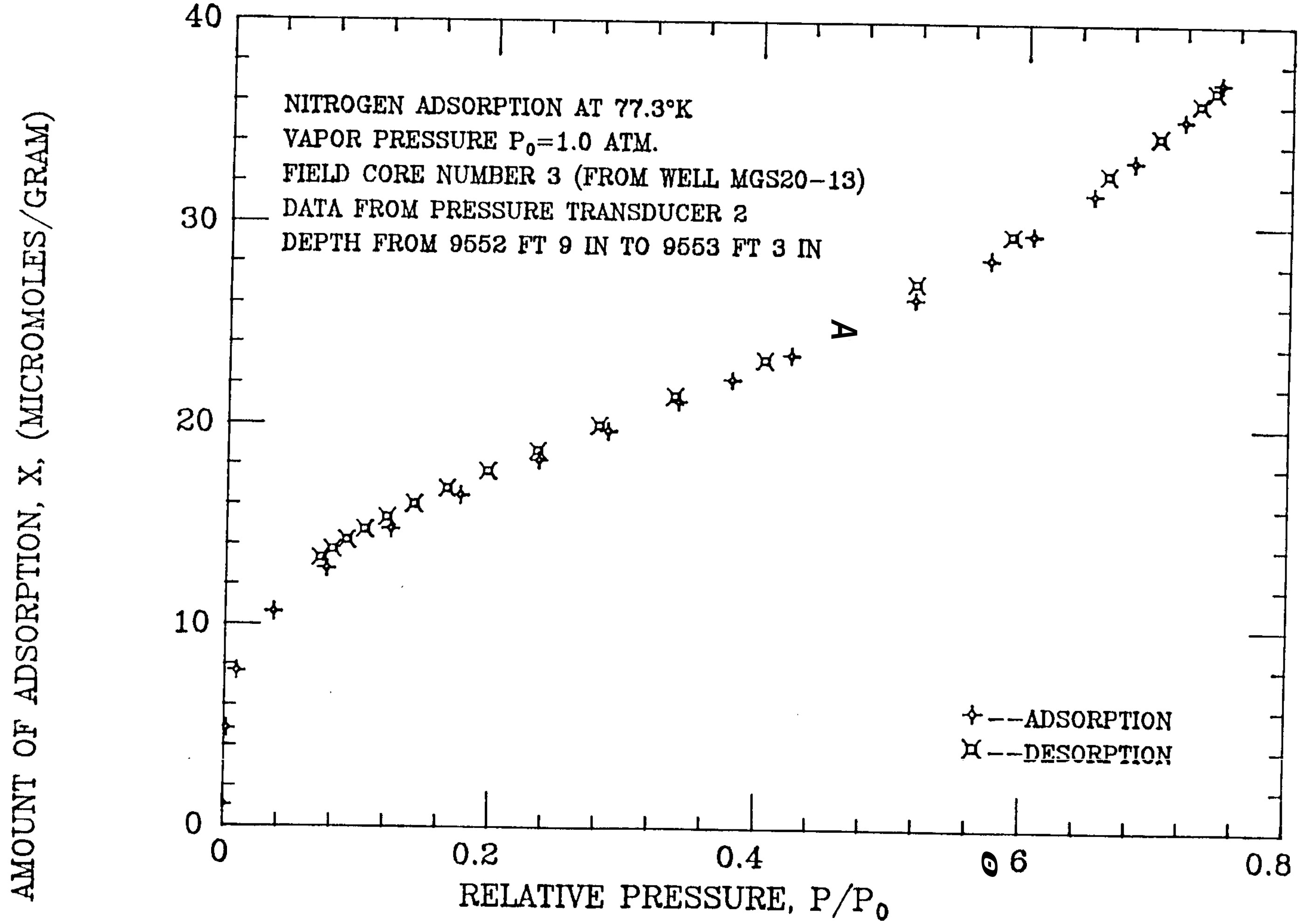


Figure 5.12 Nitrogen Adsorption Isotherm at 77.3^{o}K

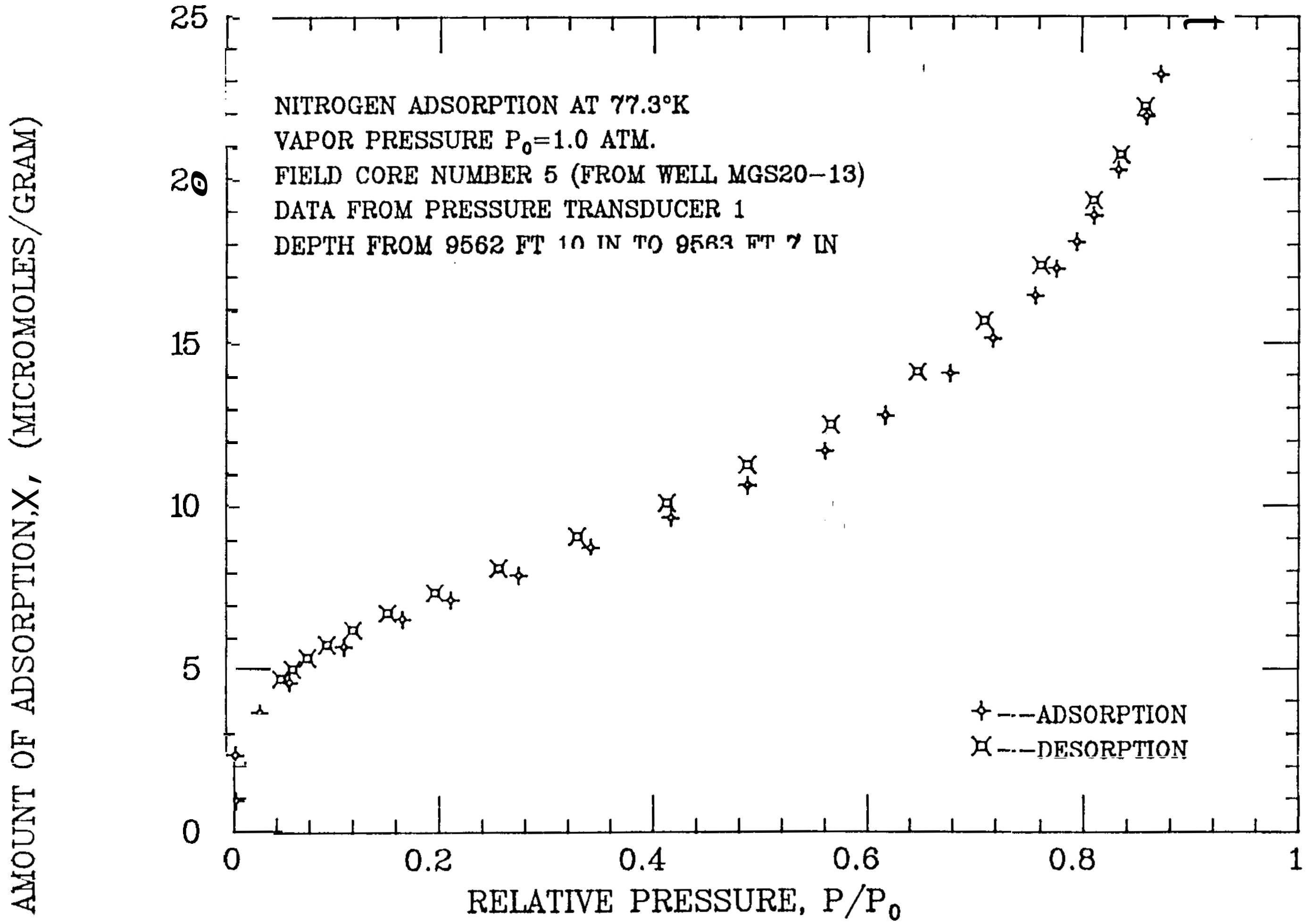


Figure 5.13 Nitrogen Adsorption Isotherm at 77.3°K

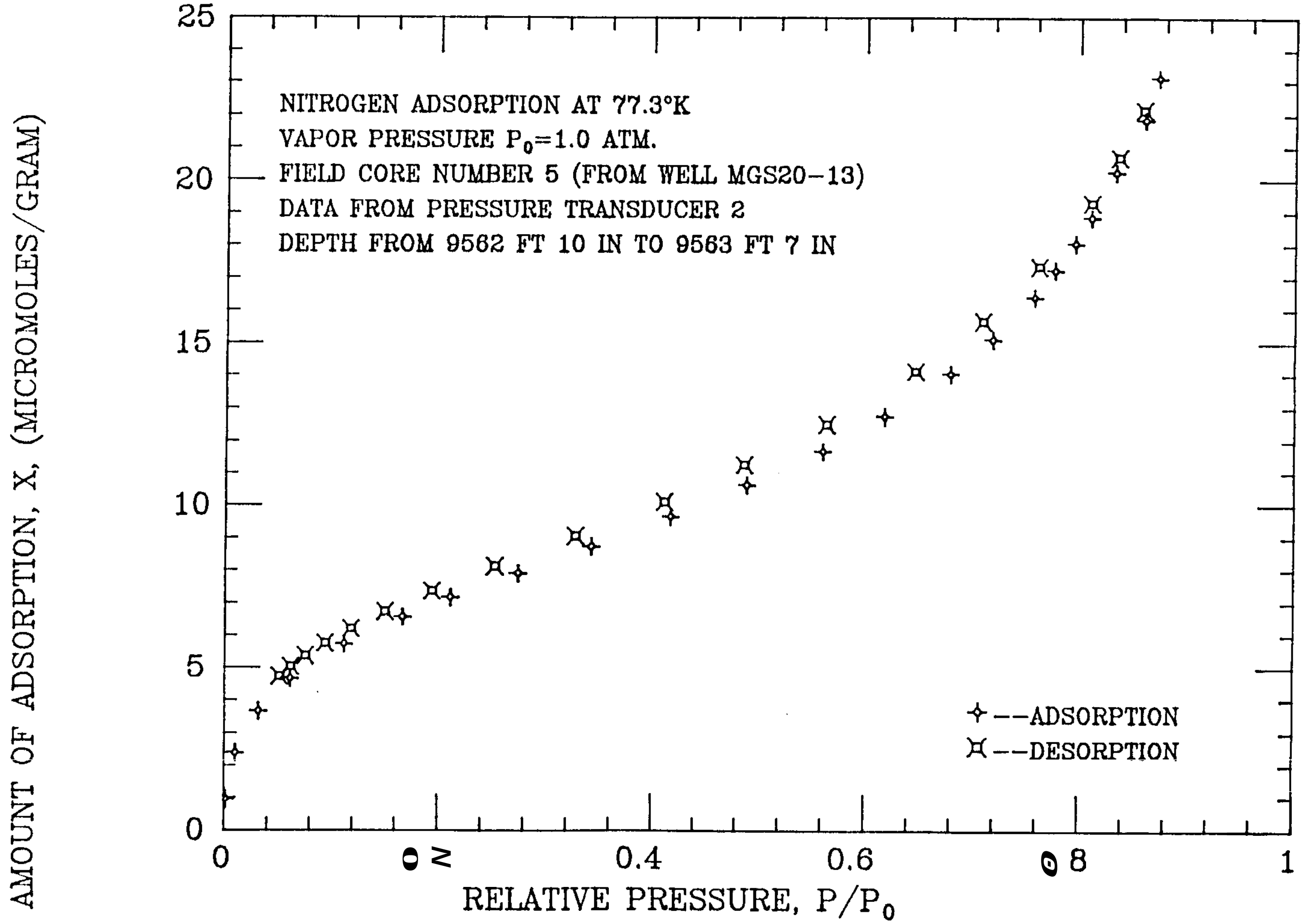


Figure 5.14 Nitrogen Adsorption Isotherm at 77.3°K

found when the relative pressure is between 0.4 and 0.44. This is consistent with results reported by Avery and Ramsay in 1973[40] and Dubinin, et. al.,[41] in 1960. Avery and Ramsay also reported that hysteresis loops did not exist in the adsorption isotherms on uncompressed silica and Zirconia powders. This is similar to the results obtained in this experiment. All the results from this experiment showed that the capillary condensation mechanism can only occur in pores with radius larger than a critical radius. The critical radius can be estimated from the relative pressure corresponding to the closure point of the hysteresis loops by combining Equations 2.6 and 2.25; that is:

$$\ln\left(\frac{P_o}{P}\right) = \frac{2\gamma_o V_\ell}{RT}\left(\frac{1}{r_M + 2}\right) \tag{5.1}$$

Assume that the closure point of the nitrogen adsorption isotherm occurs at a relative pressure of 0.42, that the surface tension of liquid nitrogen at 77.3^oK with a flat interface is γ_o = 8.85 dynes/cm, and that the molar volume of liquid nitrogen is 37.9 cm^3/mole. Substituting these values into Equation 5.1 one obtains $r_M + 2\delta = 12.04$ Å. As mentioned before, 6 is a constant for a particular fluid at a particular temperature, whose value is on the order of 1 8. Thus, r_M, the mean radius of curvature, is on the order of 10Å. The physical meaning of this calculation is that when the radius of curvature of the liquid nitrogen interface is less than 10A^o, capillary condensation will not occur.

The thickness of the adsorbed nitrogen layers can also be calculated from the experimental data. If a nitrogen molecule is of a spherical shape with a 16.22^2 cross section, then the radius of the nitrogen molecule is 2.272. From the quantity adsorbed at a relative pressure of 0.42, the thickness of the adsorbed nitrogen layers can be obtained. For example, the quantity of nitrogen on Berea sandstone Number 1 at a relative pressure of 0.42 is 3460 μ moles, and the surface area of the sample is 207 m^2. The thickness of the nitrogen layer is

$$t = \frac{(3460\mu \text{ moles}) \times (6.02\times10^{17} \frac{\text{molecules}}{\mu \text{ mole}}) \times \left\{\frac{4\pi}{3} \times (2.27\times10^{-8})^3 \frac{cm^3}{\text{molecule}}\right\}}{2.07 \times 10^4 cm^2}$$

$$= 4.94 \text{ Å} \tag{5.2}$$

This calculated thickness is consistant with a thickness of 5.22 obtained by Dubinin, et. al.,[41] for activated carbons.

The minimum radius of pores to have capillary condensation can be calculated from r_M and t, which is $r = r_M + t \simeq 15$Å. This value is comparable with the value obtained by Avery and Ramsay,[40] 10 ± 5Å, from a different technical approach. We now consider methane and ethane adsorption.

5-2 Methane and Ethane Adsorption at Room Temperature

Figures 5.15-5.19 present adsorption isotherms for methane and Figures 5.20-5.24 present adsorption isotherms for ethane. At temperatures near room temperature, the gas content of the pore space can be estimated by the following calculations.

In 1 cm^3 of rocks, there is about 0.2 cm^3 pore space and 0.8 cm^3 of rock matrix. If the density of the rock matrix is 2.65 gm/cm^3, then the quantity of gas in the pore space of 1 gm rock matrix, X_1, can be obtained:

$$X_1 = \frac{0.2\ cm^3}{0.82 \times 2.65\ (gm\ rock)} \quad \frac{1}{0.0224\left(\frac{cm^3\ Atm}{\mu\ mole}\right)} \times \frac{273}{T}$$

$$= \frac{1150}{T} \frac{\mu\ moles}{(Atm) \qquad (gm\ rock)} \tag{5.3}$$

where T is the absolute temperature in degrees Kelvin.

When the temperature is room temperature, X_1 is about 4 (μmoles/Atm-gm rock).

From experimental results in Appendix B, and adsorption isotherms in Figures 5.15–5.19, the quantity of methane adsorbed on the rock surface is very small, only about 6 percent of the quantity of methane in the pore space. Large hysteresis loops for methane adsorption isotherms might be caused by the hysteresis of pressure gauge. From Appendix B and Figures 5.20–5.24, the quantity of ethane adsorbed is on the order of 25 percent of the quantity of ethane in the pore space. Since the methane experimental results have large errors, no further quantitative conclusions can be reached. The data is presented only for the sake of interest. Such data is rare.

Due to the limitations of bourdon tube pressure gauges, and the small quantity adsorbed, BET analysis of ethane adsorption isotherms is not meaningful, and BET analysis of methane adsorption isotherms is not possible. These runs were preliminary ones made to check experimental design and construction. More precise pressure measurement is needed for further conclusions. We turn now to water adsorption results,

5-3 Water Adsorption at Elevated Temperatures

The adsorption of water at temperatures between 100°C and 200°C

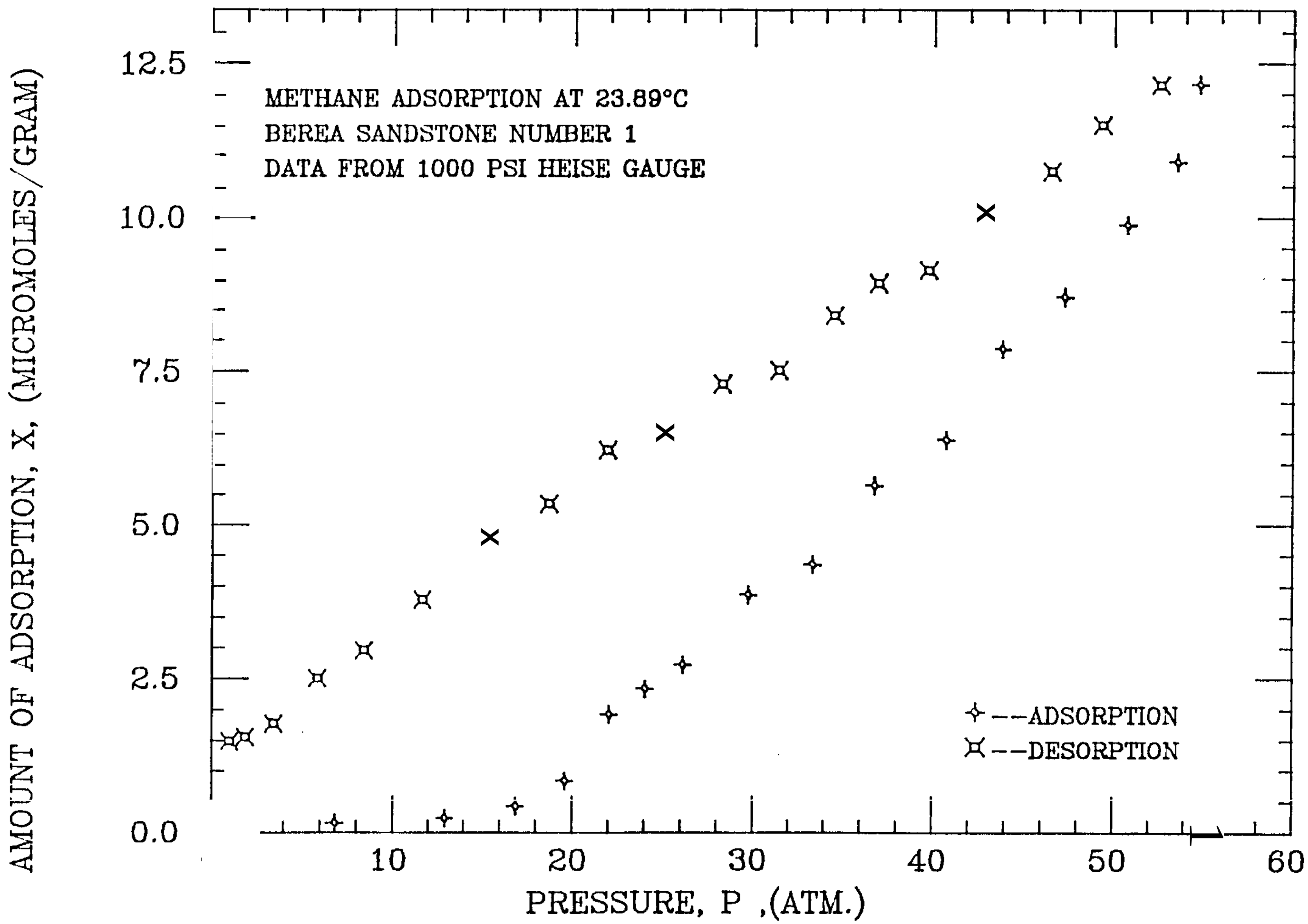


Figure 5.15 Methane Adsorption Isotherm at Room Temperature

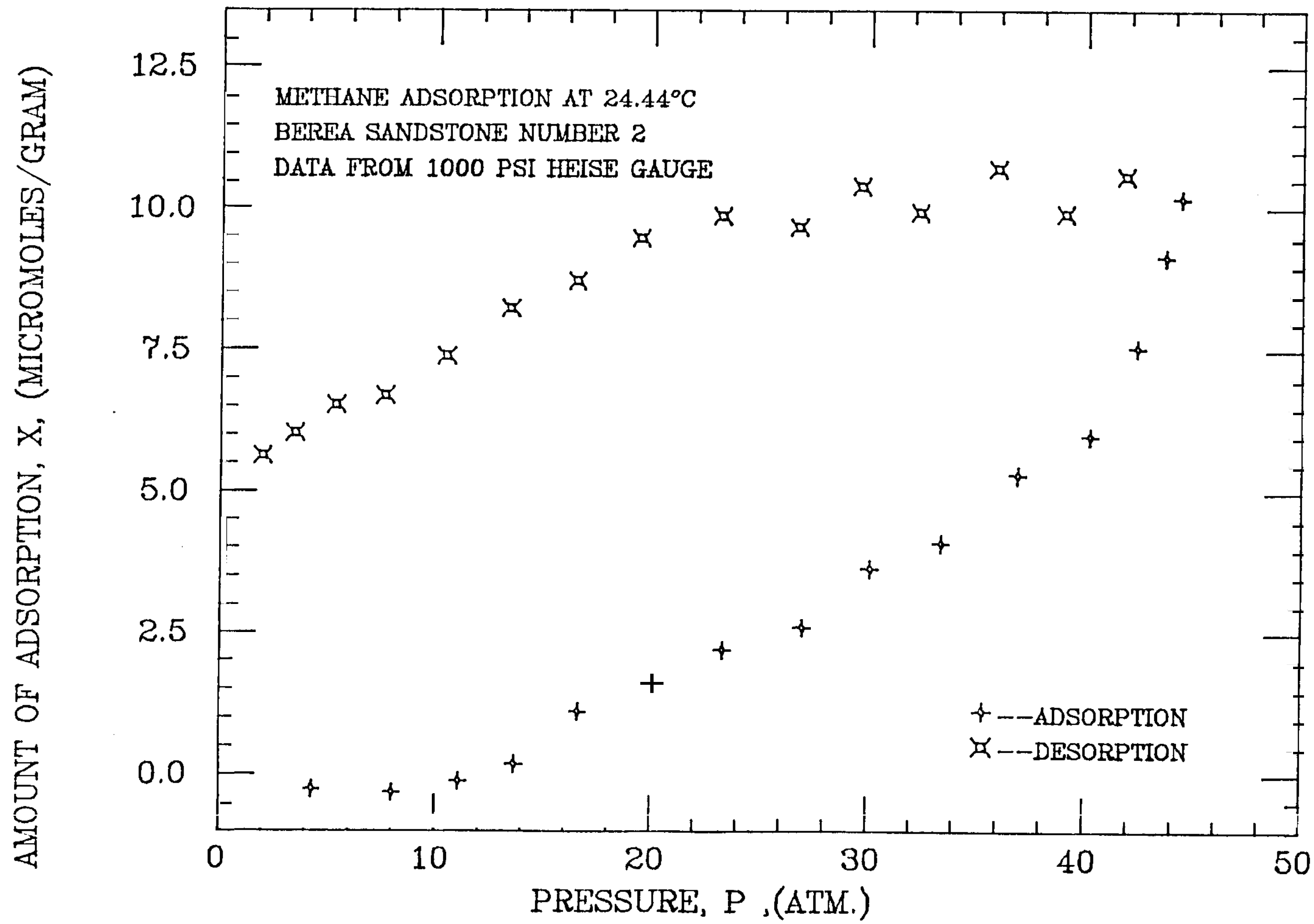


Figure 5.16 Methane Adsorption Isotherm at Room Temperature

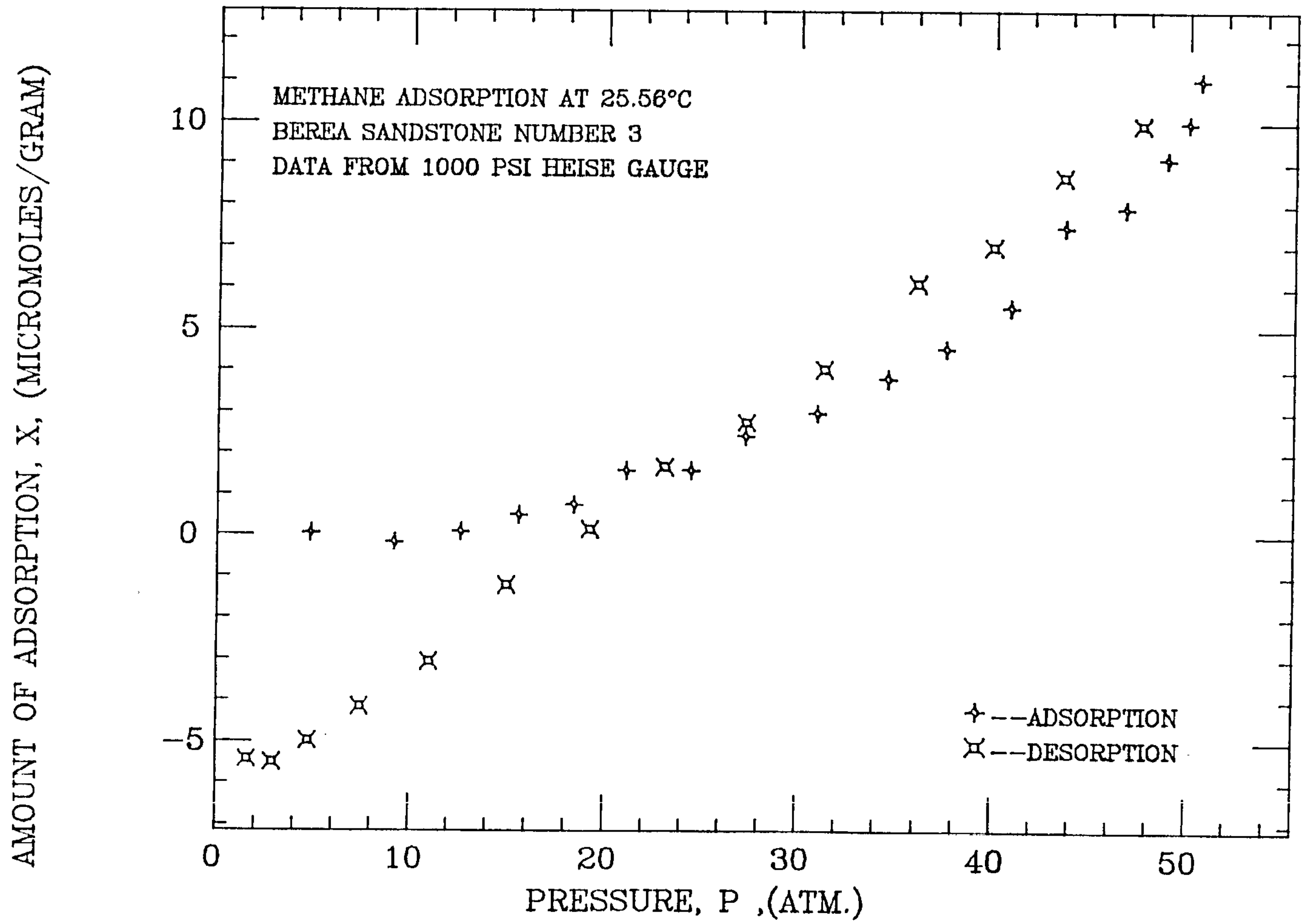


Figure 5.17 Methane Adsorption Isotherm at Room Temperature

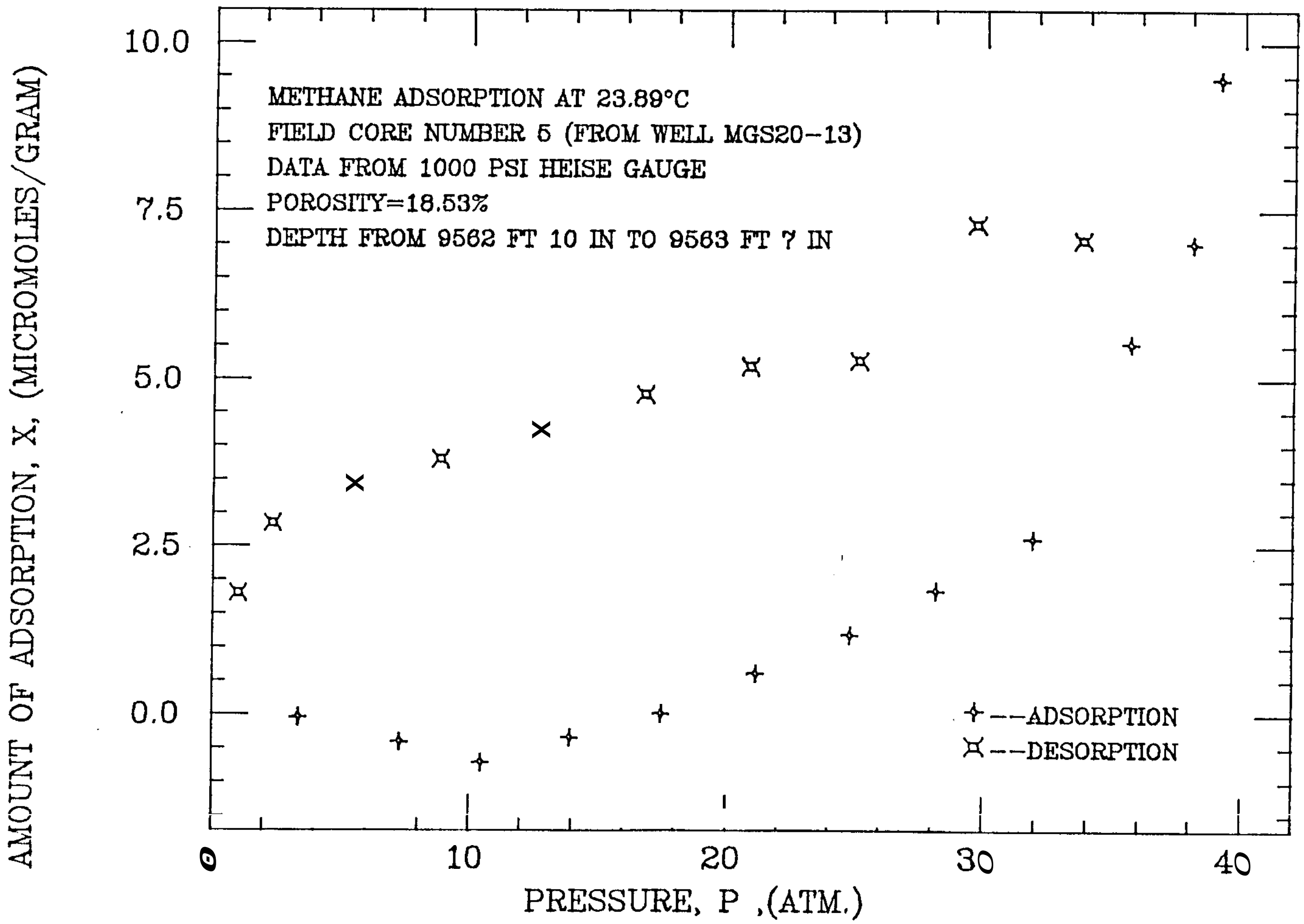


Figure 5.18 Methane Adsorption Isotherm at Room Temperature

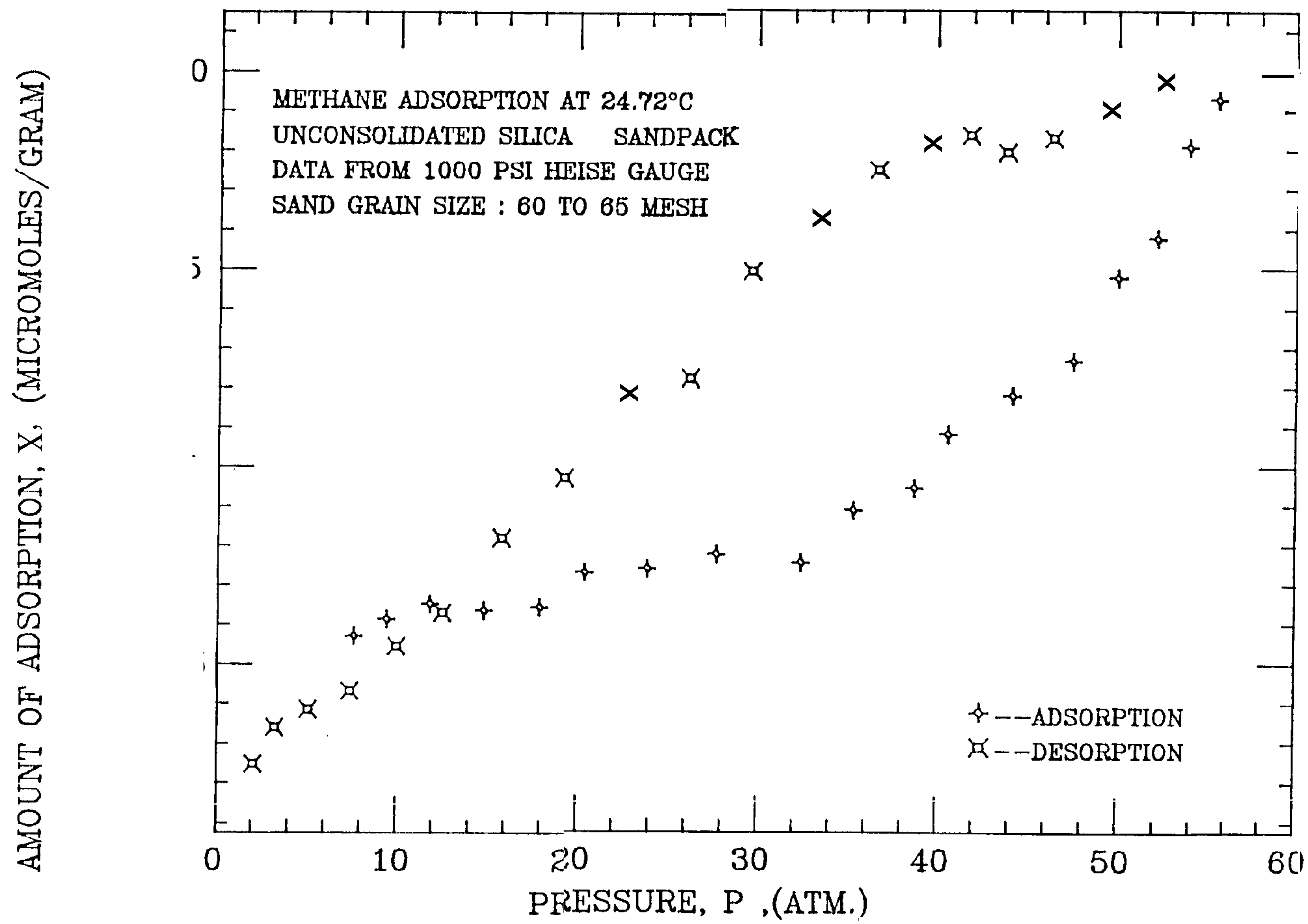


Figure 5.19 Methane Adsorption Isotherm at Room Temperature

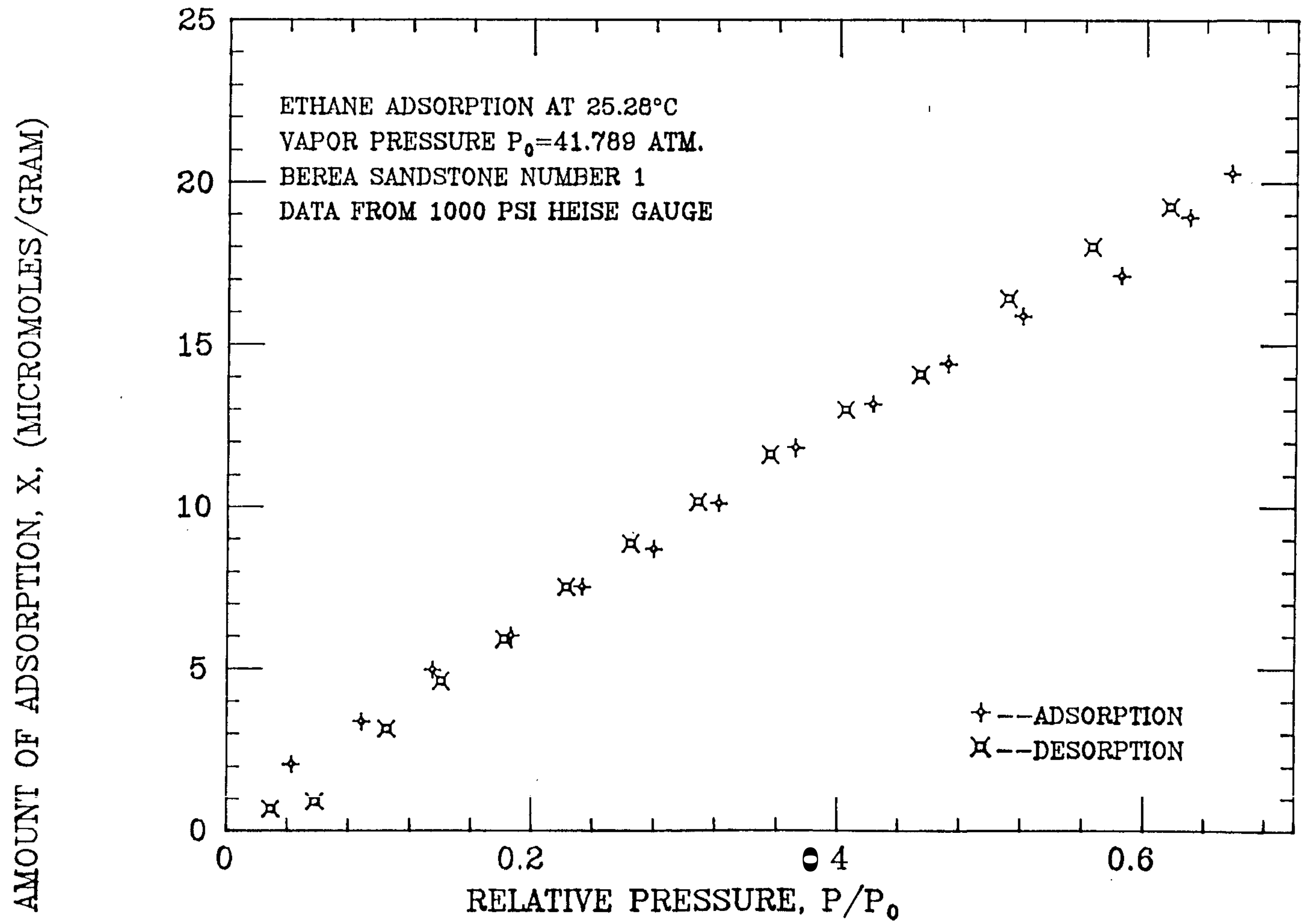


Figure 5.20 Ethane Adsorption Isotherm at Room Temperature

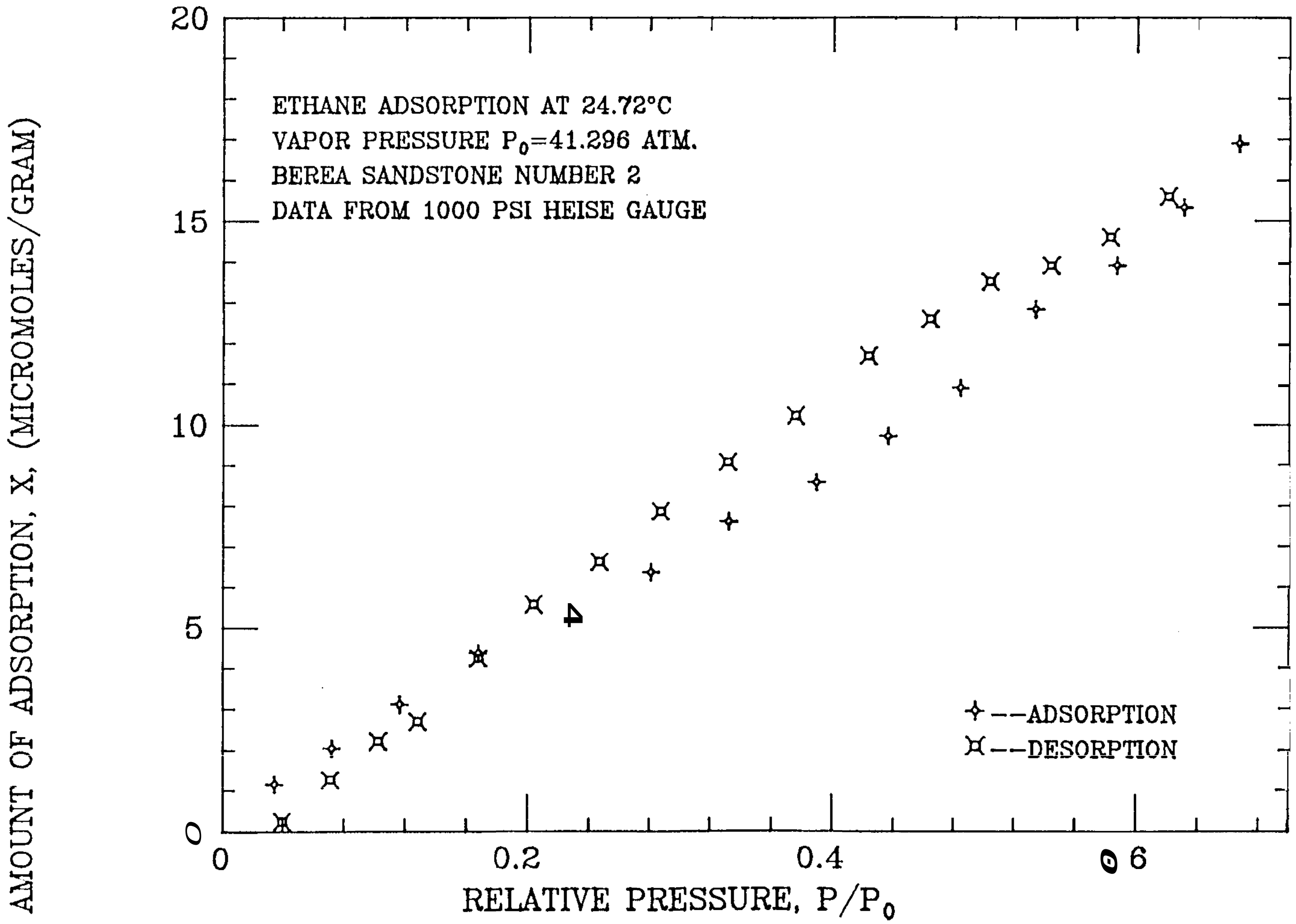


Figure 5.21 Ethane Adsorption Isothrm at Room Temperature

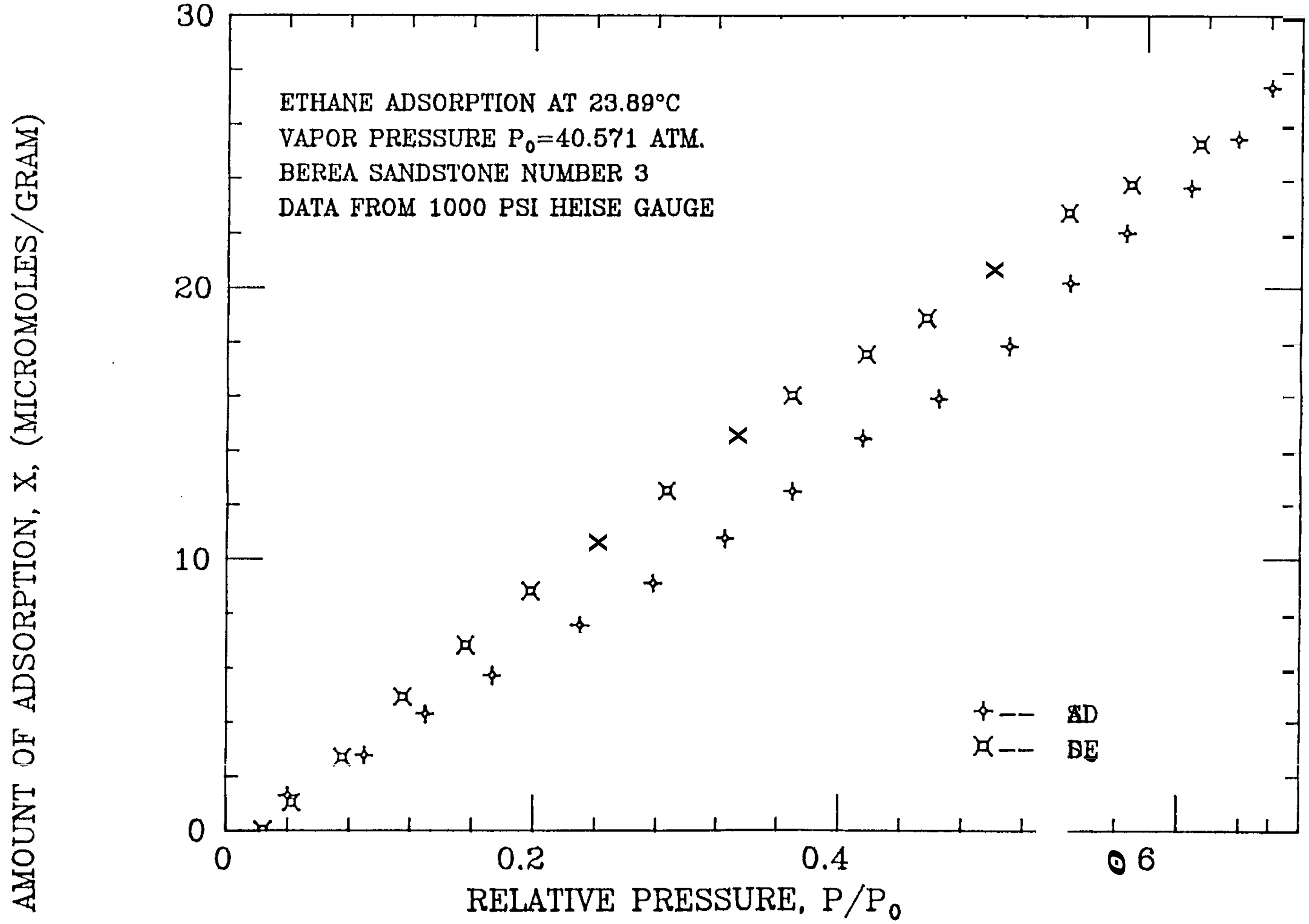


Figure 5.22 Ethane Adsorption Isotherm at Room Temperature

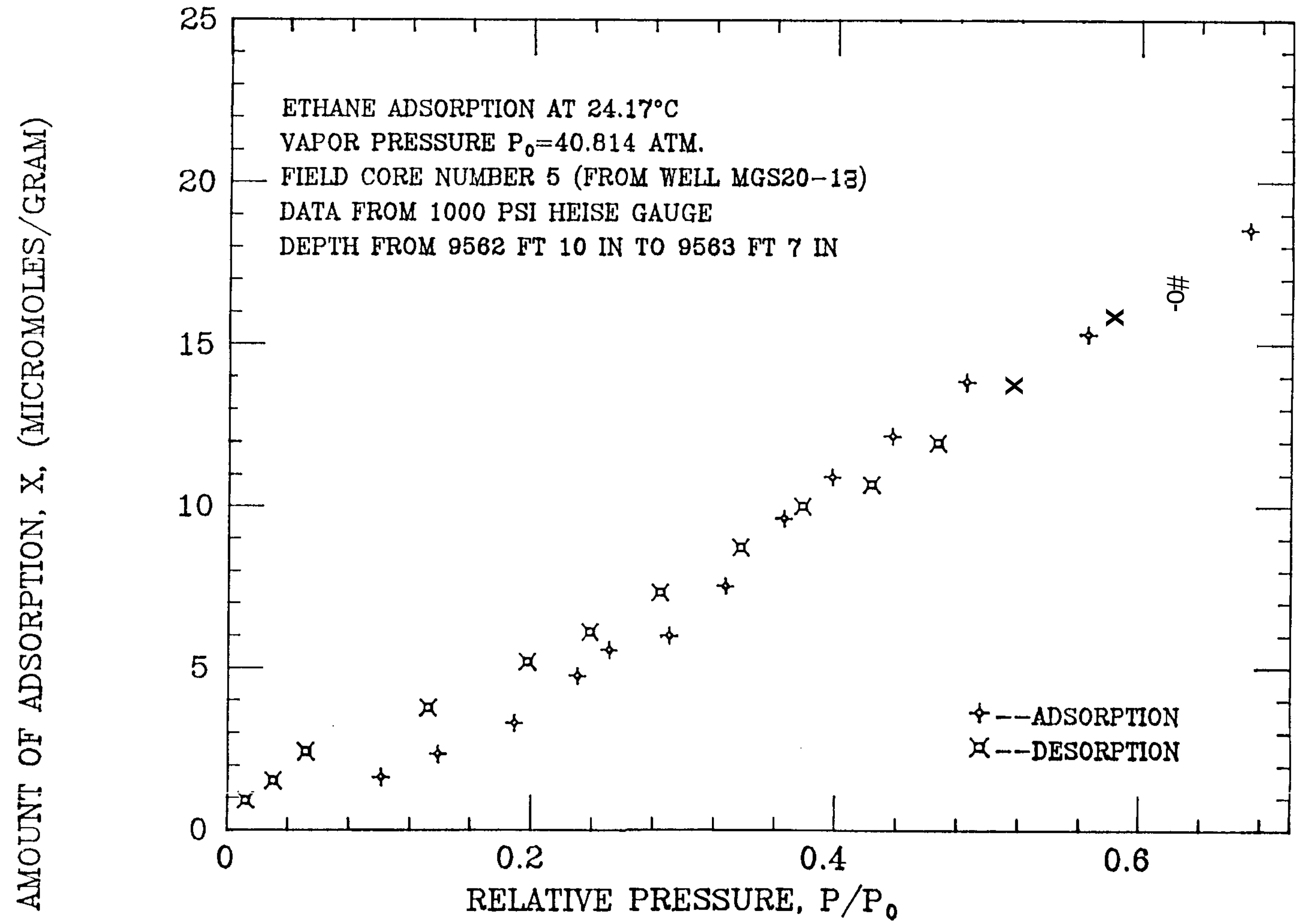


Figure 5.23 Ethane Adsorption Isotherm at Room Temperature

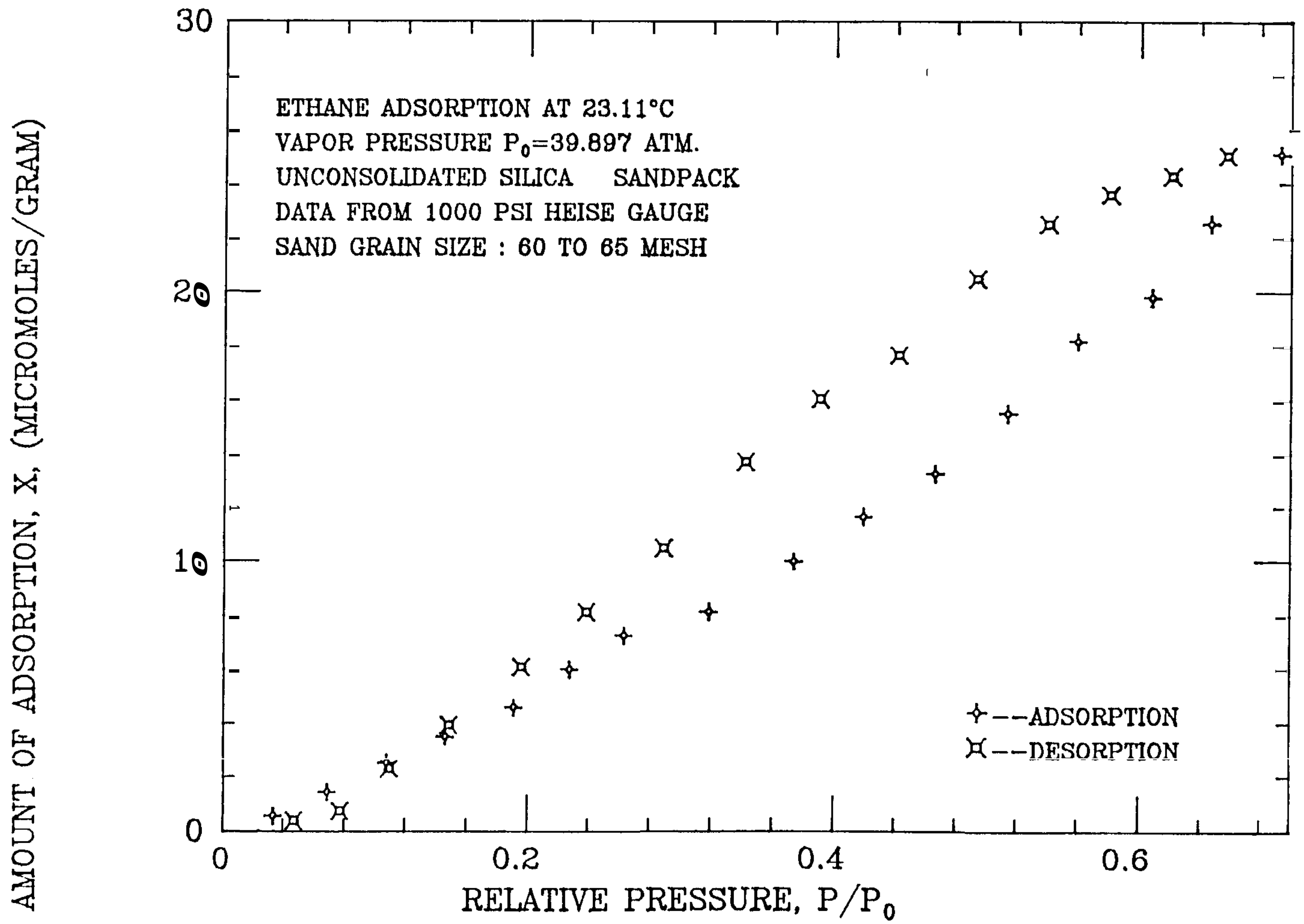


Figure 5.24 Ethane Adsorption Isotherm at Room Temperature

was studied carefully for potential geothermal steam reservoir information. Figures 5.25-5.86 present the results for water adsorbed on different rock samples at elevated temeratures. Experimental results are given in Appendix C.

In 1977, Nonaka and Ishizaki[42] observed that there exists a stepwise multiple adsorption of water vapor on silica at temperatures between 130°C and 150°C. This phenomenon was not found in this experiment. The reason for this is probably because the composition of rock samples are much more complicated from that of the pure silica used by Nonaka and Ishizaki.

As temperature exceeds 165°C-170°C, irreversible adsorption was observed in the experiment. It has been suggested t'hat silica can interact with water when the temperature is more than 165°C, chemical reaction might occur and cause the irreversible adsorption.

In general, the adsorption data are much more accurate than the desorption data because the desorption data contained much accumulated error. Data were taken by an accumulative method; thus, all desorption data necessarily contained more accumulated error than adsorption data. The following analysis is based on adsorption data only.

No significant hysteresis loops were obtained in water adsorption isotherms. A further analysis of experimental data suggested that water adsorption is due to the existence of micropores.

Figures 5.87-5.96 are the characteristic curves of rock samples. The "characteristic curve" is a graph of the potential of the adsorbed fluid, A, versus the quantity of adsorption. The physical meaning A is the difference of chemical potential between the adsorbed fluid and

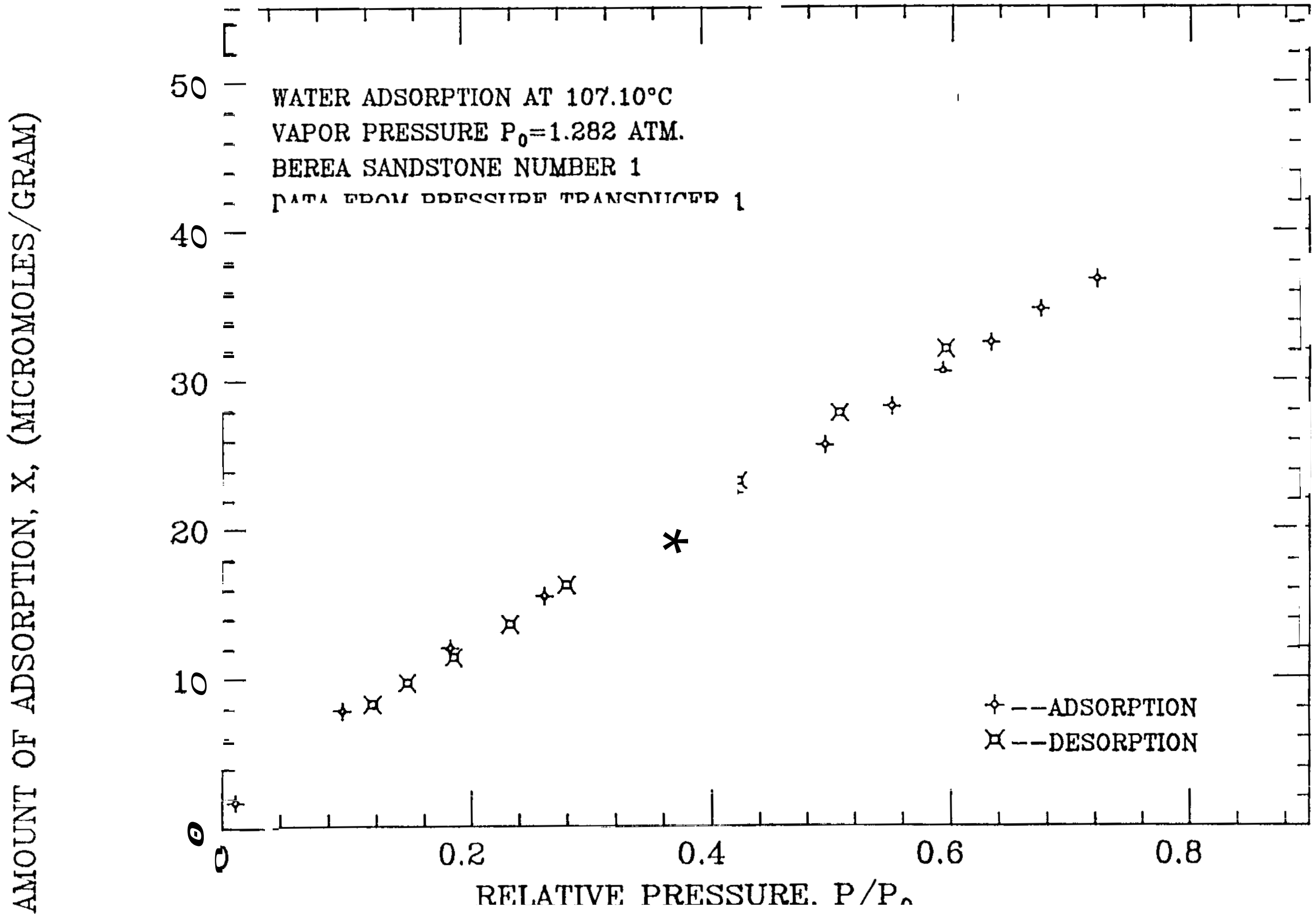


Figure 5 25 Water Adsorption Isotherm at Elevated Temperature

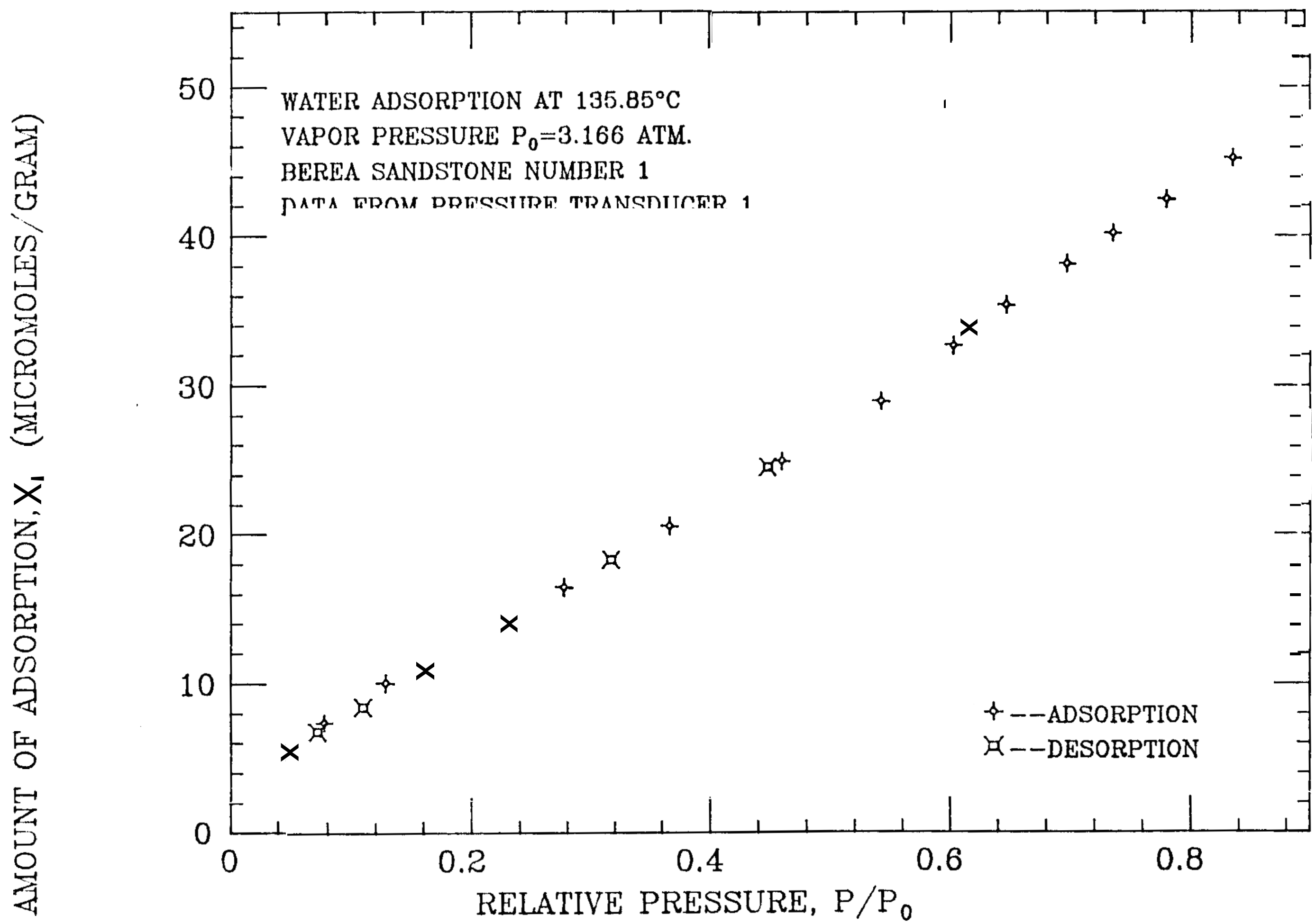


Figure 5.29 Water Adsorption Isotherm at Elevated Temperature

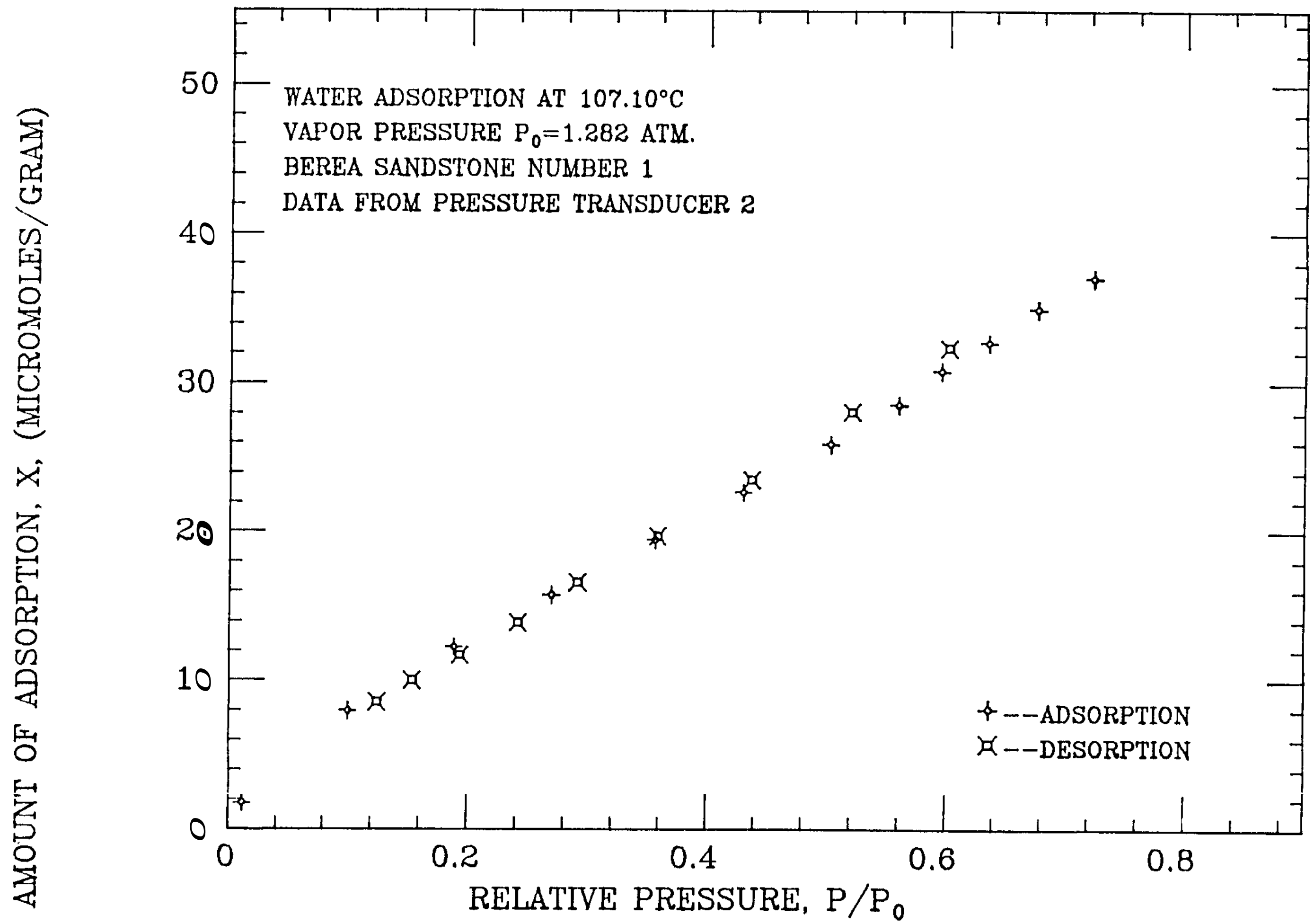


Figure 5.26 Water Adsorption Isotherm at Elevated Temperature

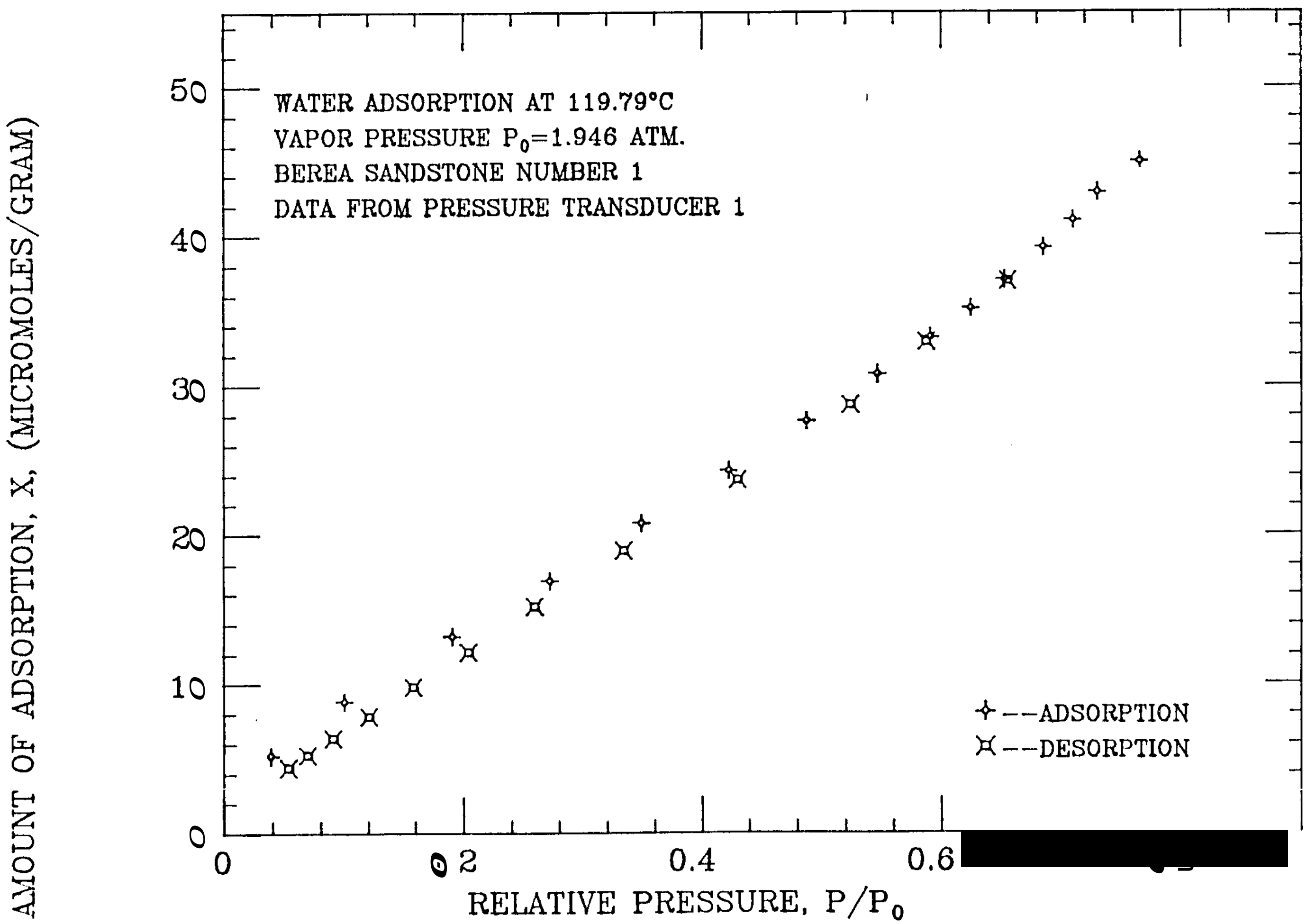


Figure 5.27 Water Adsorption Isotherm at Elevated Temperature

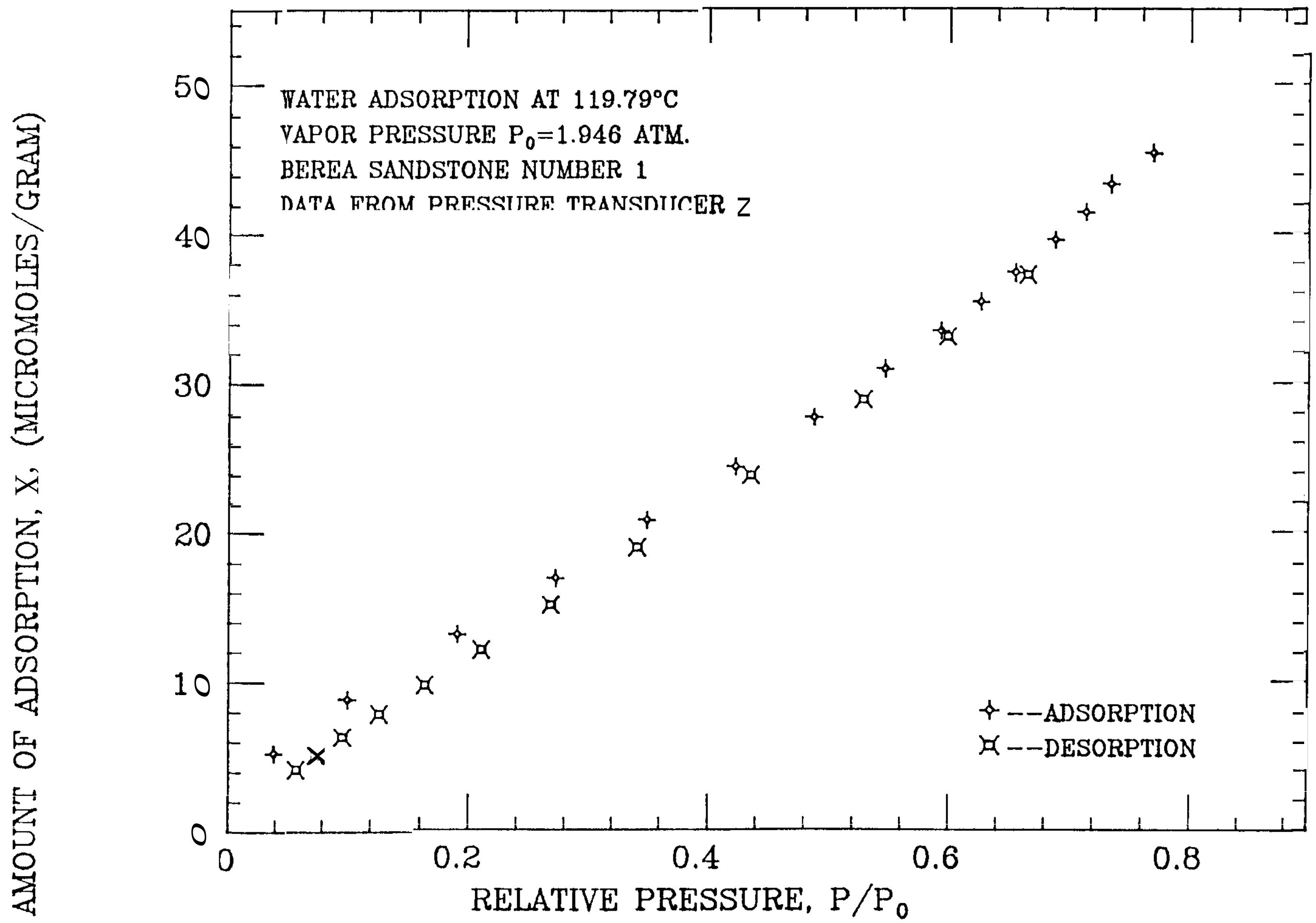


Figure 5 28 Water Adsorption Isotherm at Elevated Temperature

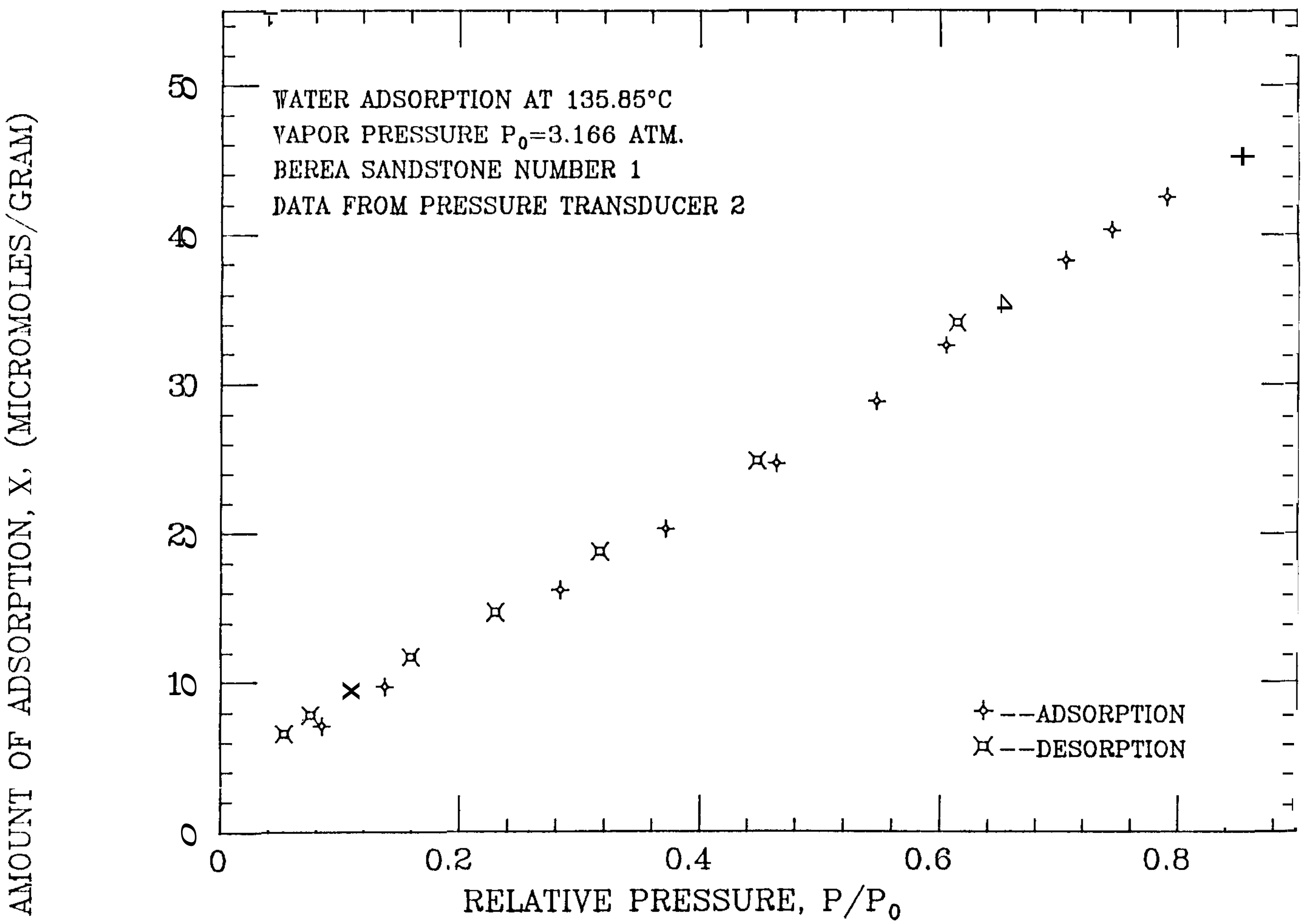


Figure 5.30 Water Adsorption Isotherm at Elevated Temperature

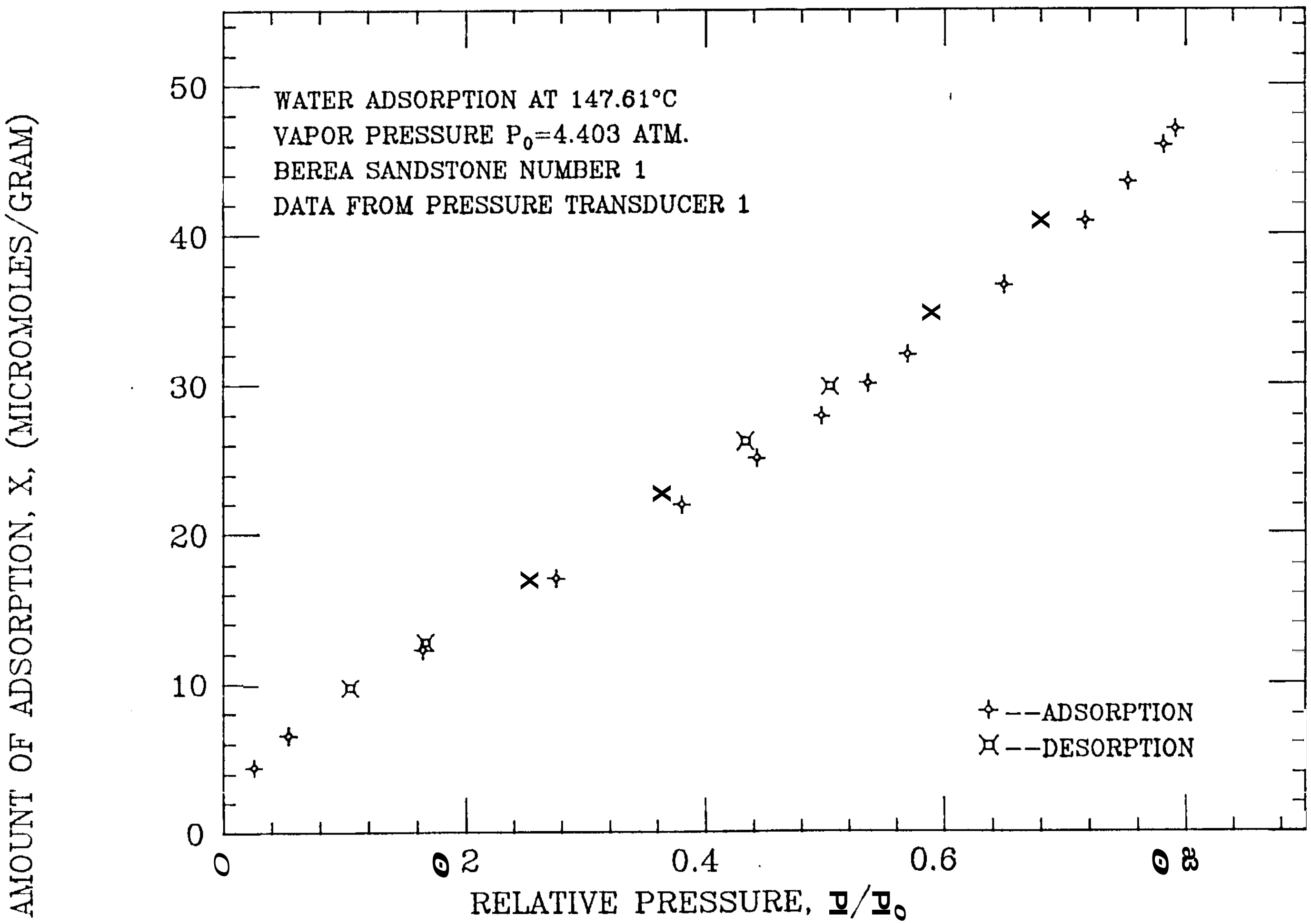


Figure 5 31 Water Adsorption Isotherm at Elevated Temperature

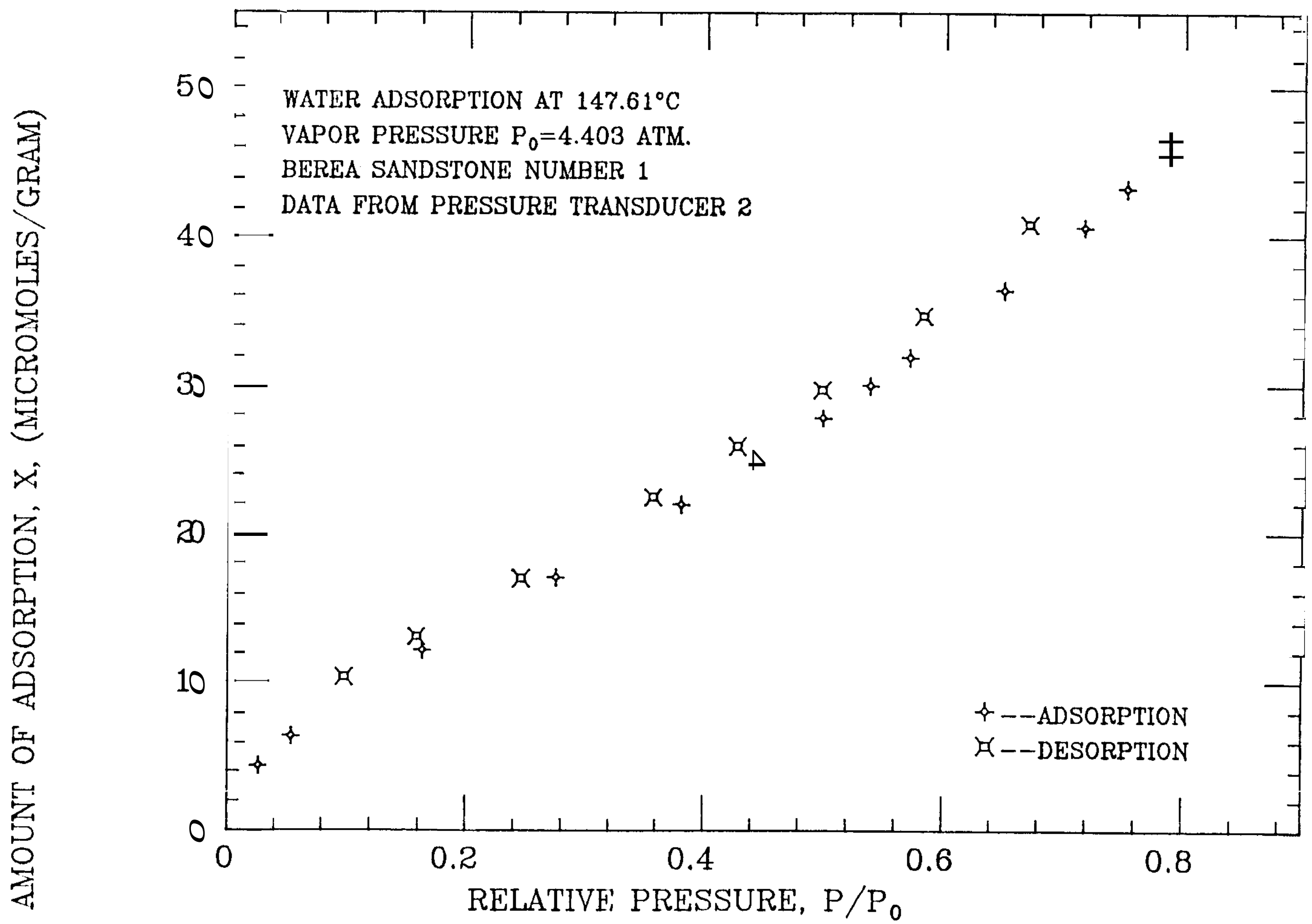


Figure 5.32 Water Adsorption Isotherm at Elevated Temperature

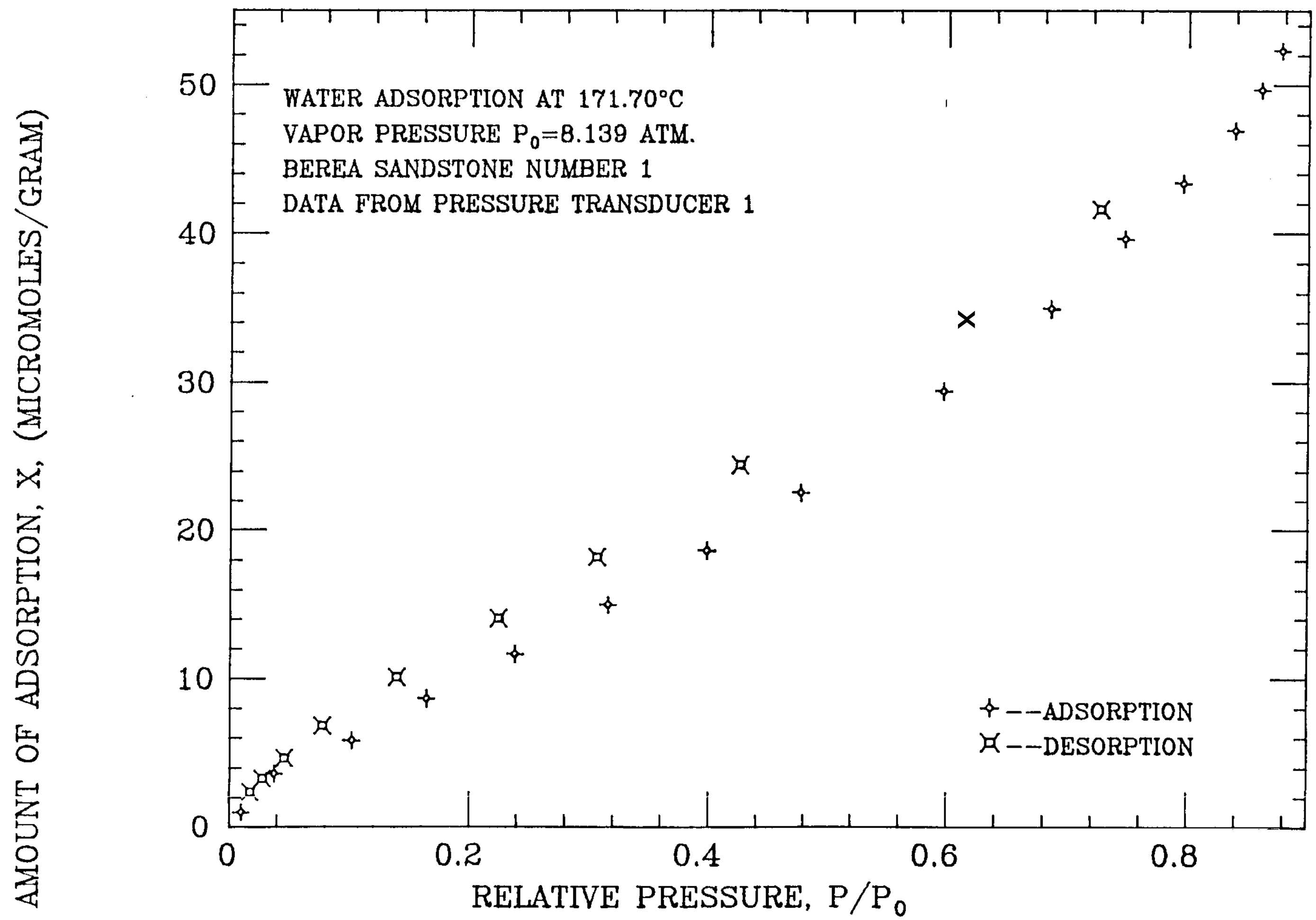


Figure 5 -3 Water Adsorption Isotherm at Elevated Temperature

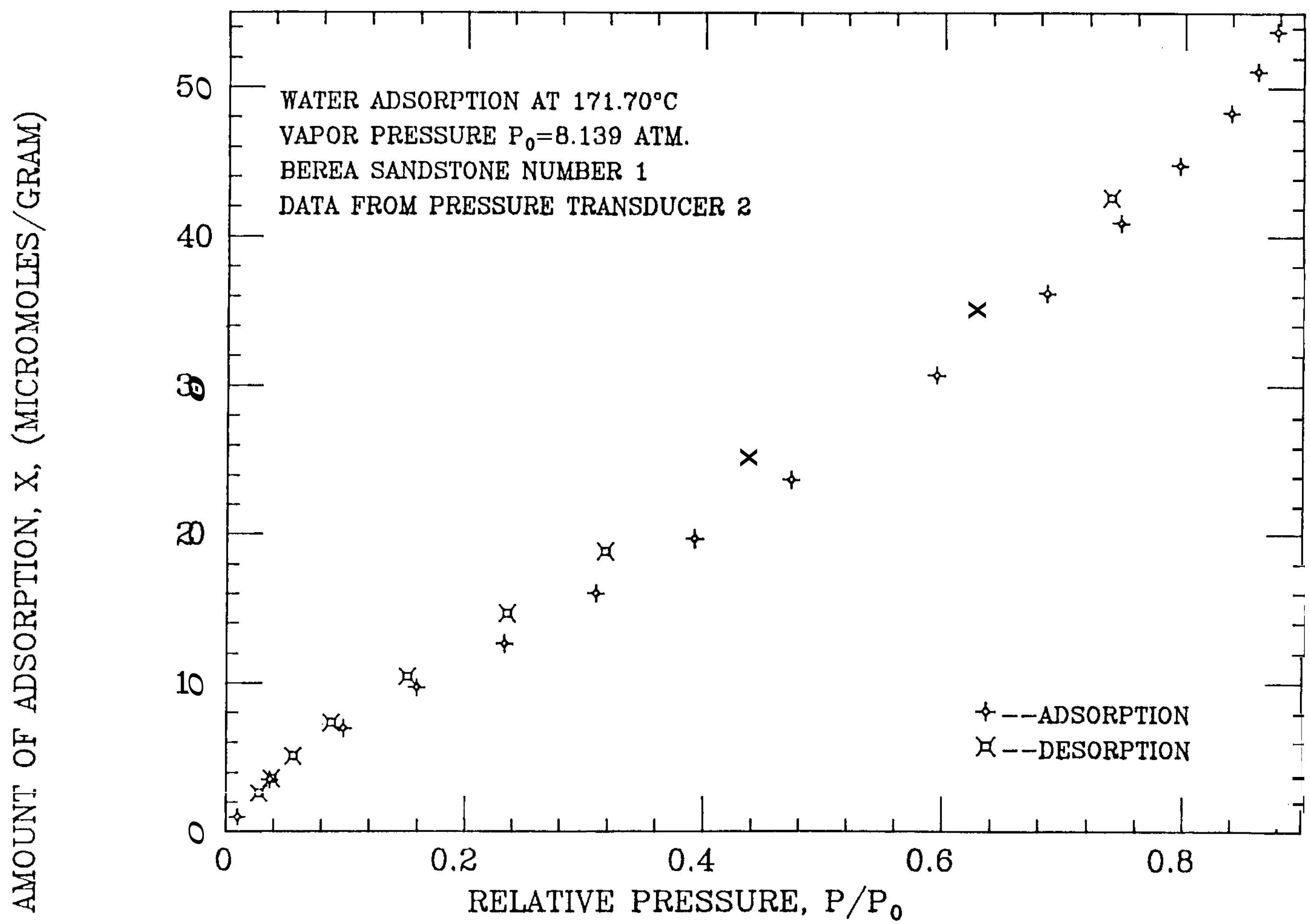


Figure 5.34 Water Adsorption Isotherm at Elevated Temperature

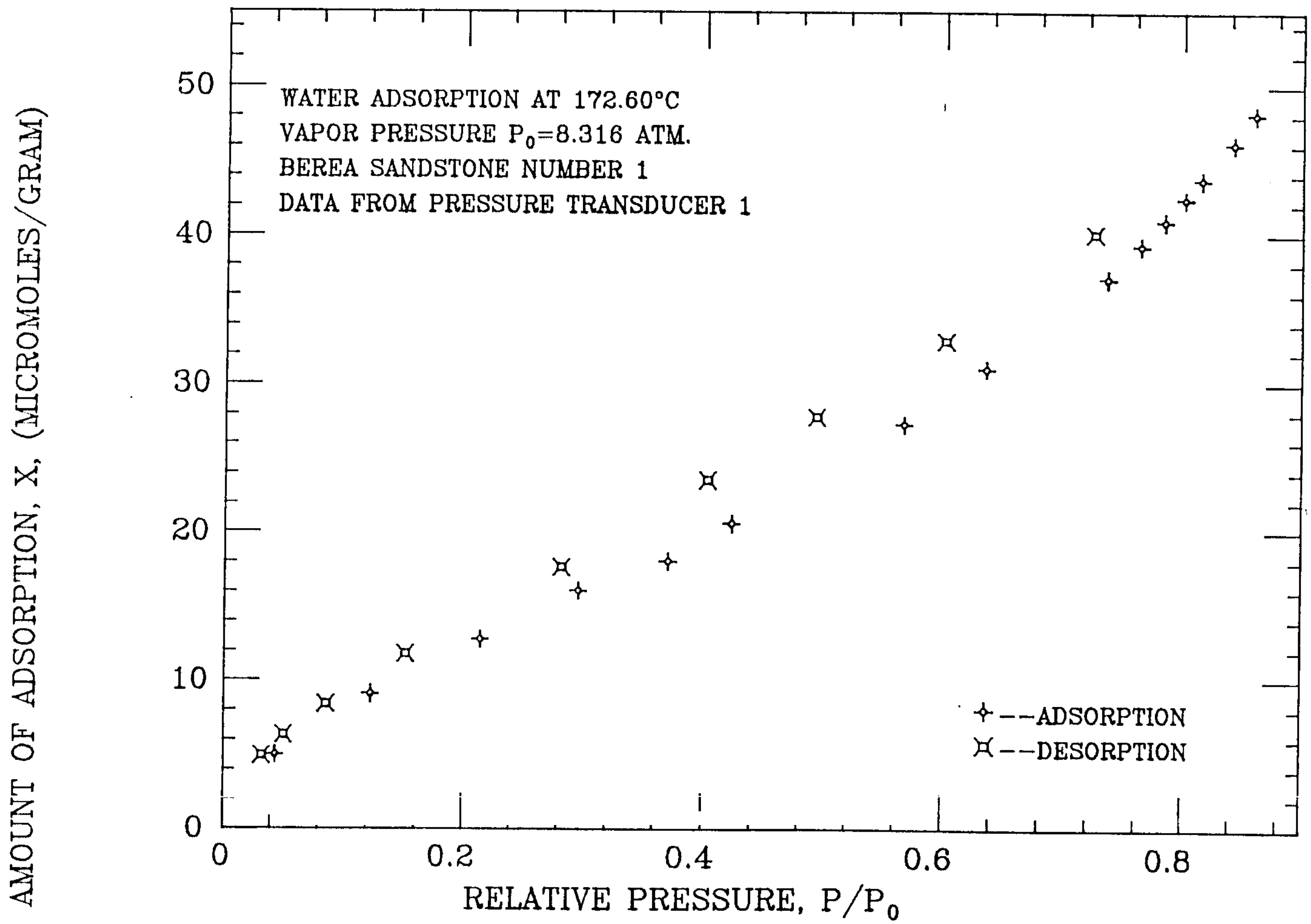


Figure 5.35 Water Adsorption Isotherm at Elevated Temperature

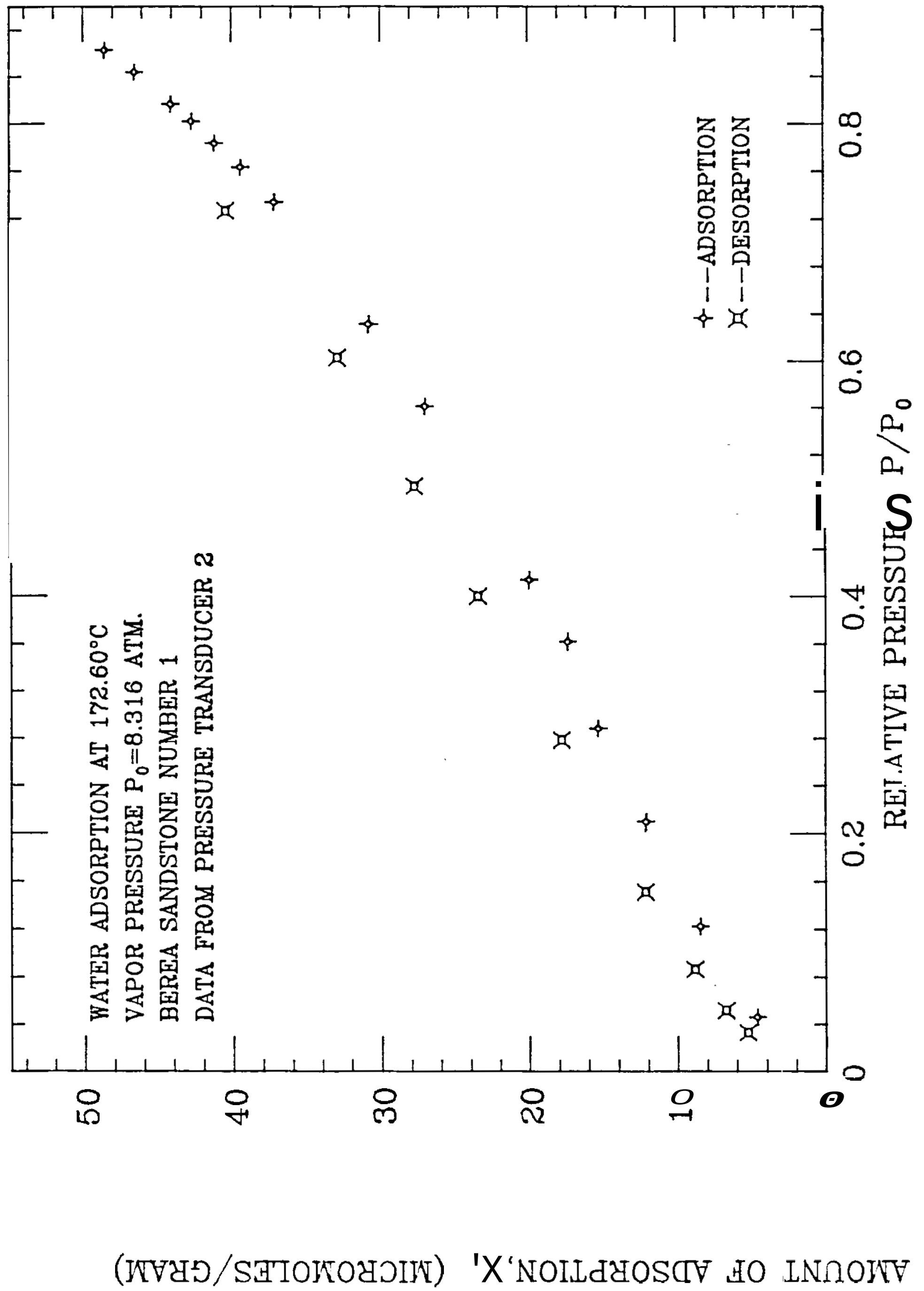


Figure 5.36 Water Adsorption Isotherm at Elevated Temperature

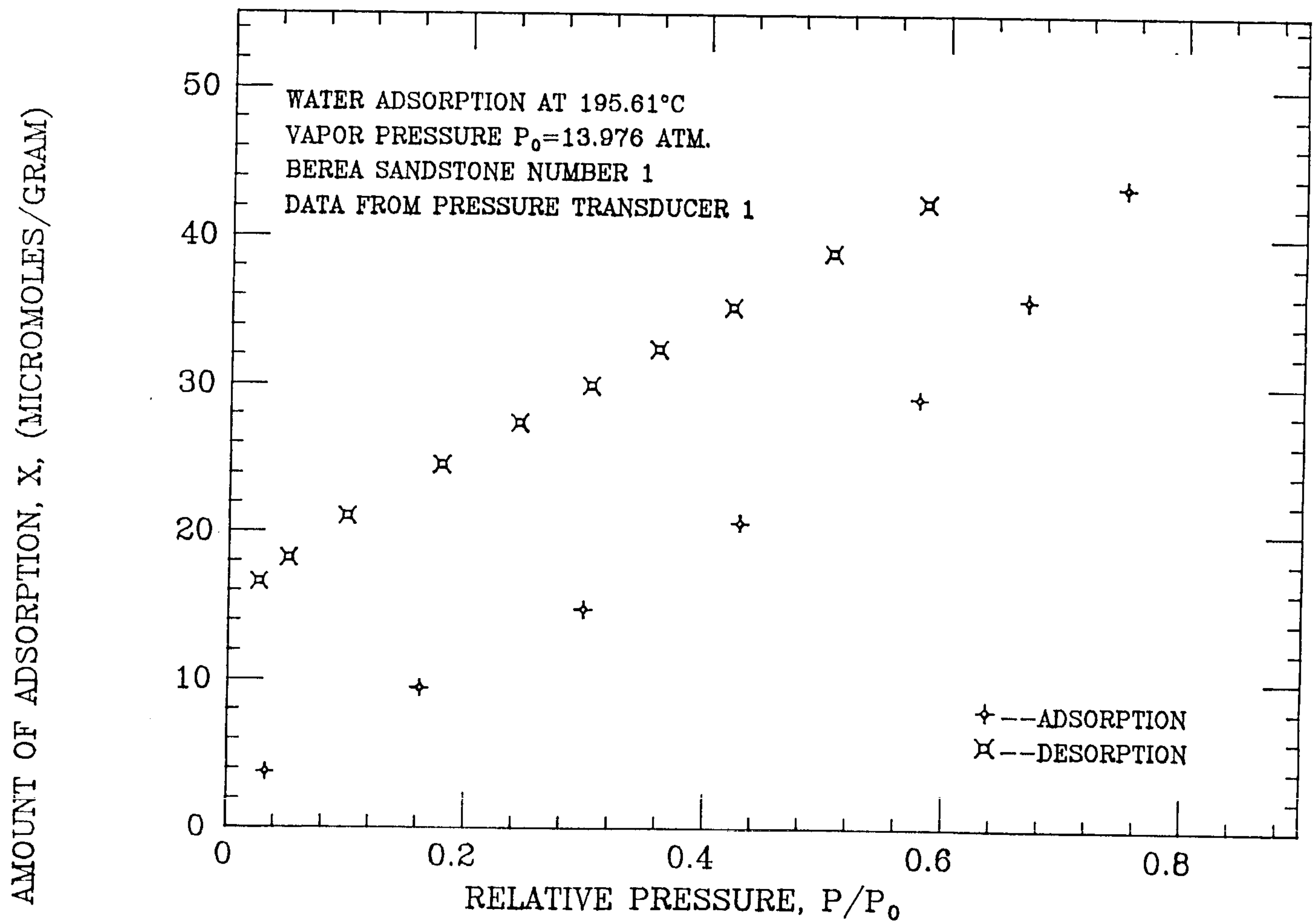


Figure 5.37 Water Adsorption Isotherm at Elevated Temperature

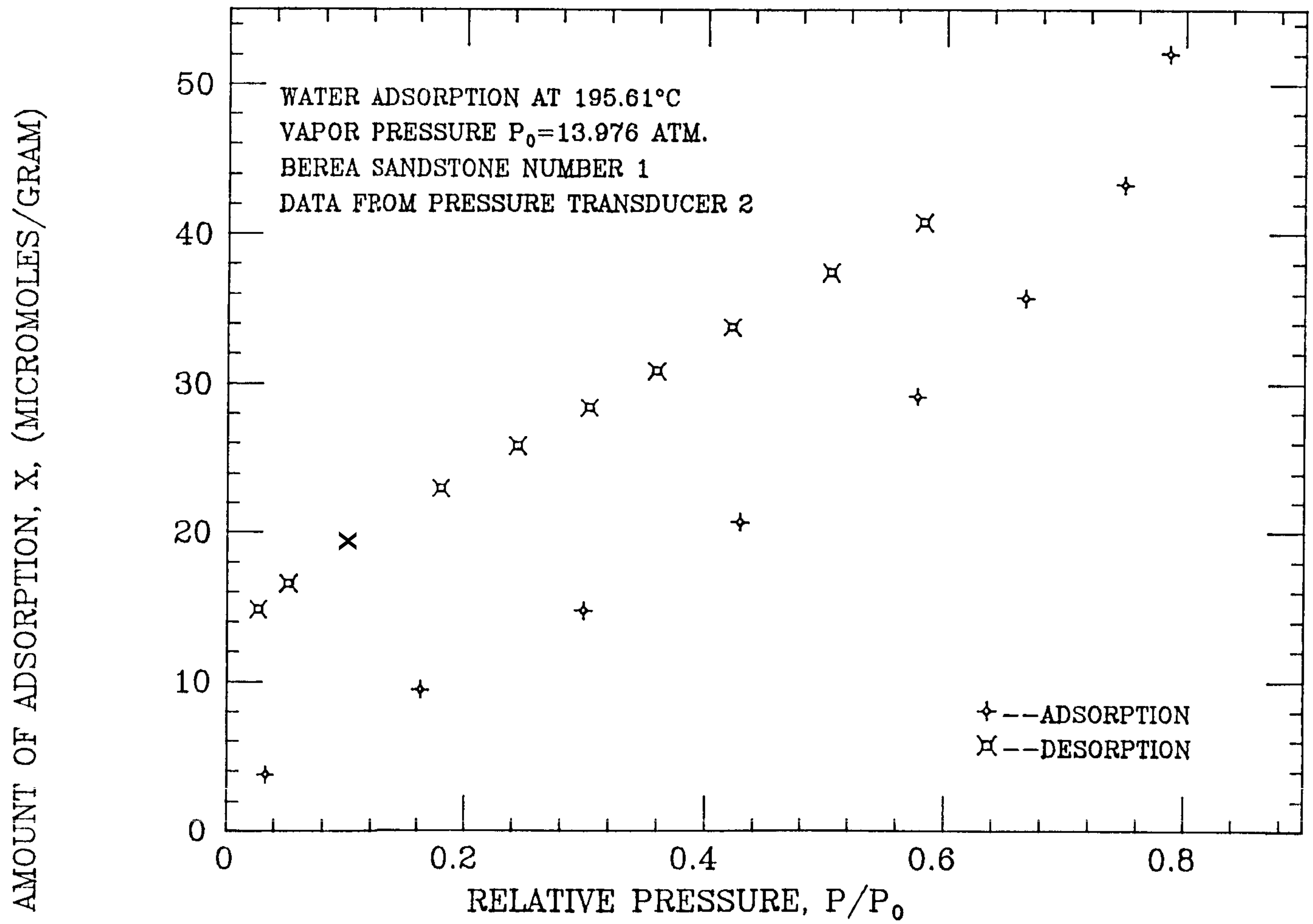


Figure 5 38 Water Adsorption Isotherm at Elevated Temperature

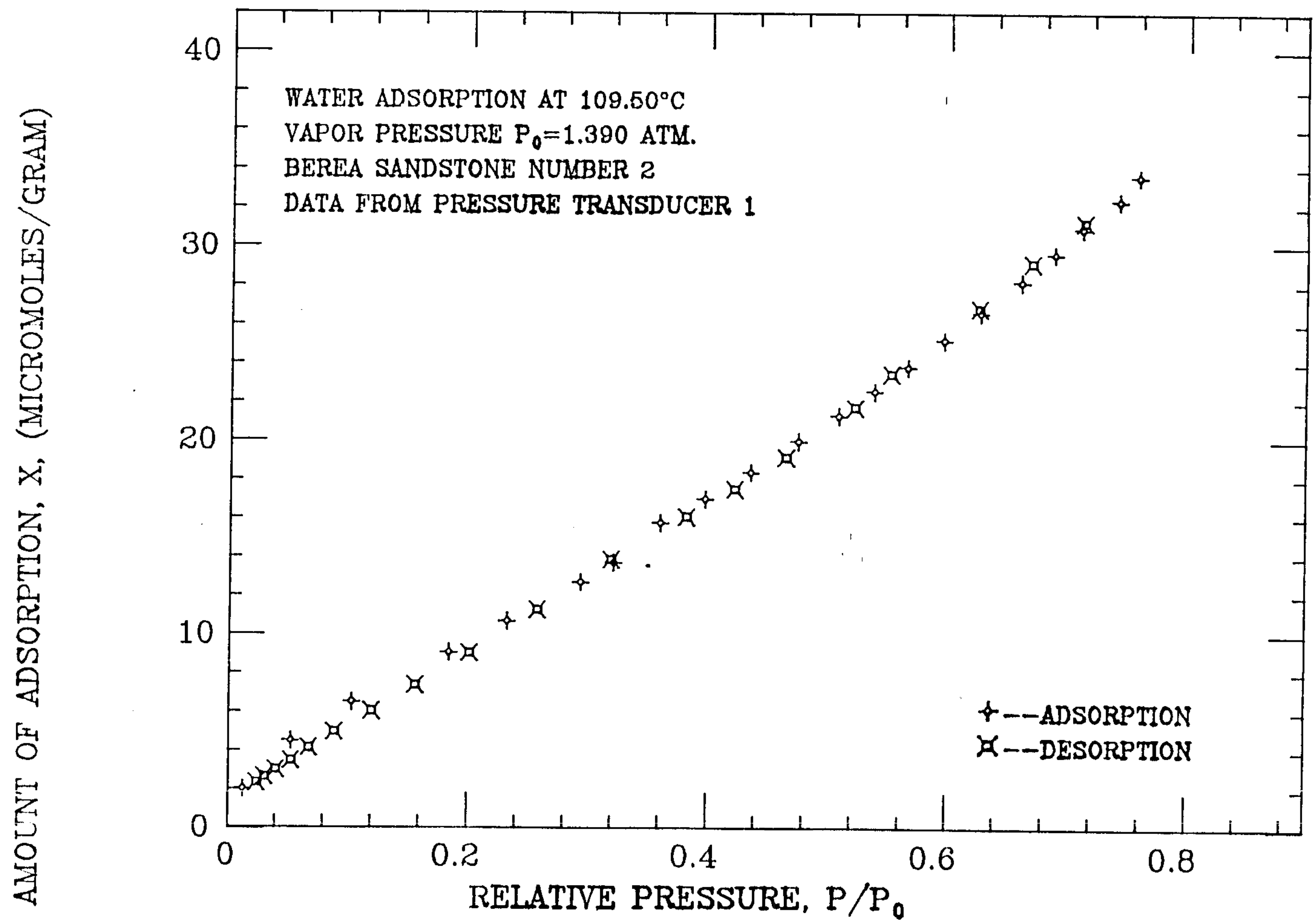


Figure 5.39 Water Adsorption Isotherm at Elevated Te erature

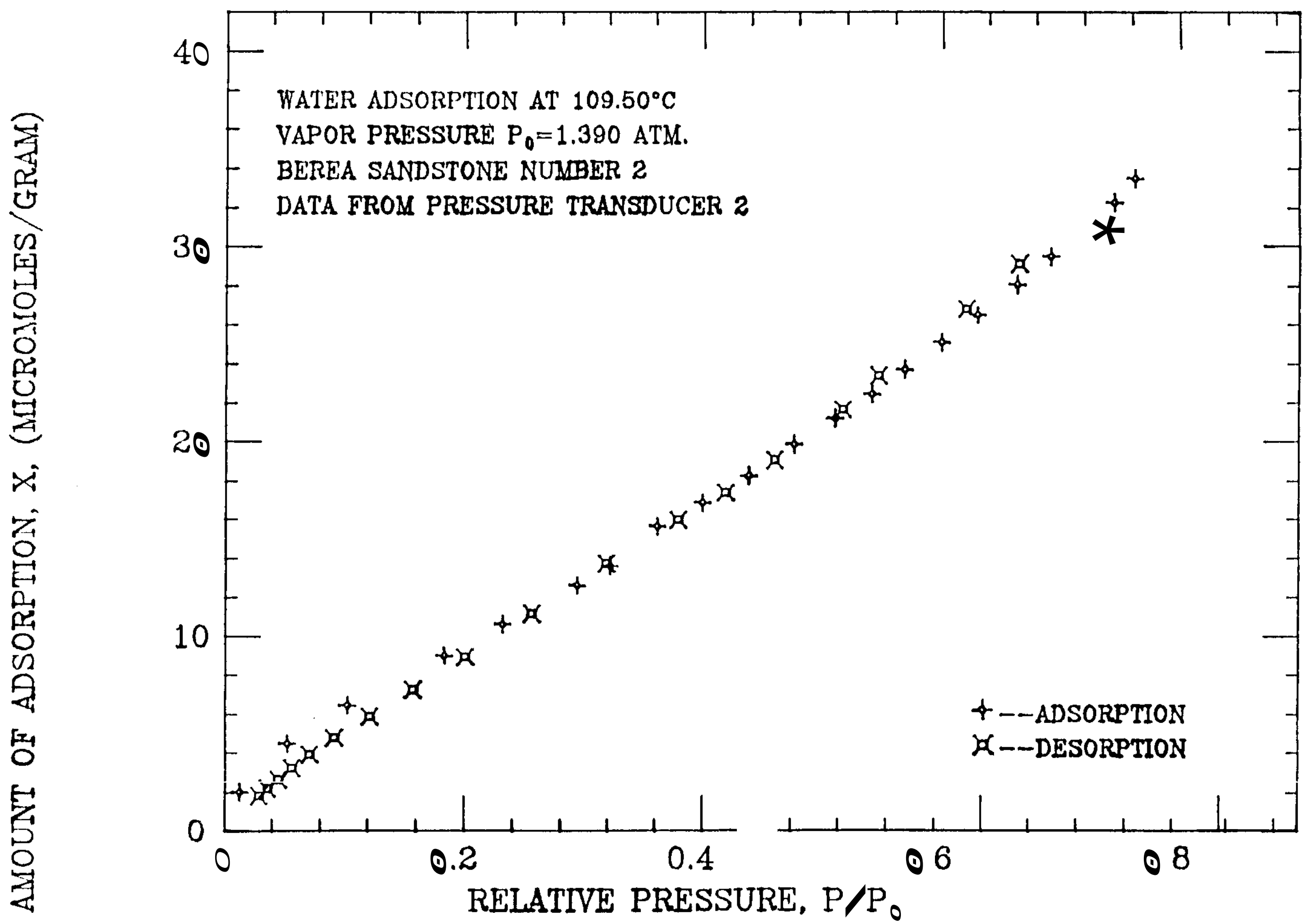


Figure 5.40 Water Adsorption Isotherm at Elevated Temperature

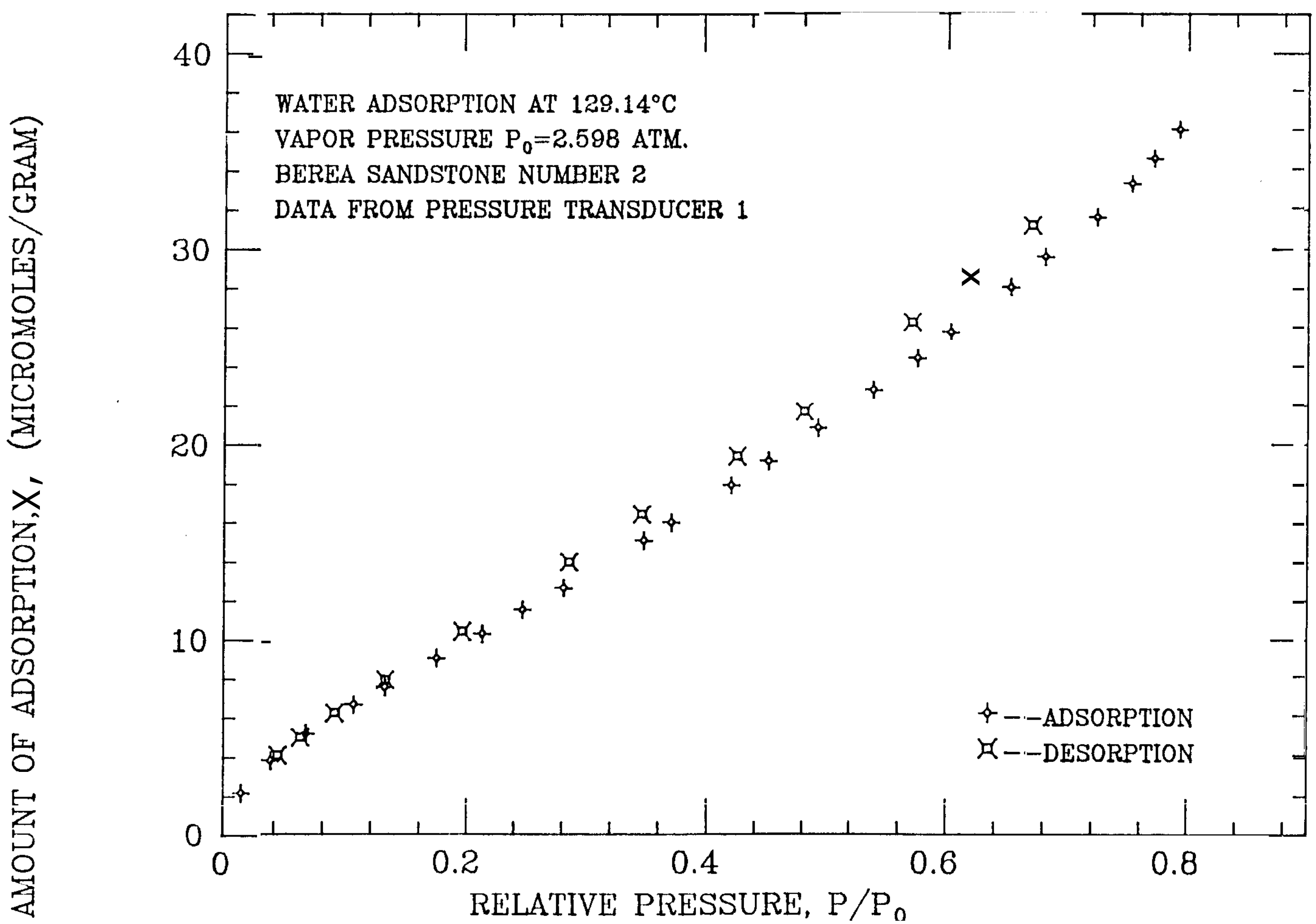


Figure 5 41 ter Adsorpti Isotherm at Elevated Temperature

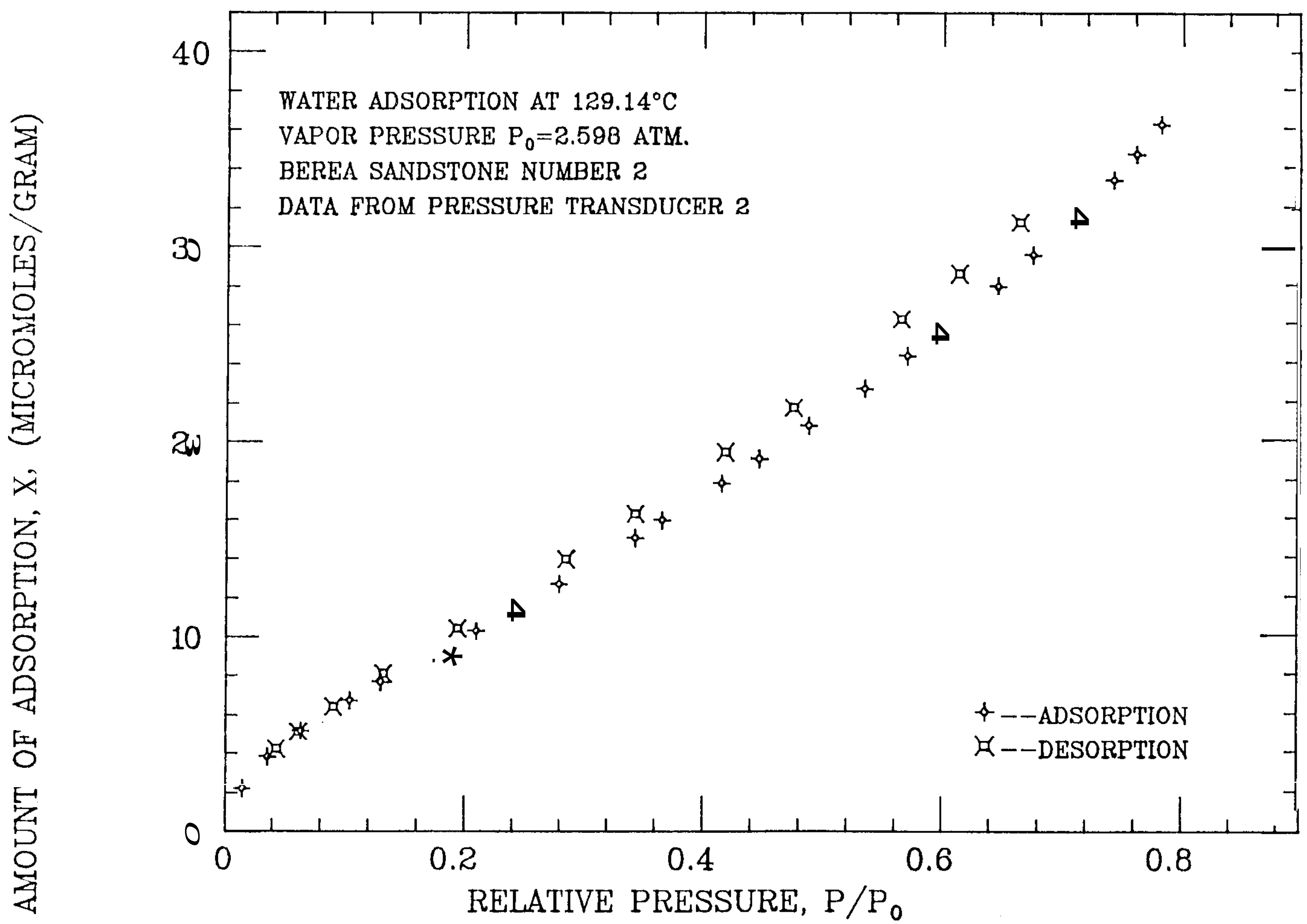


Figure 5.42 Water Adsorption Isotherm at Elevated Temperature

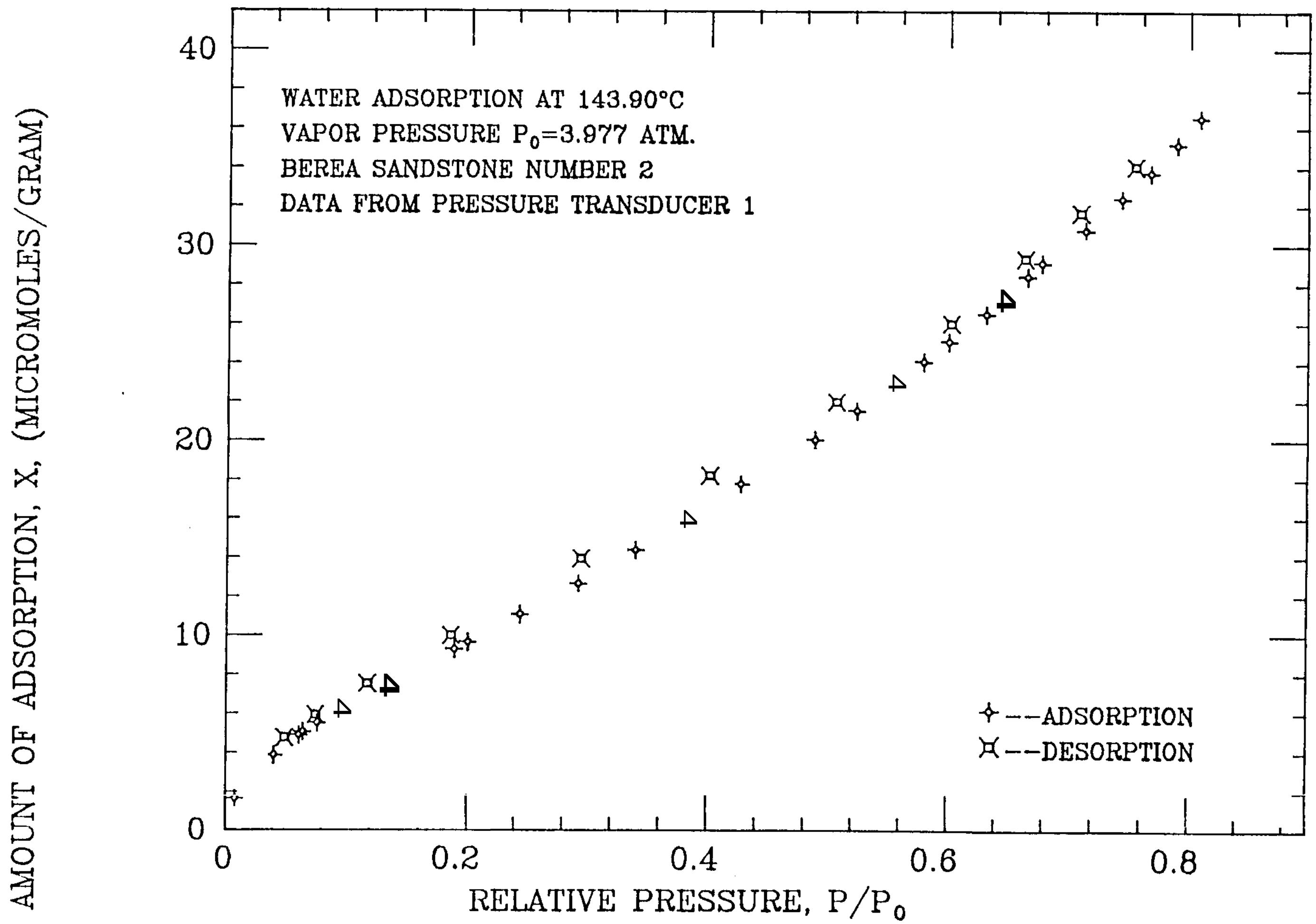


Figure 5.43 Water Adsorption Isotherm at Elevated Temperature

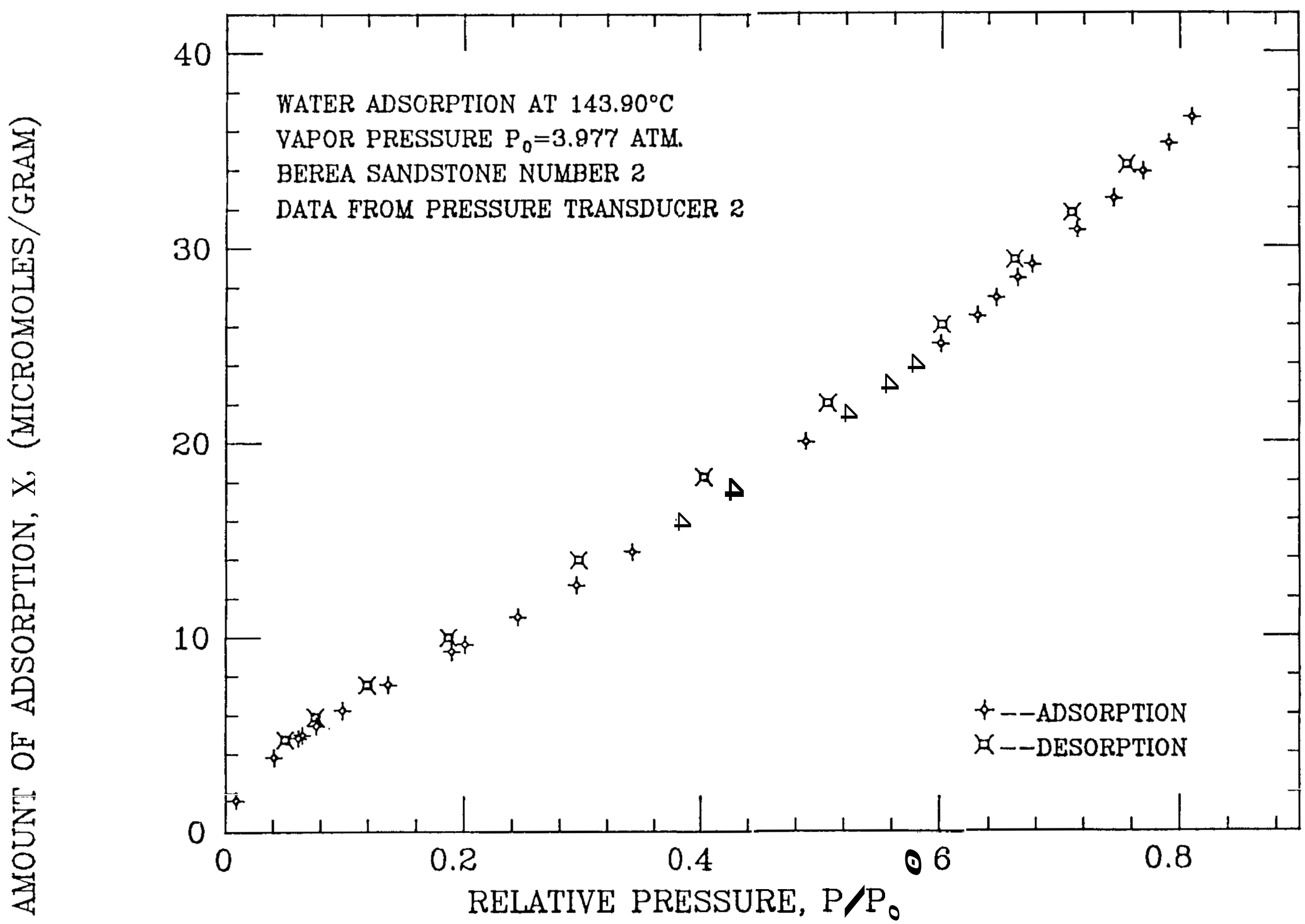


Figure 5.44 Water Adsorption Isotherm at Elevated Temperature

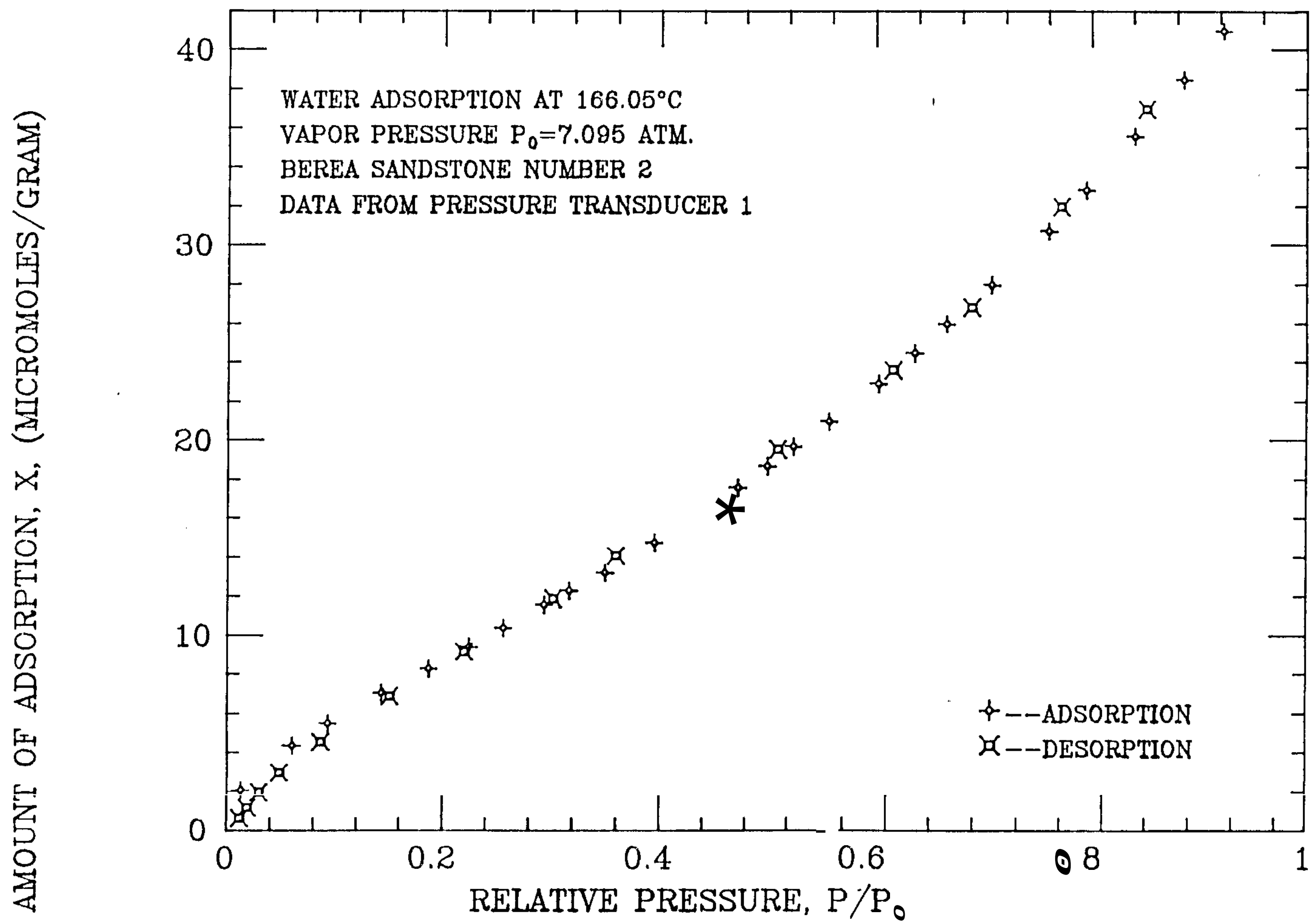


Figure 5.45 Water Adsorption Isotherm at Elevated Temperature

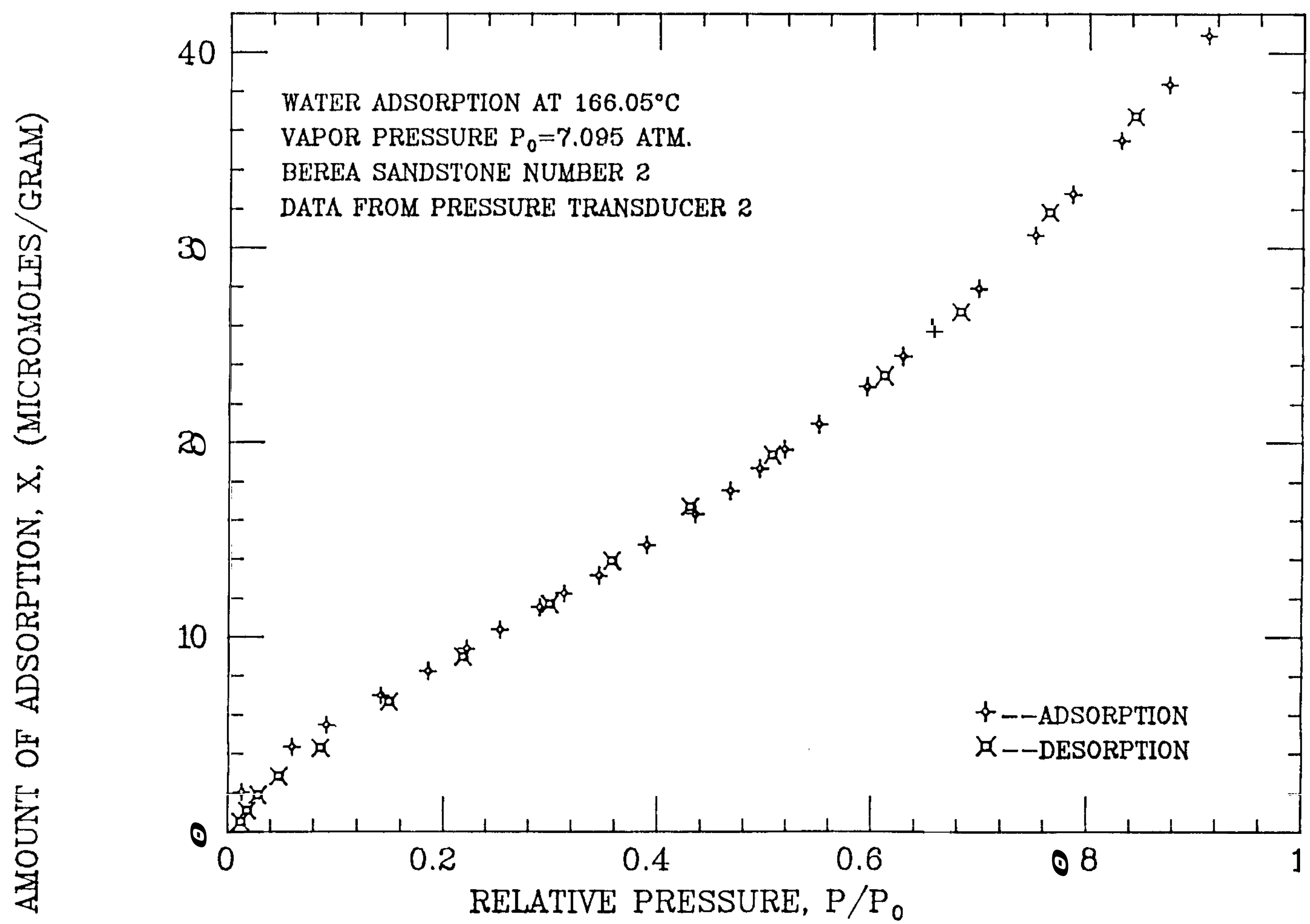


Figure 5.46 Water Adsorption Isotherm at Elevated Temperature

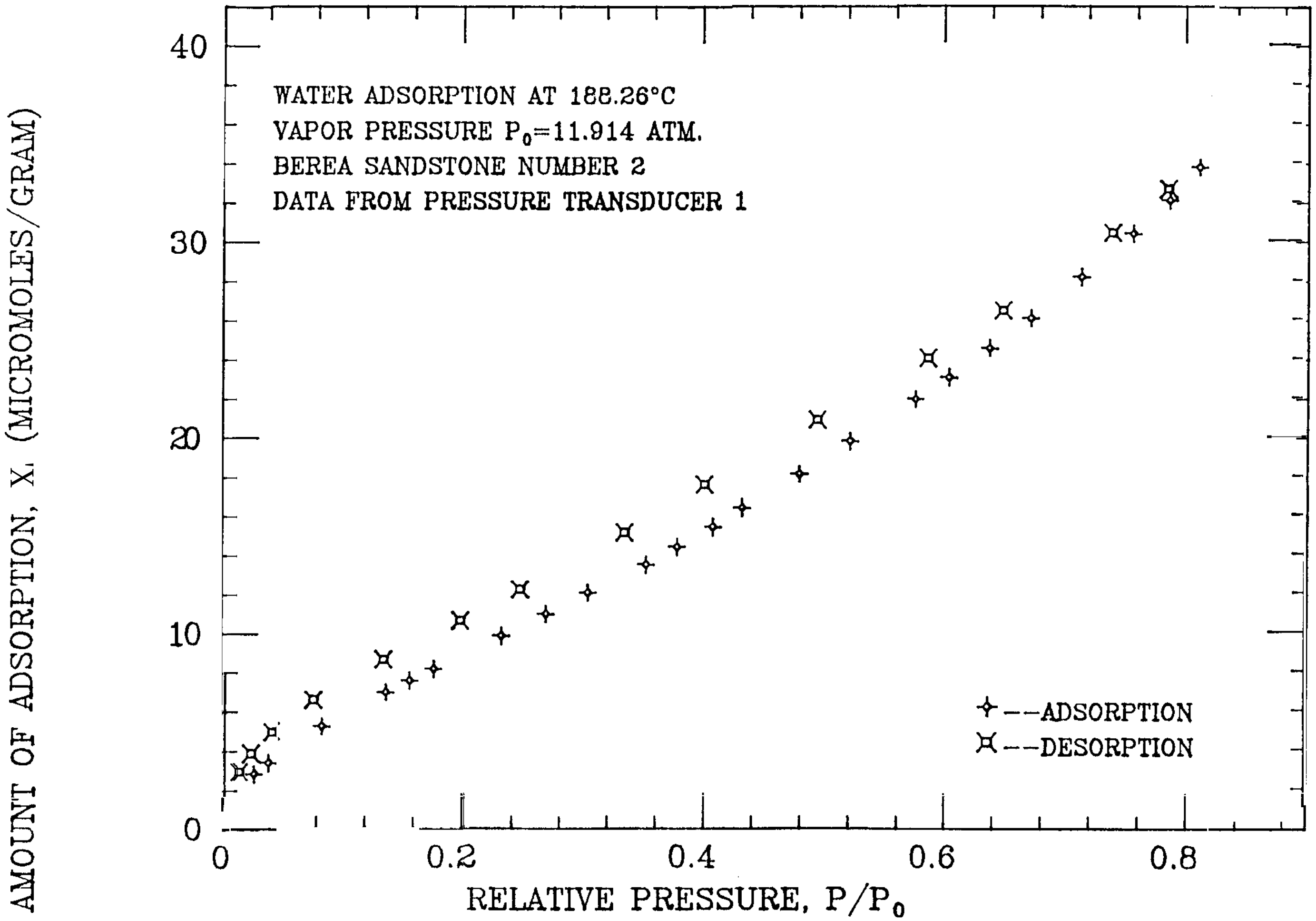


Figure 5 47 ter Adsorption Isotherm at Elevated Temperature

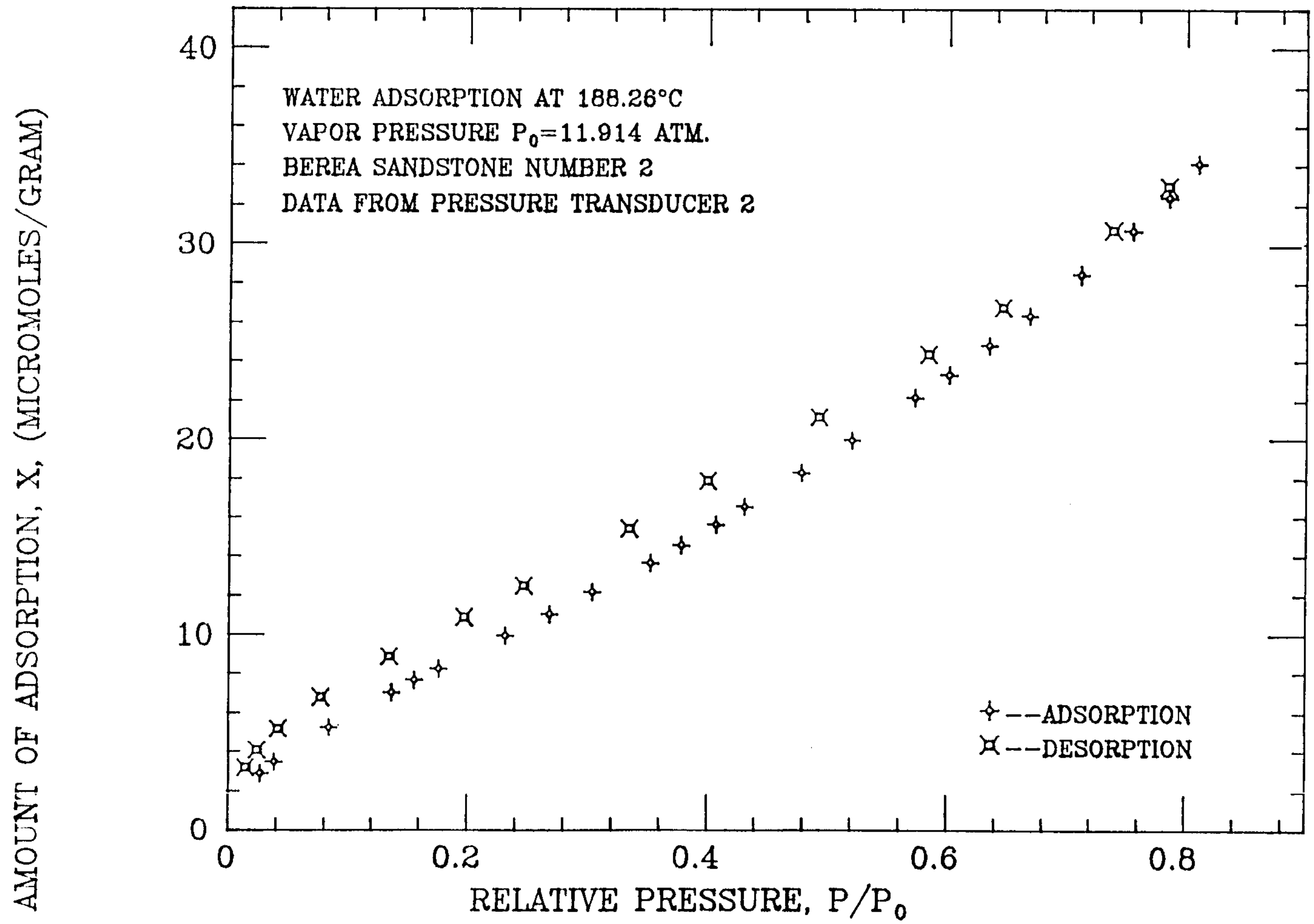
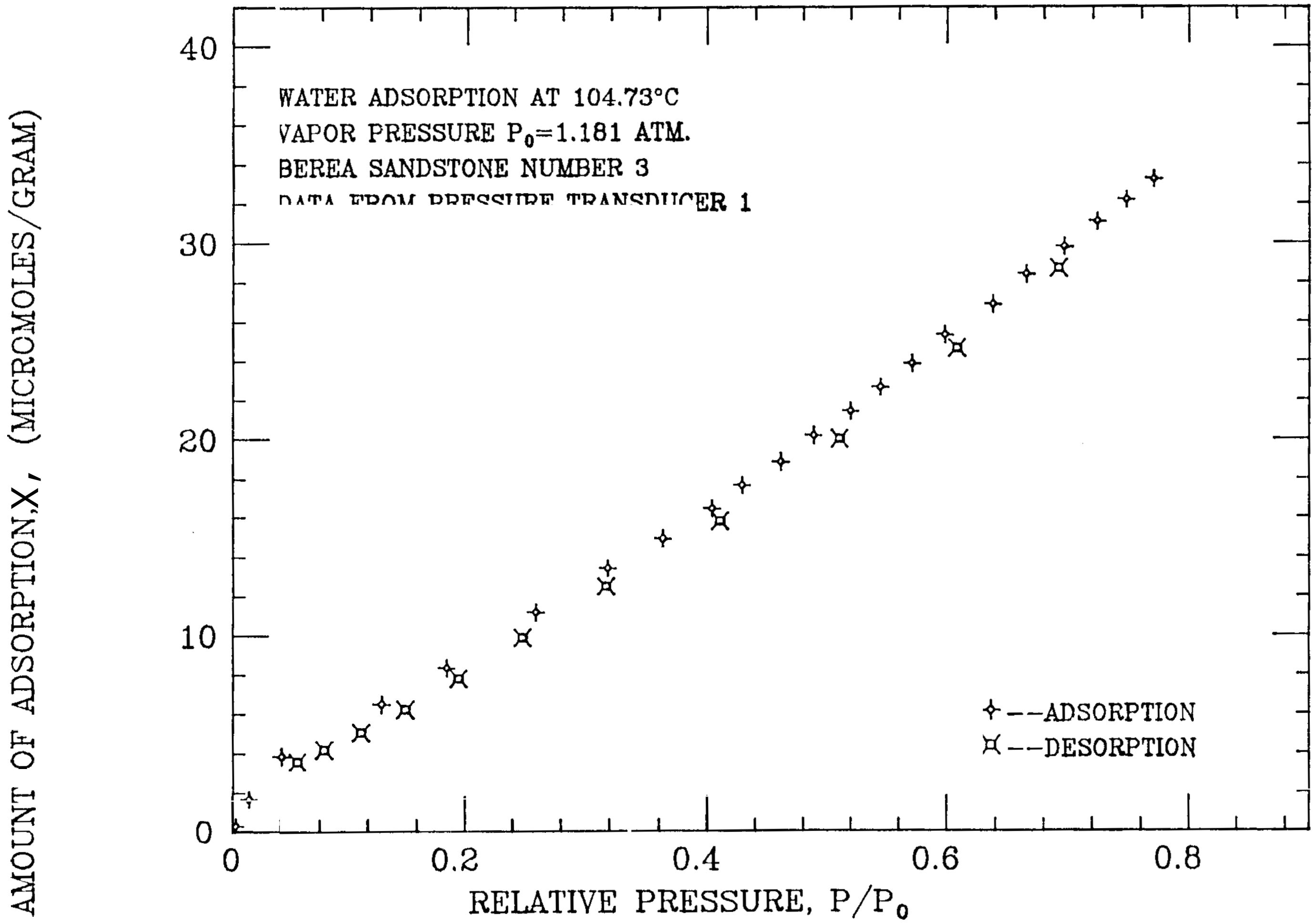


Figure 5.48 Water Adsorption Isotherm at Elevated Temperature



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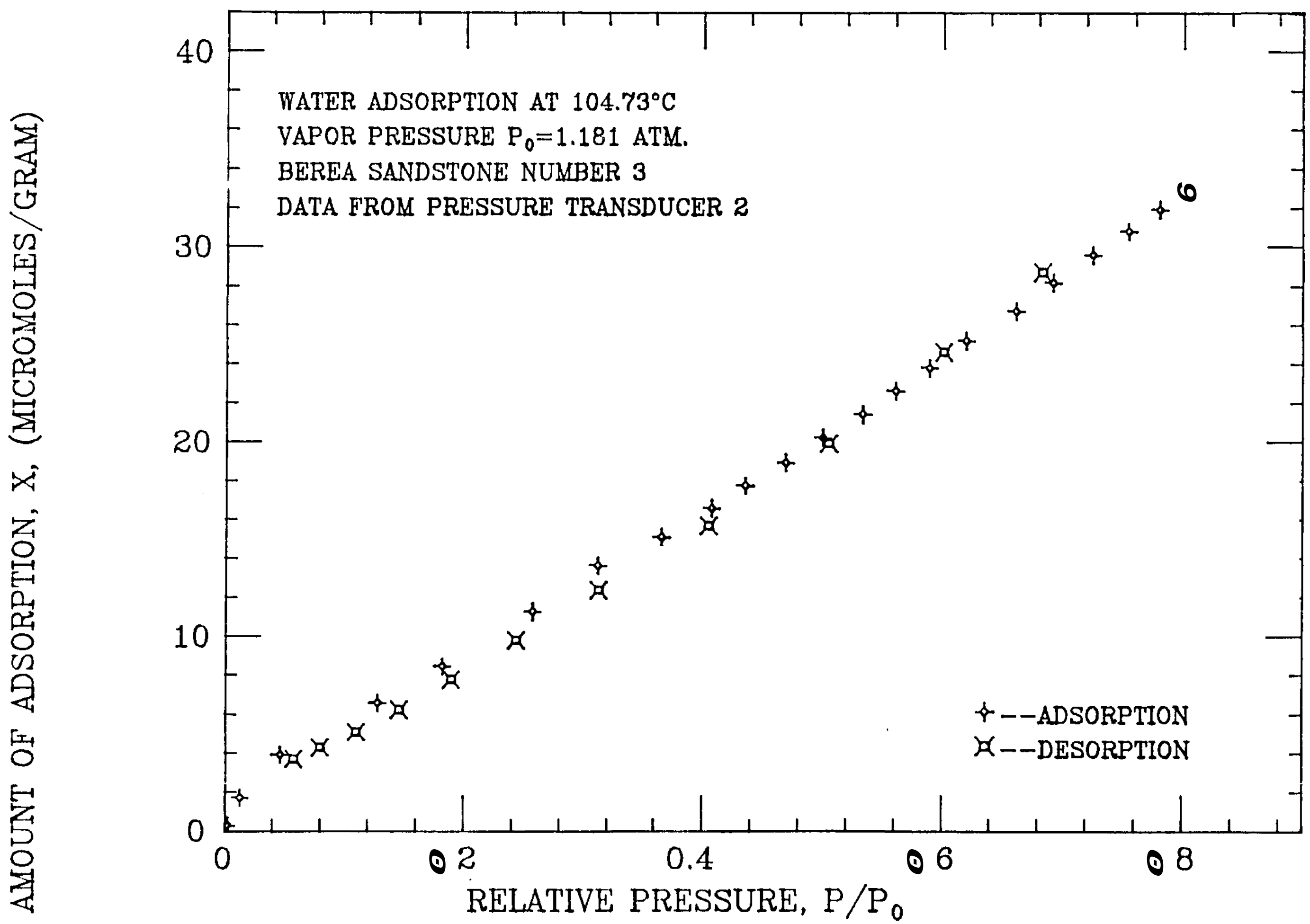
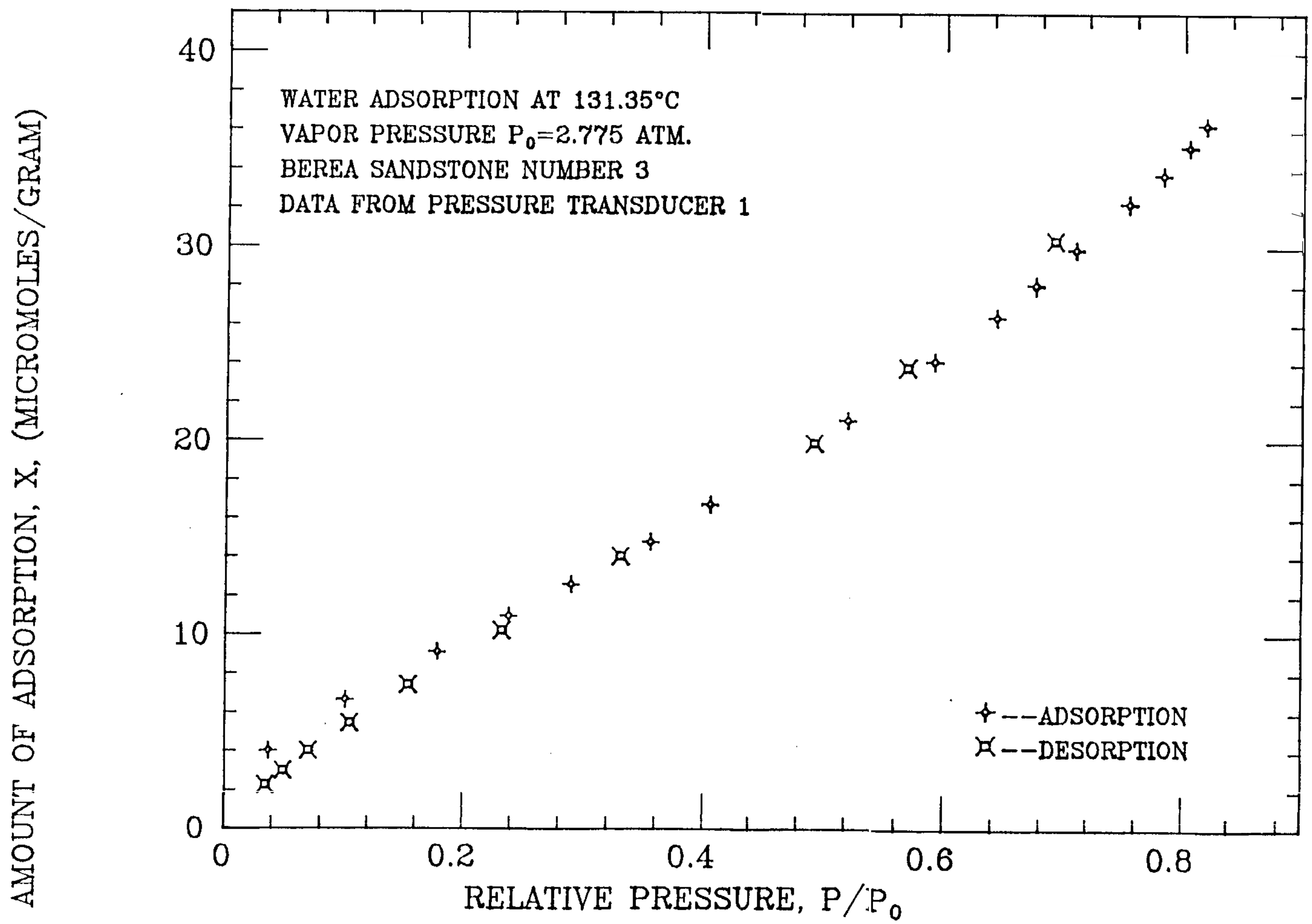


Figure 5 50 Water Adsorption Isotherm at Elevated Temperature



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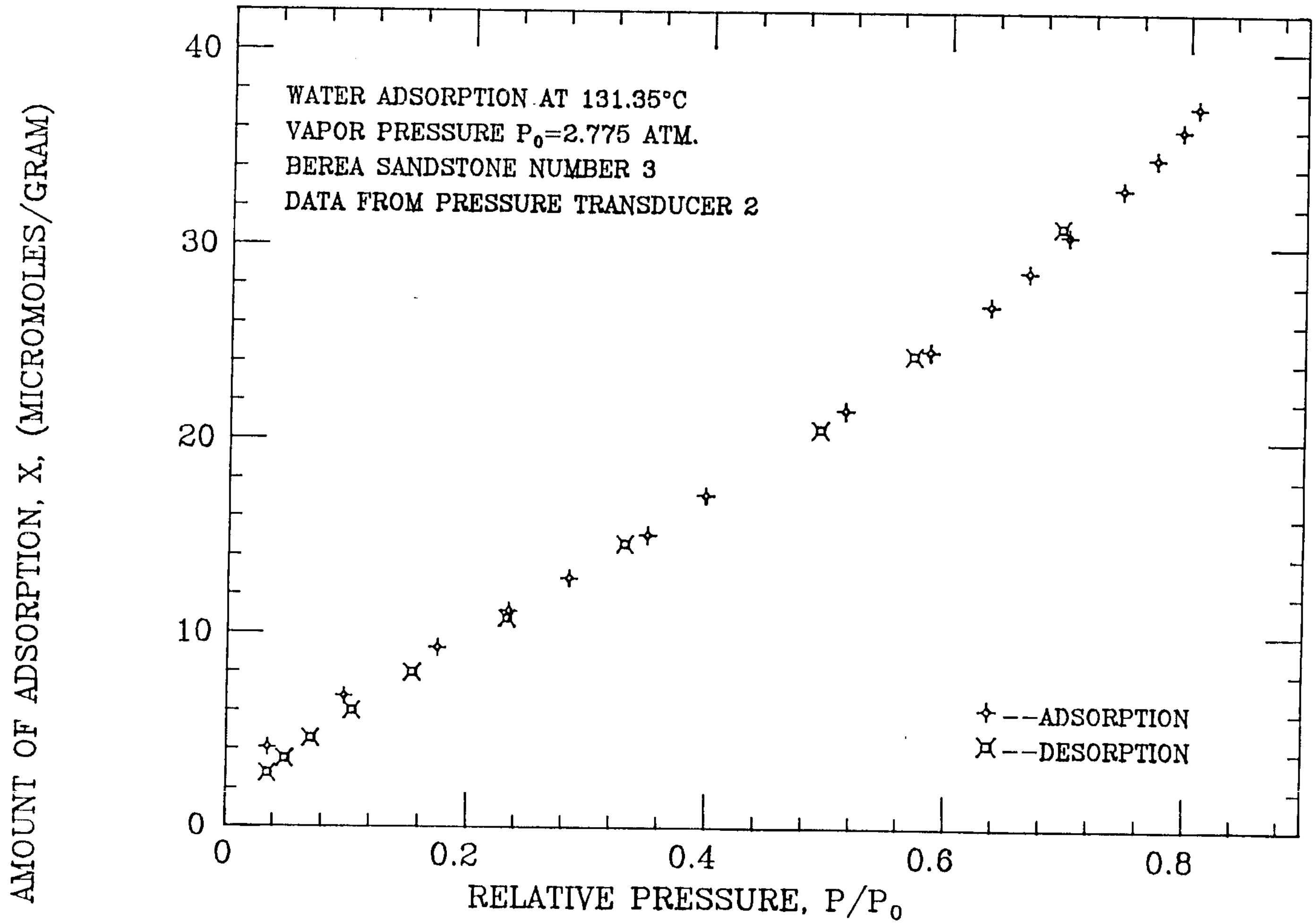

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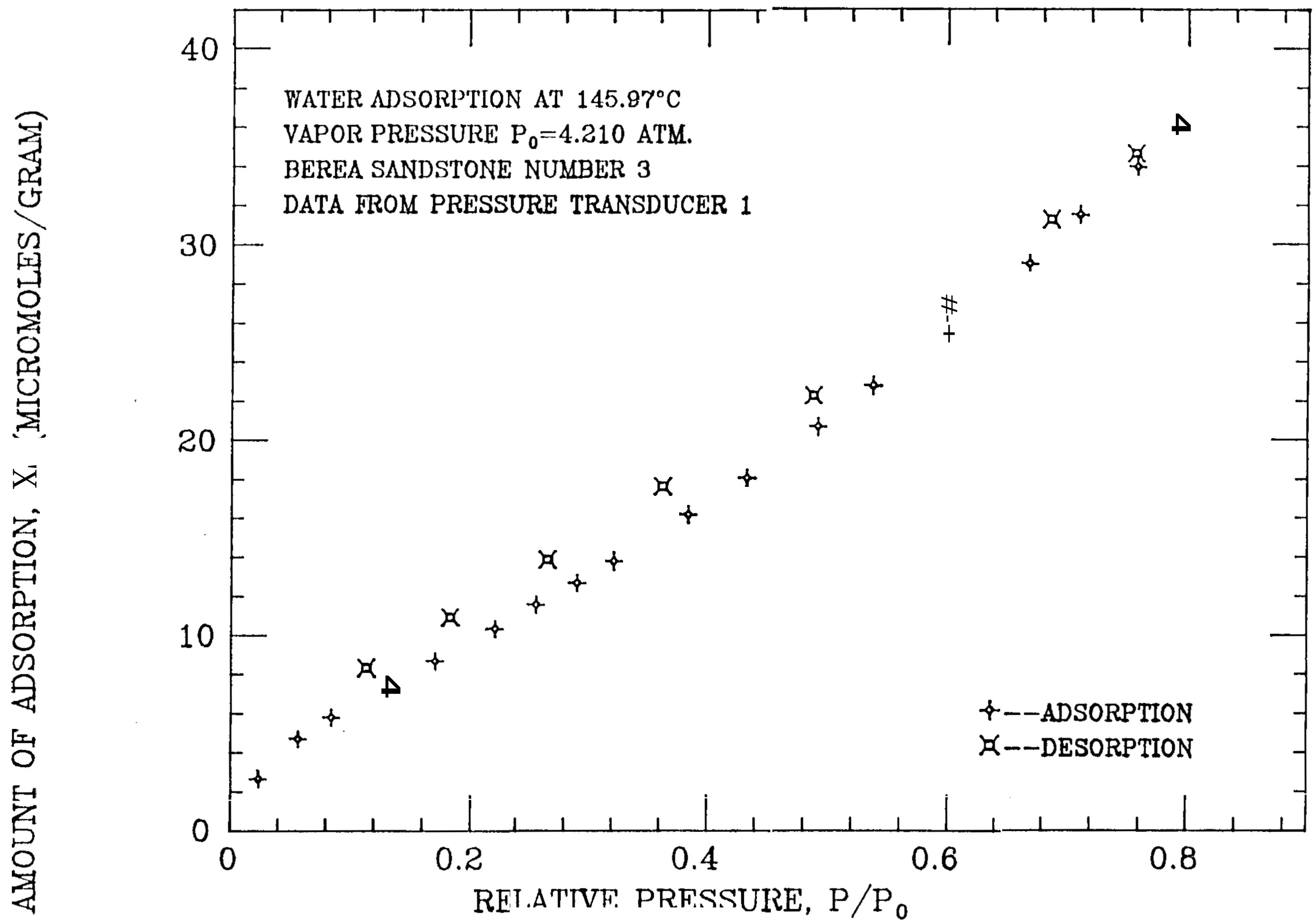

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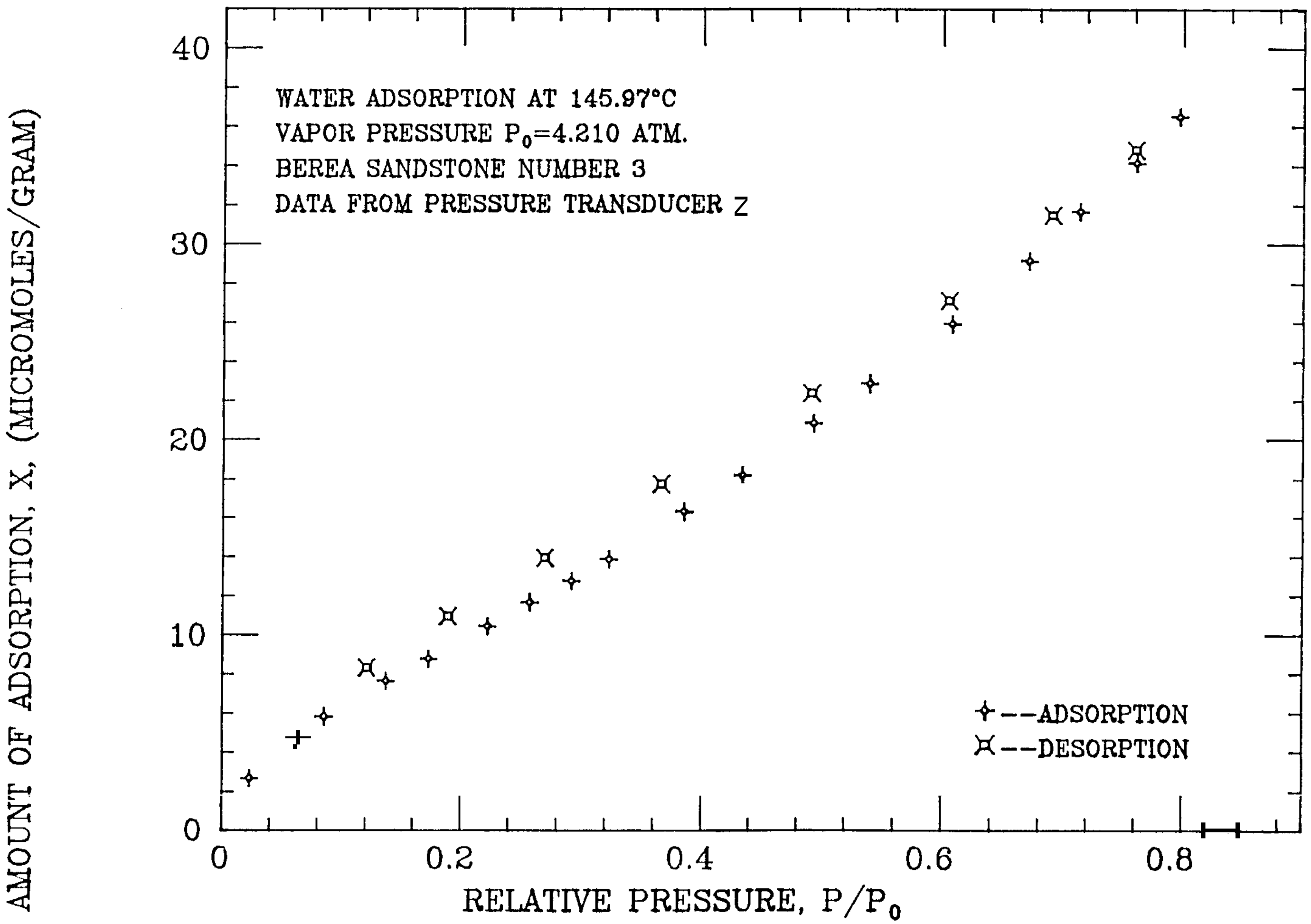

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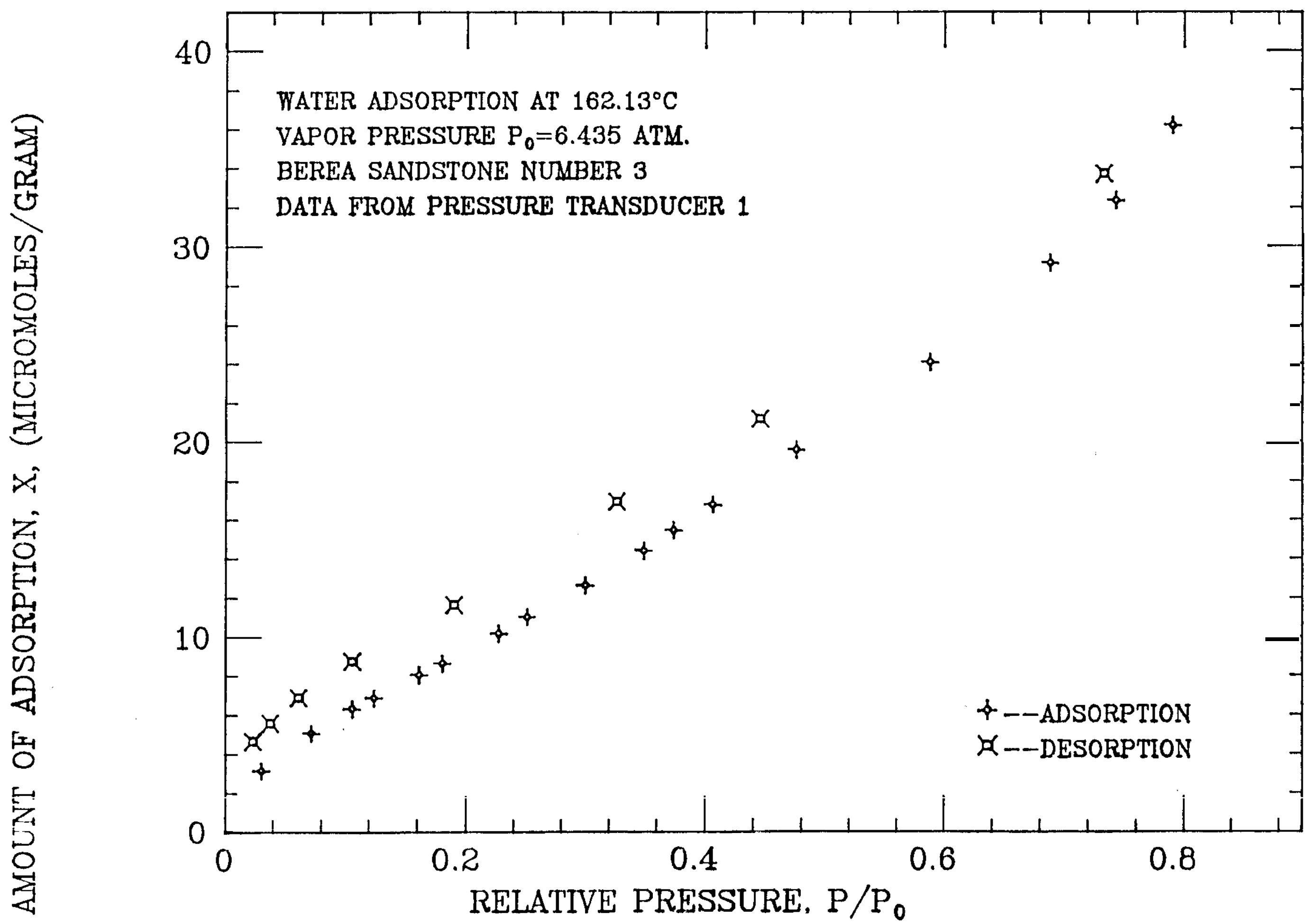

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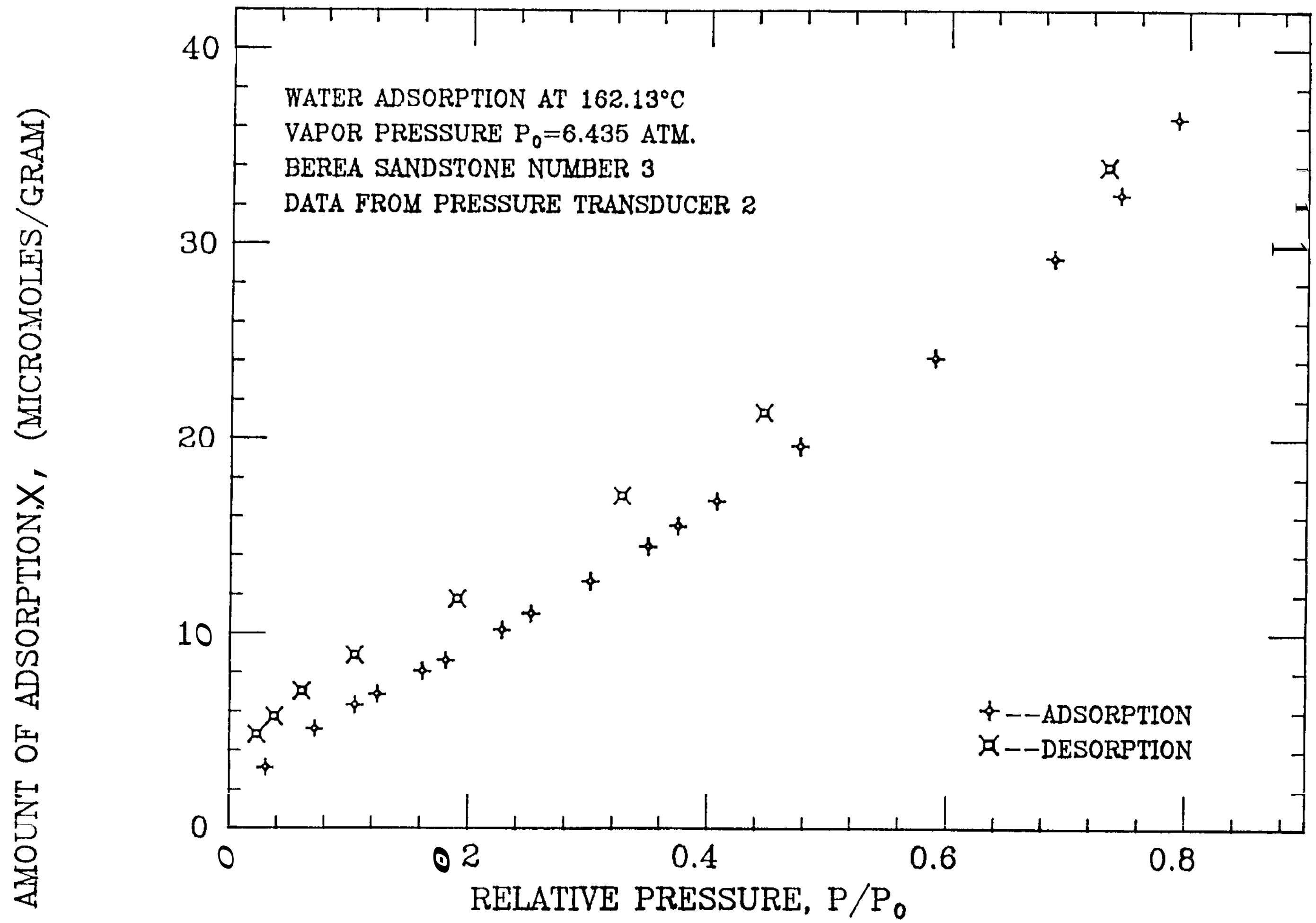

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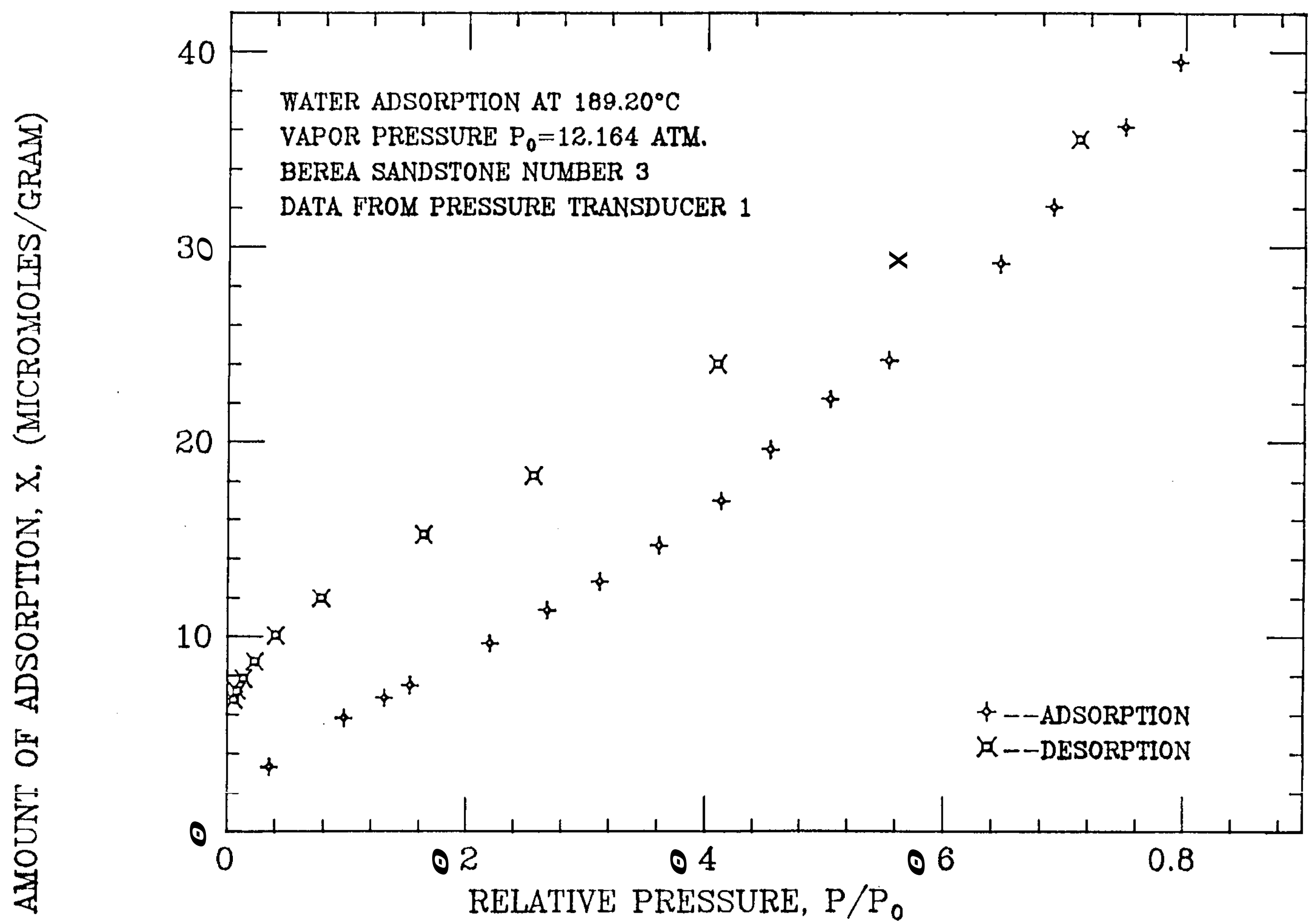

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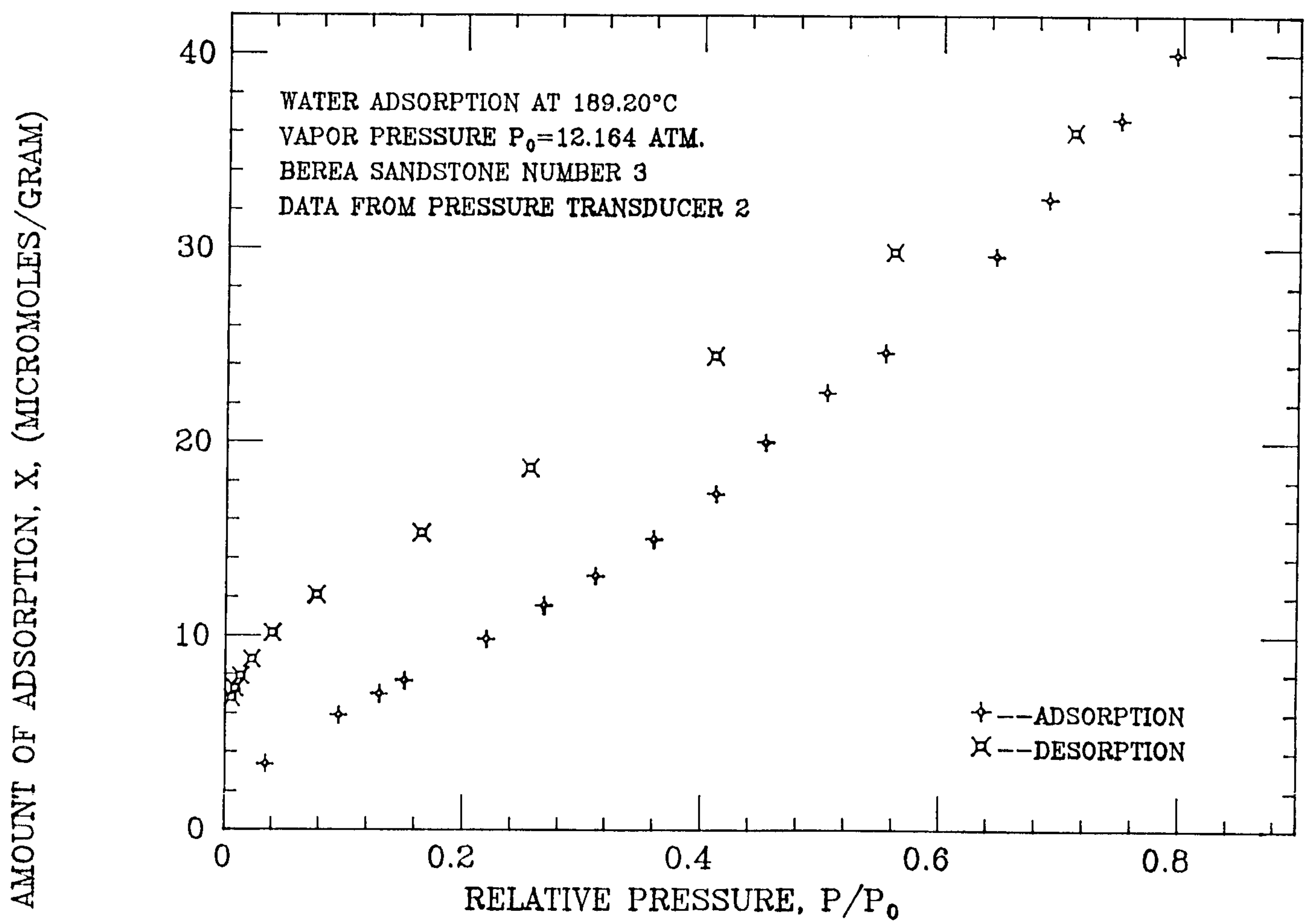

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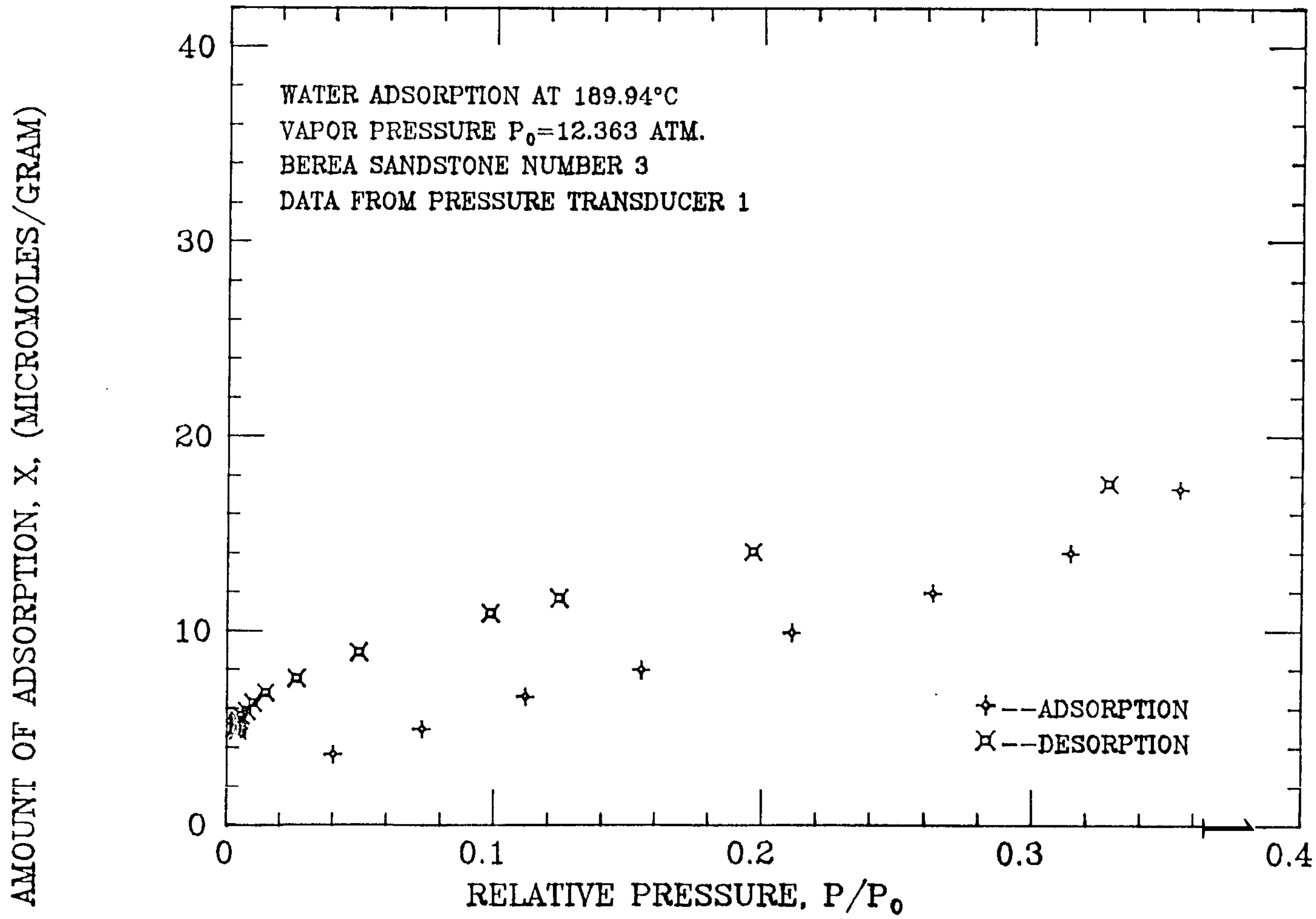

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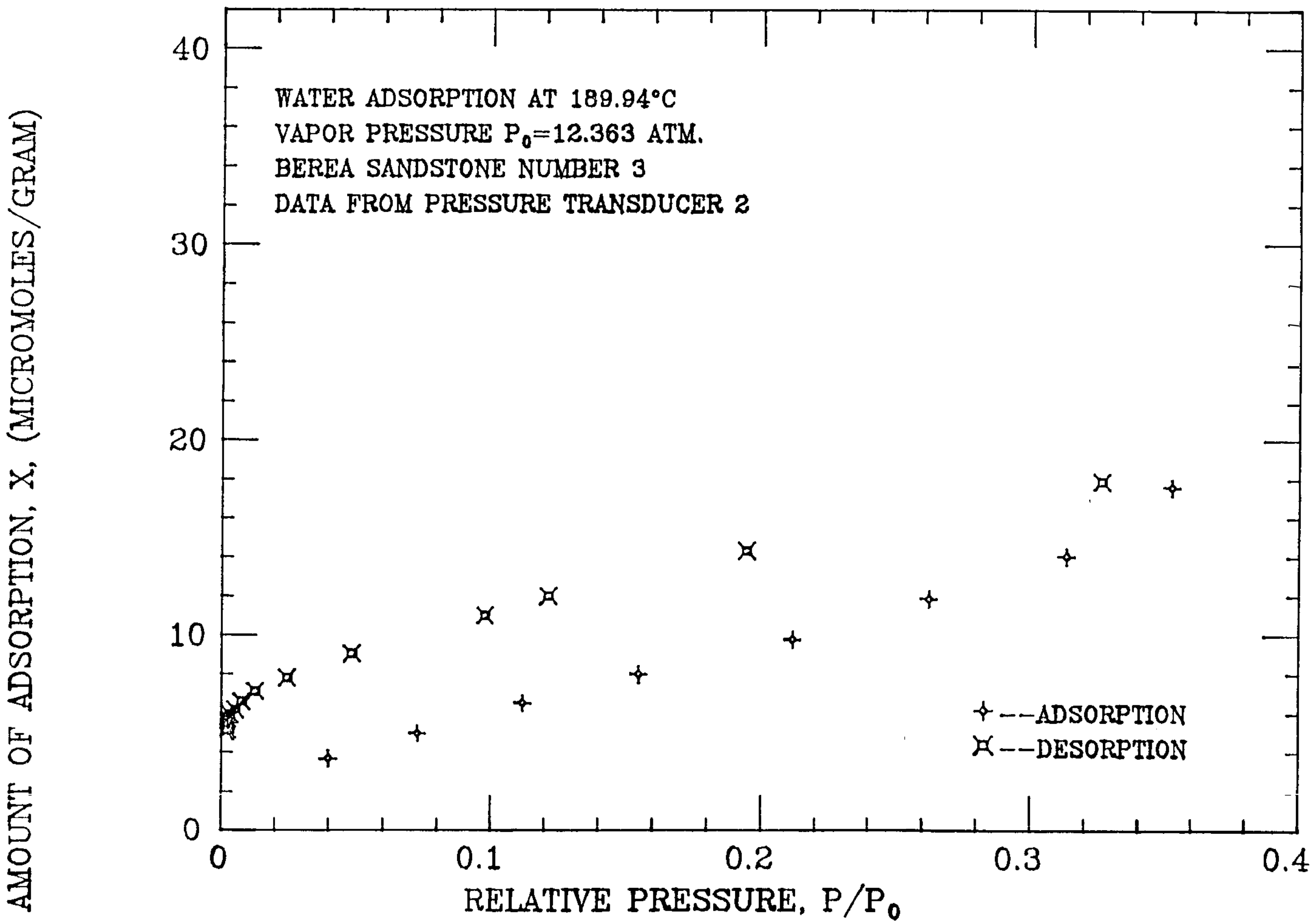

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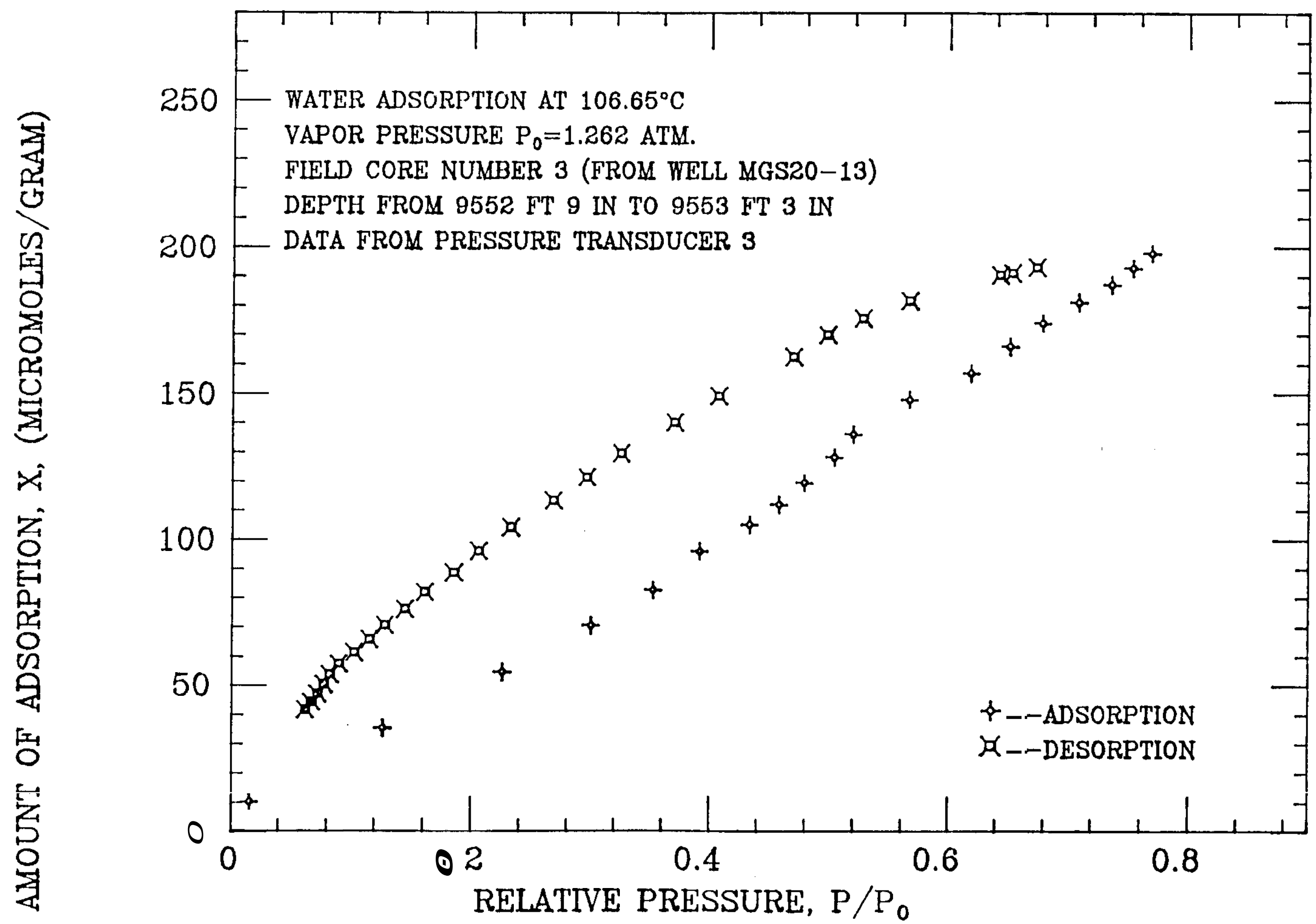

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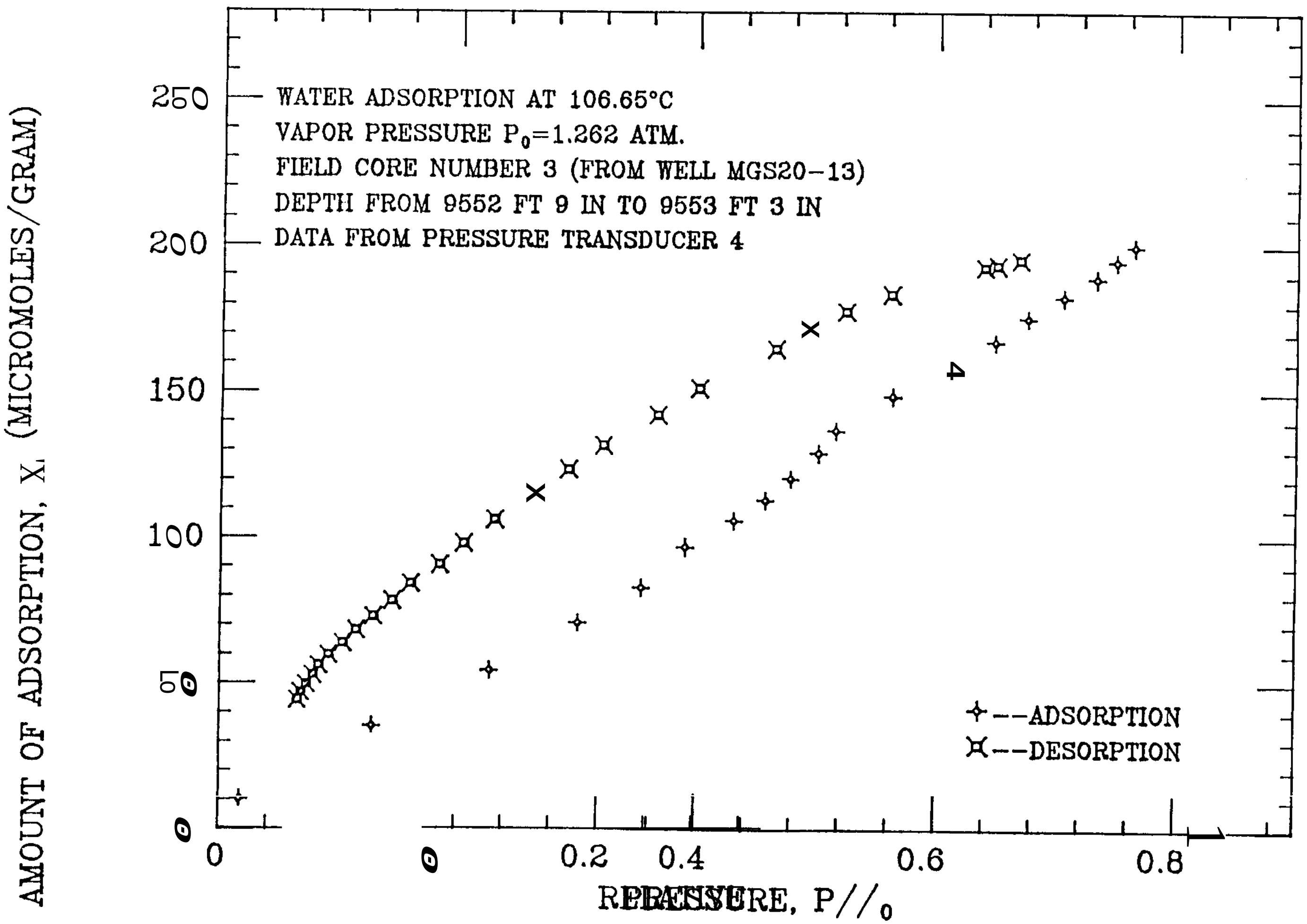
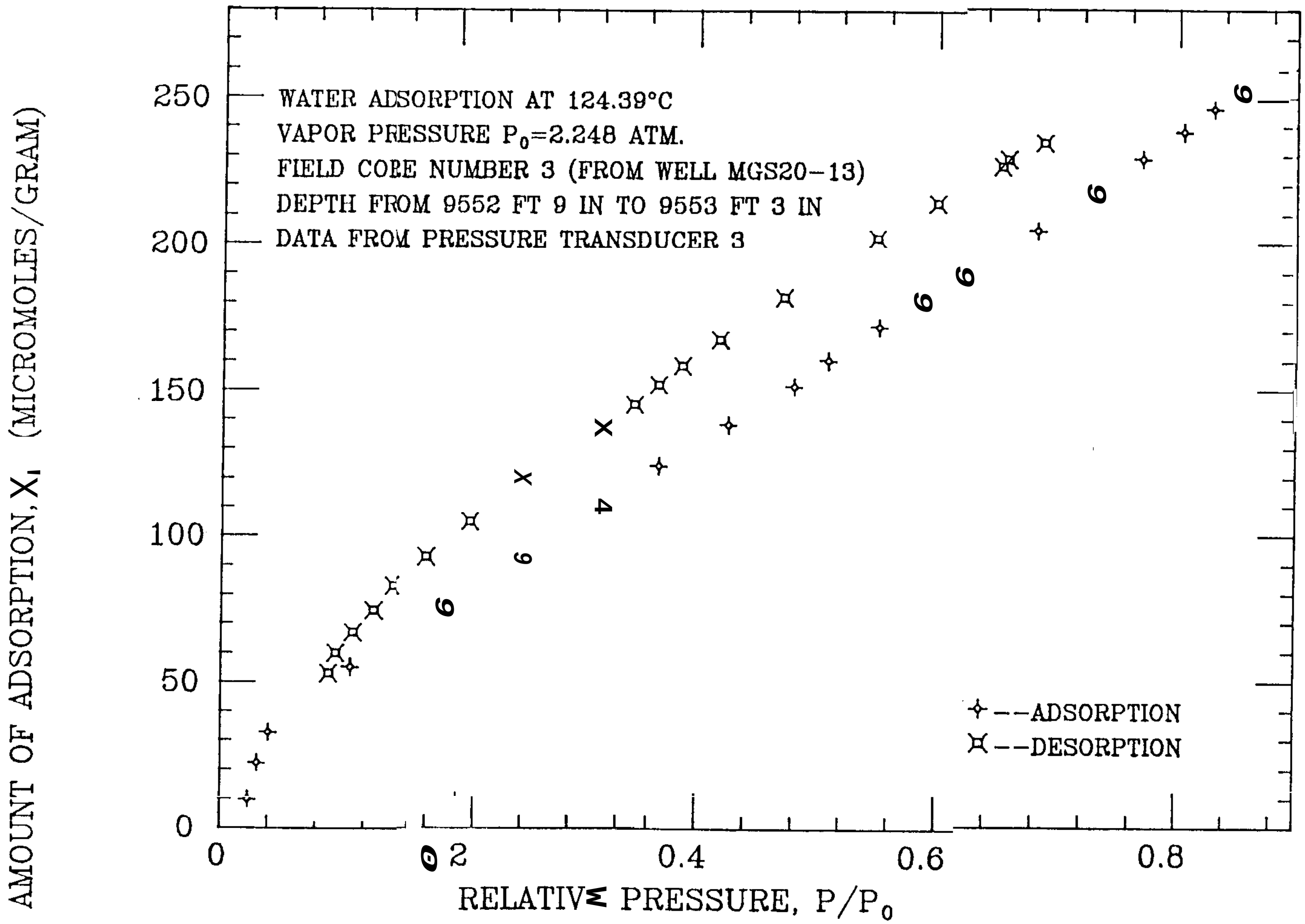


Figure 5 62 Water Adsorption Isotherm at Elevated Temperature



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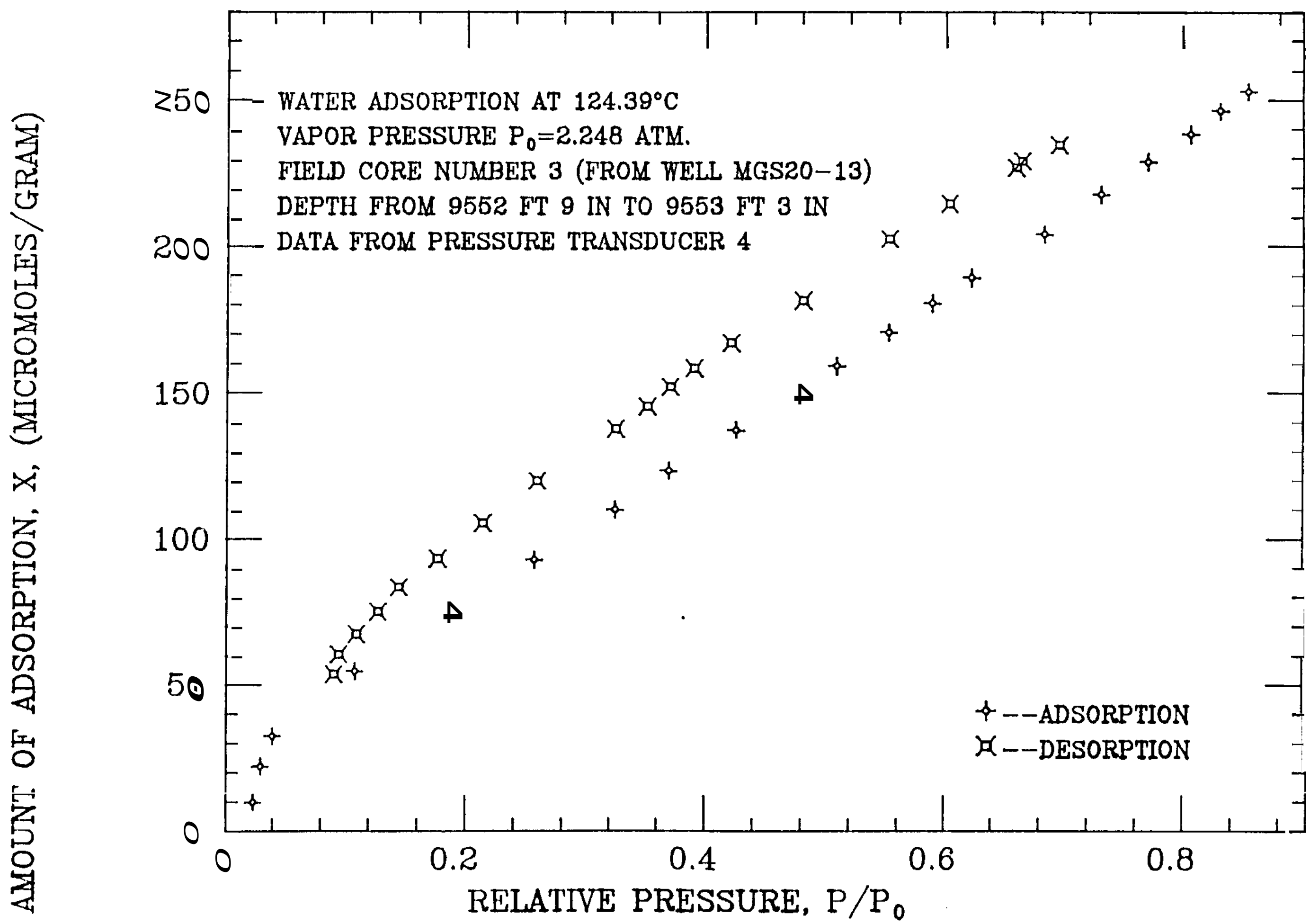

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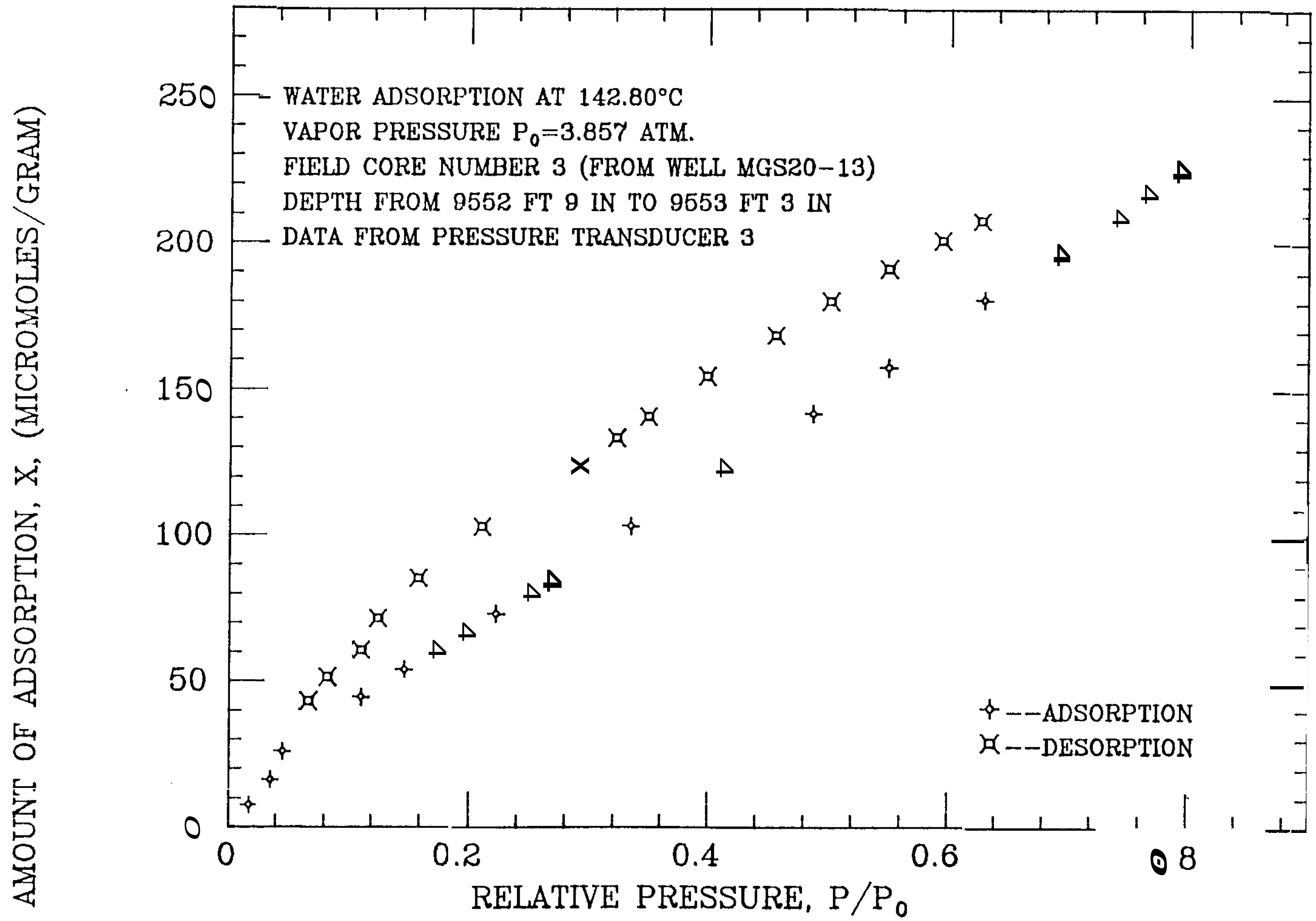
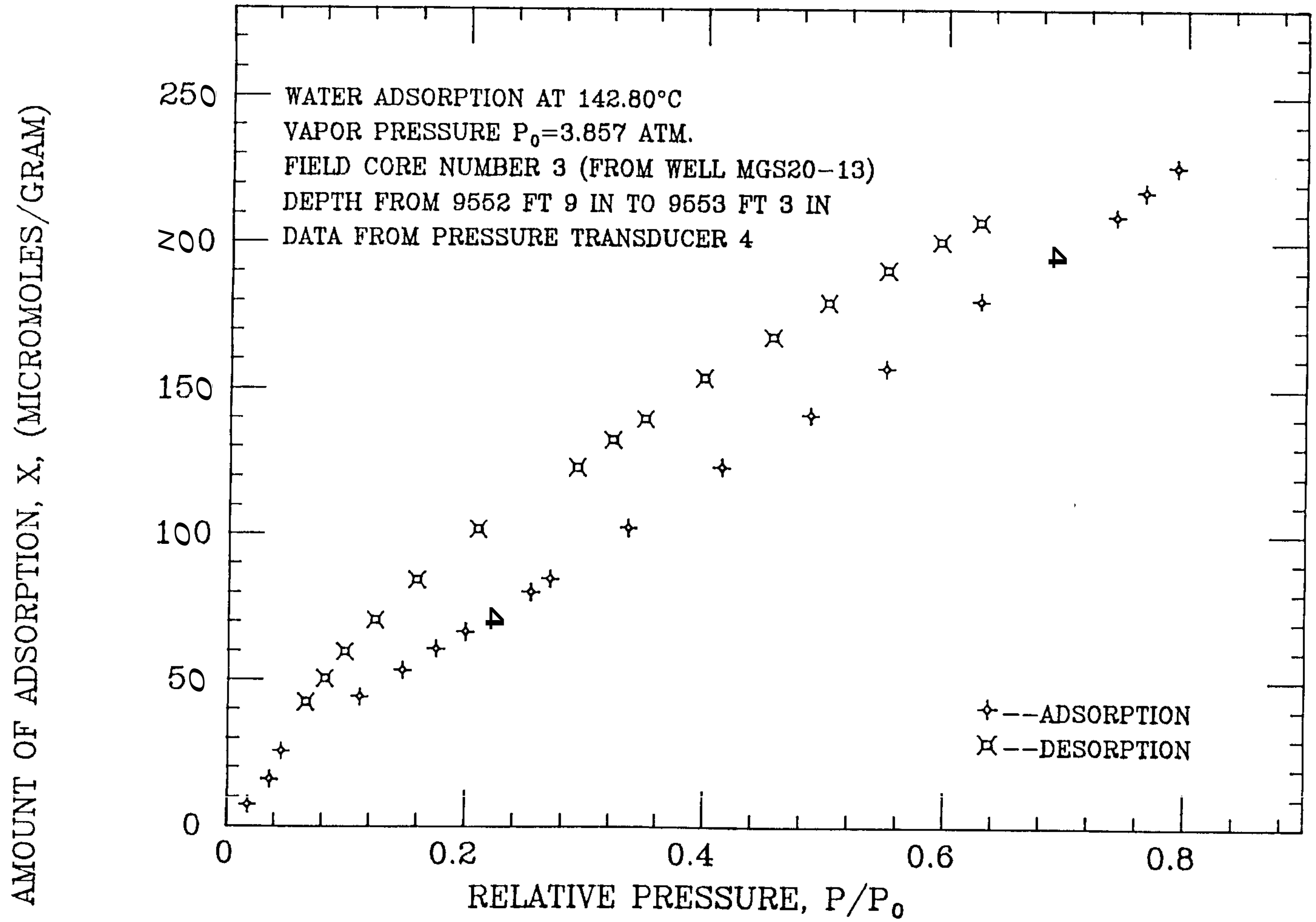


Figure 5.65 Water Adsorption Isotherm at Elevated Temperatures



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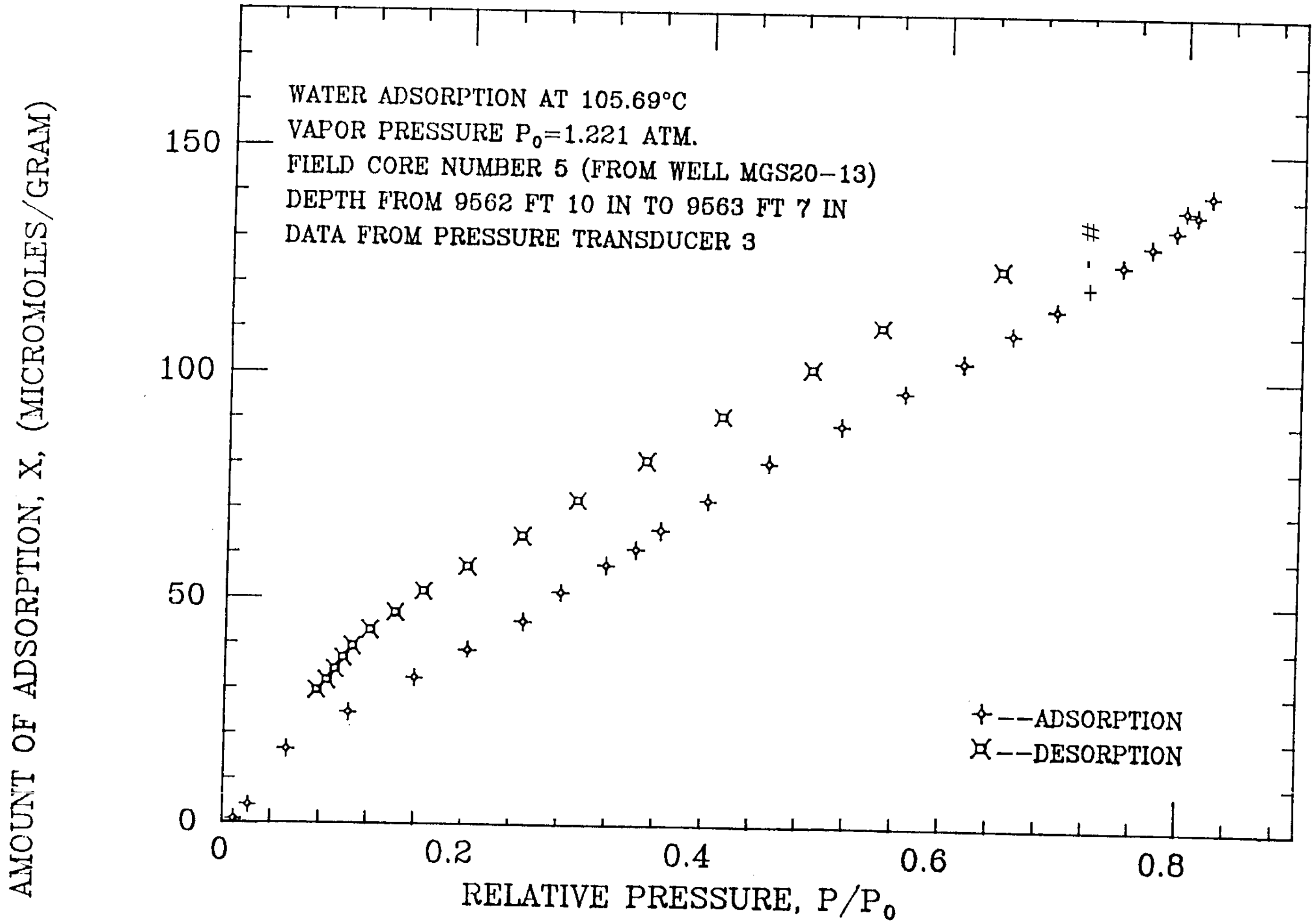

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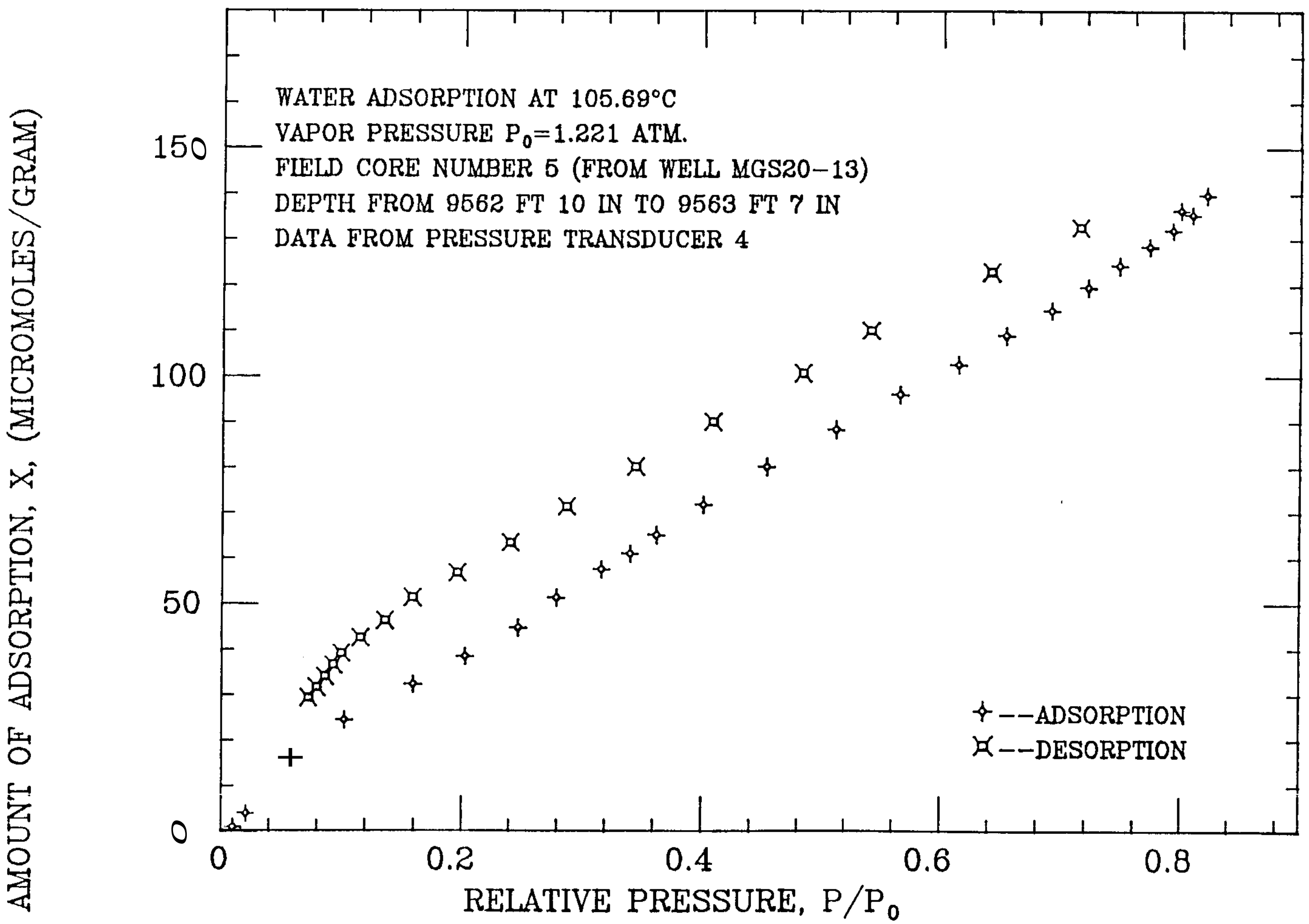

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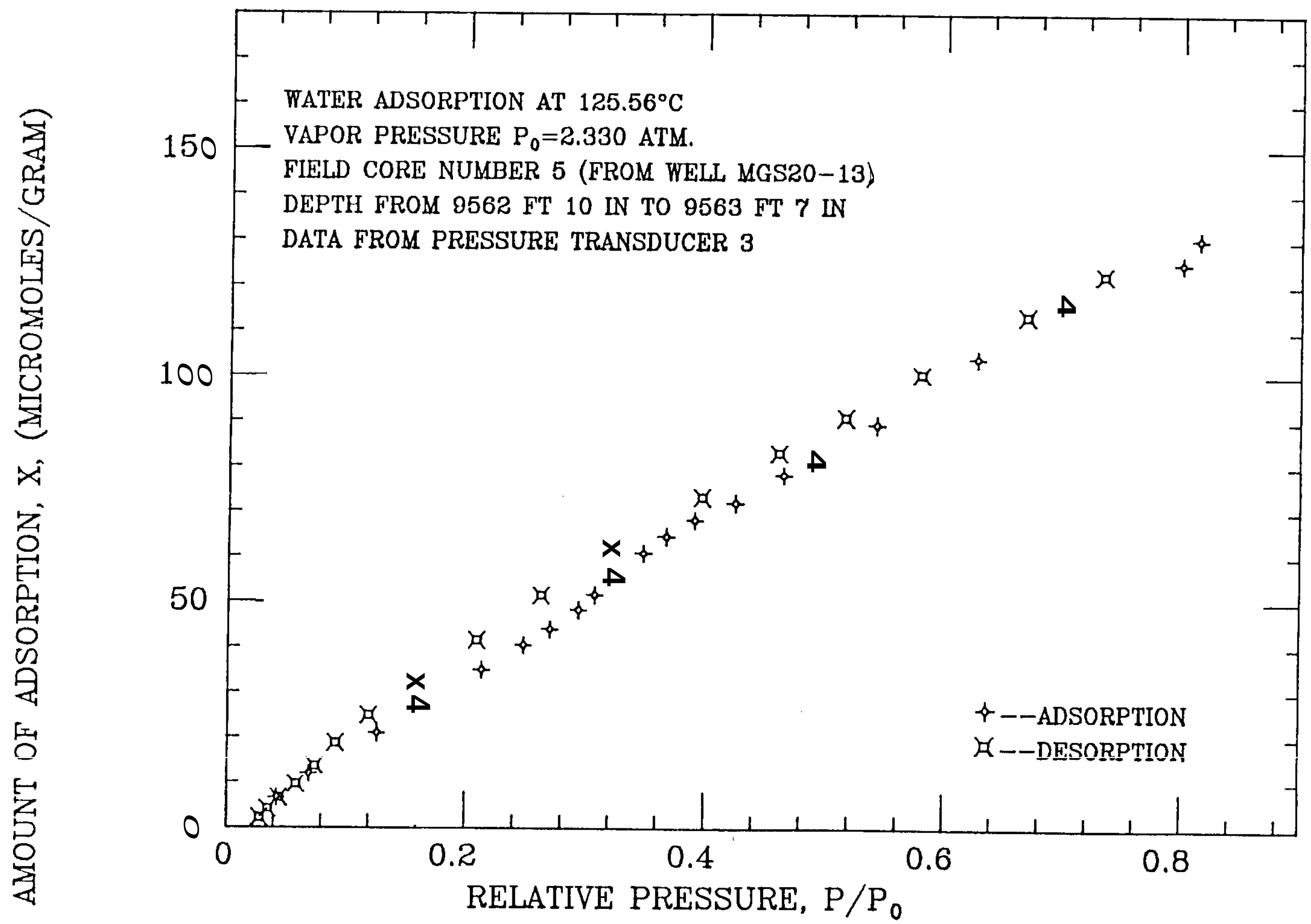

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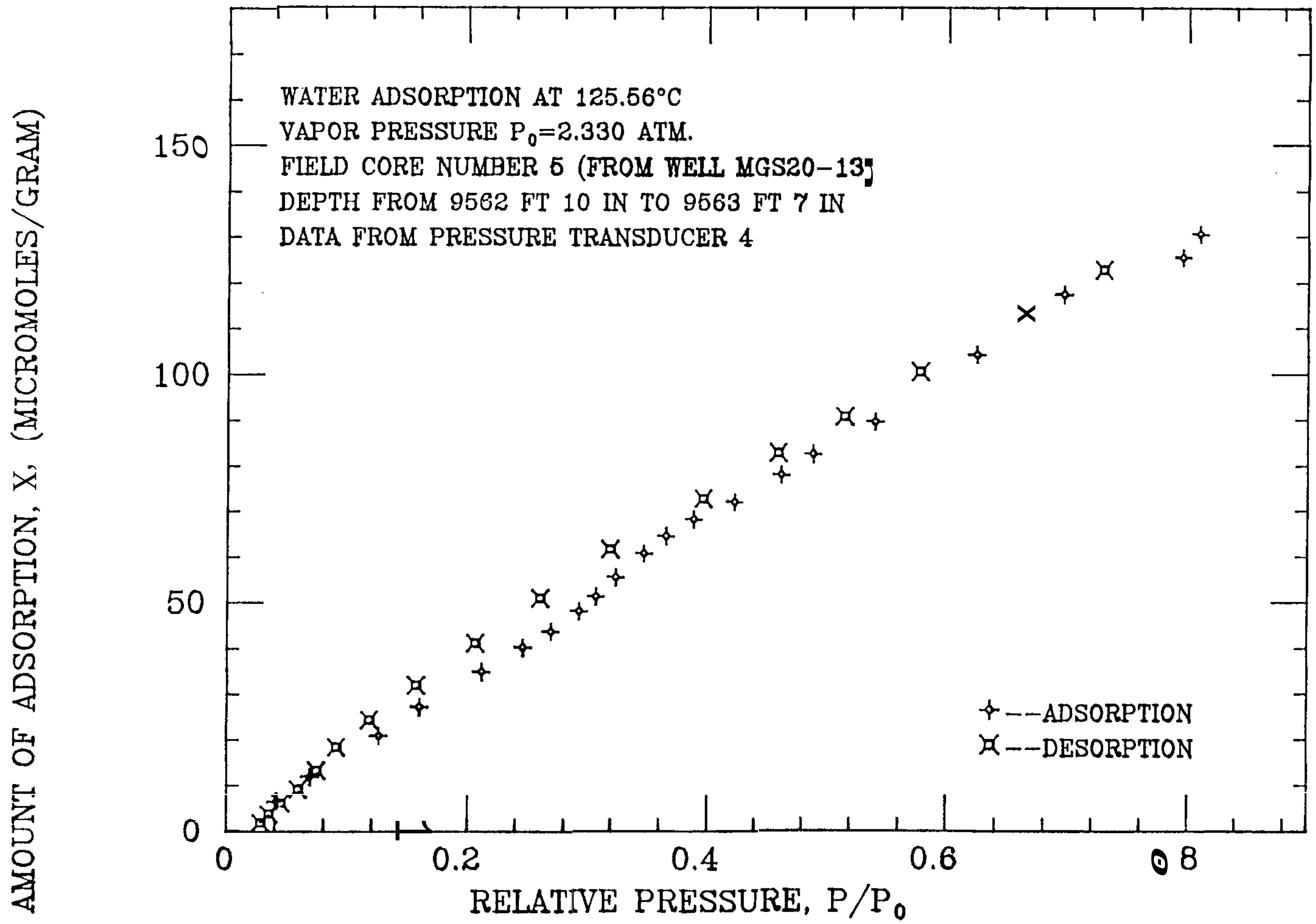
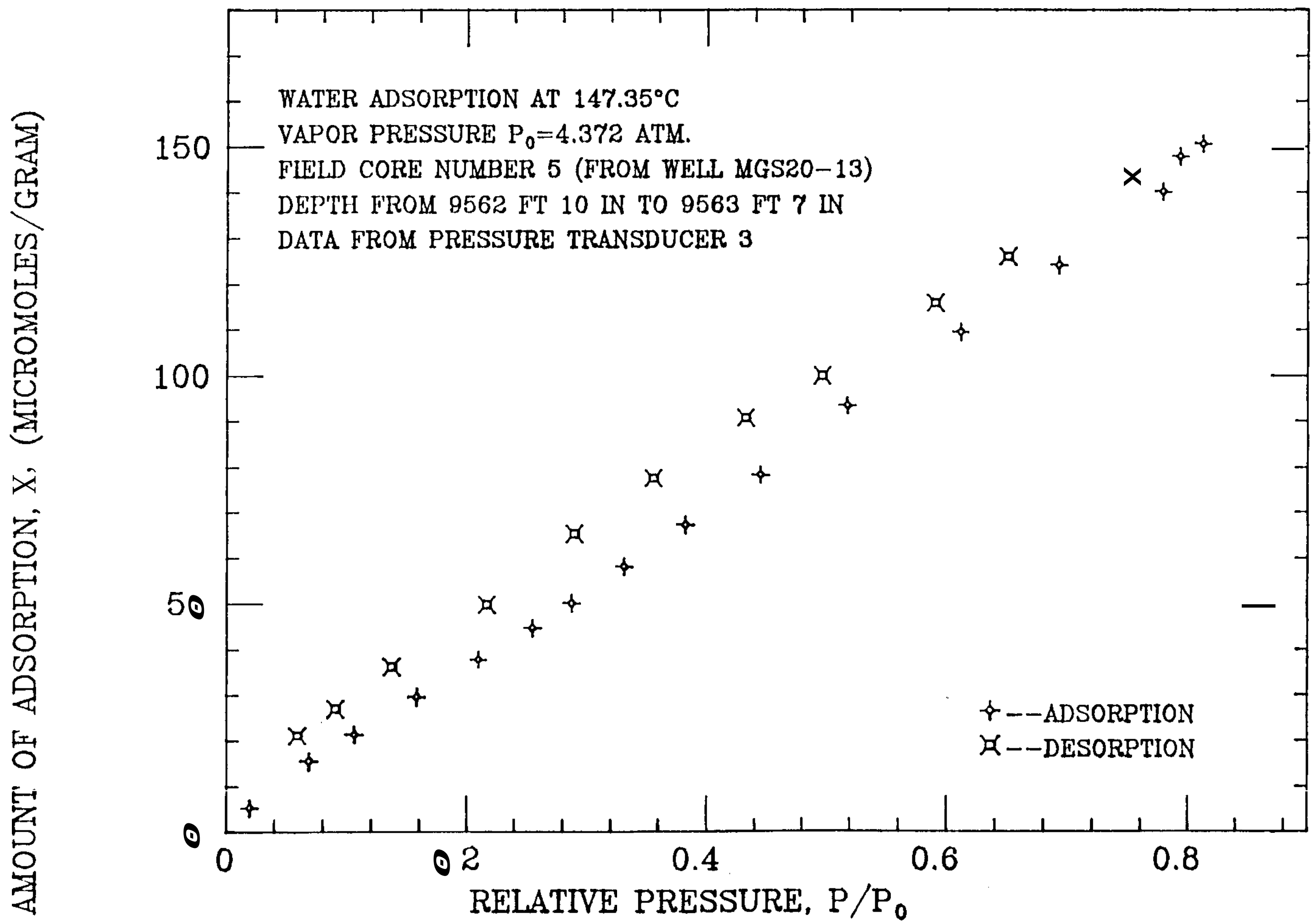


Figure 5.70 Water Adsorption Isotherm at Elevated Temperature



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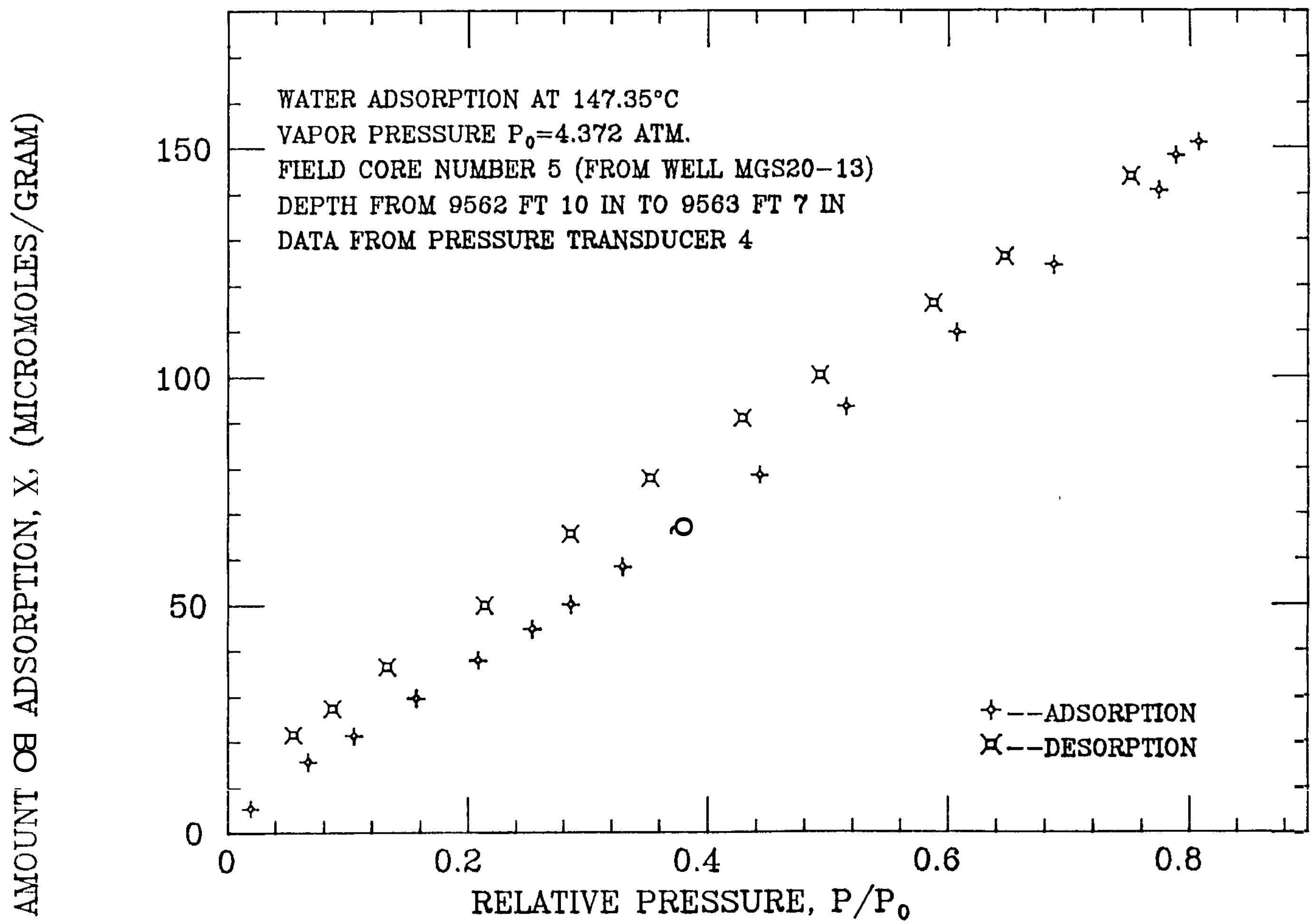


Figure 5 72 Water Adsorption Isotherm at Elevated Temperature

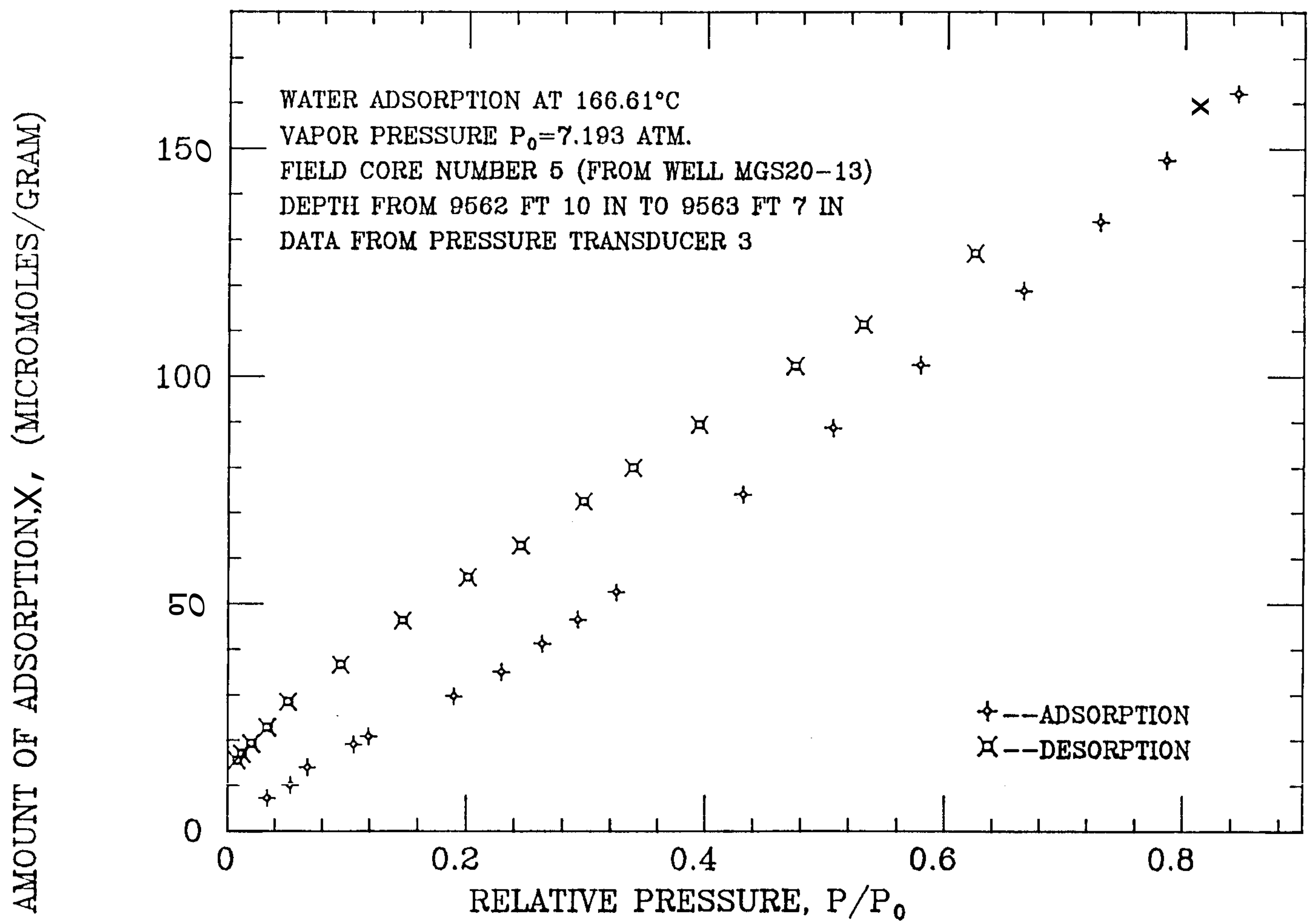
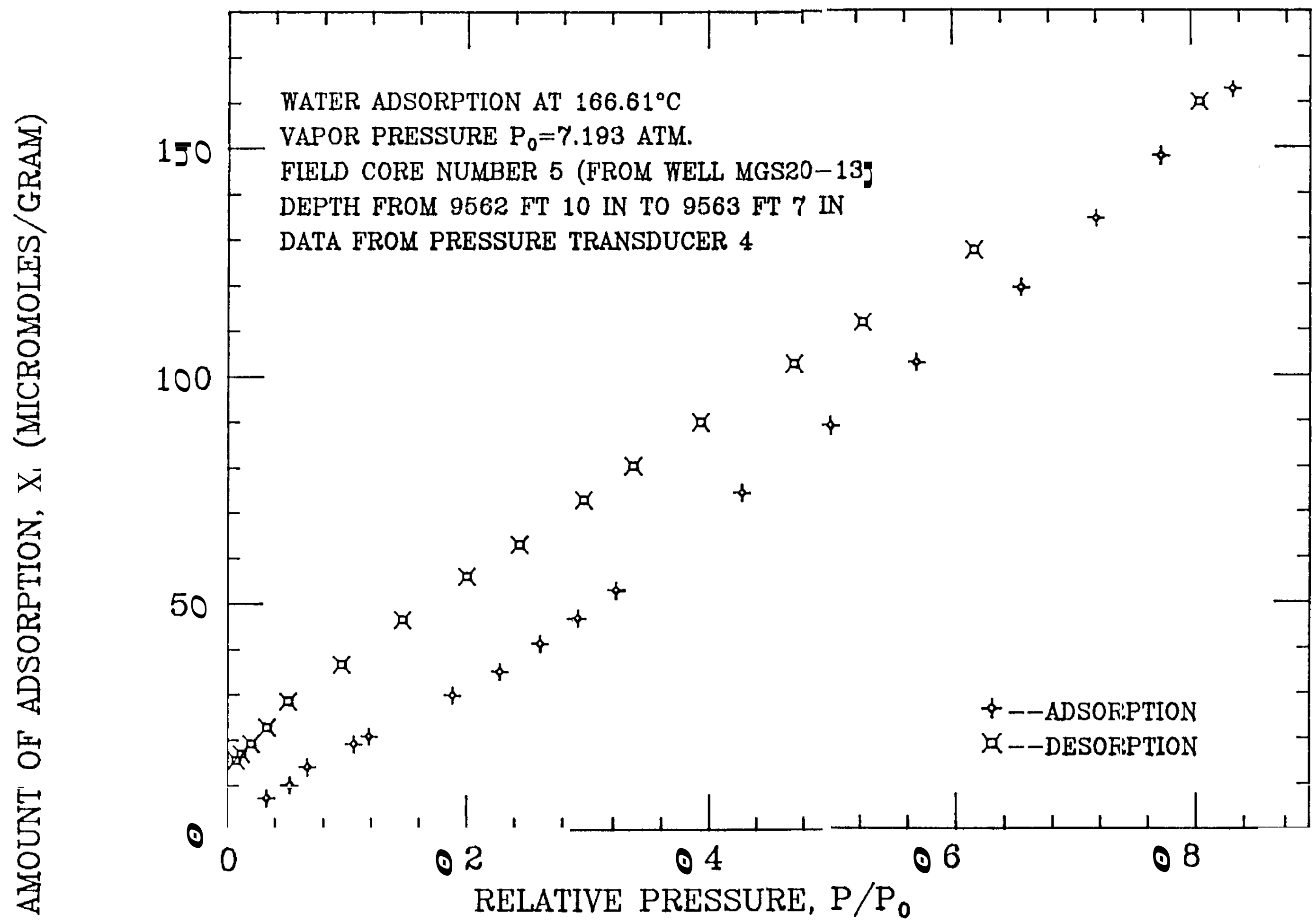


Figure 5.73 Water Adsorption Isotherm at Elevated Temperature



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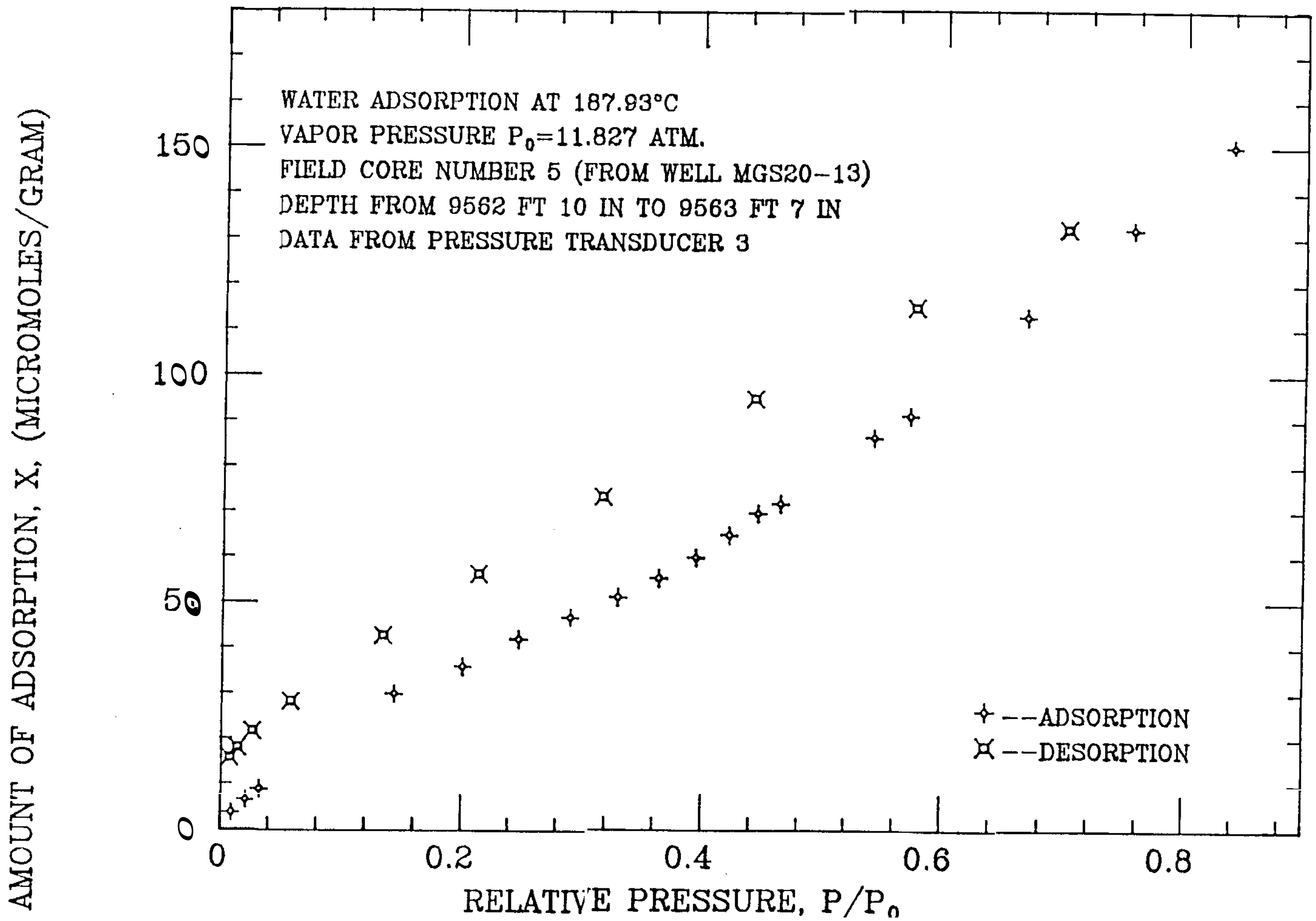

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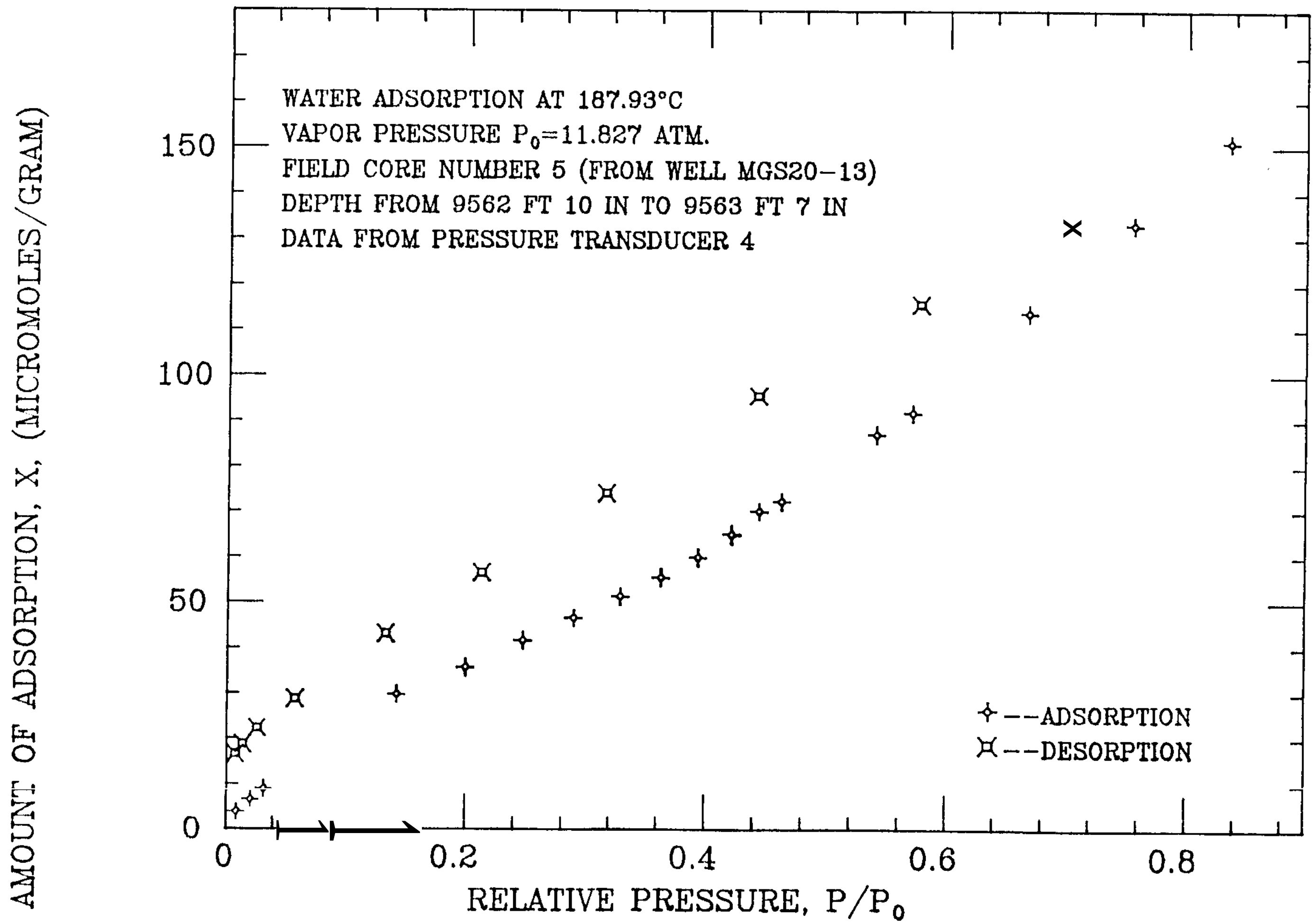
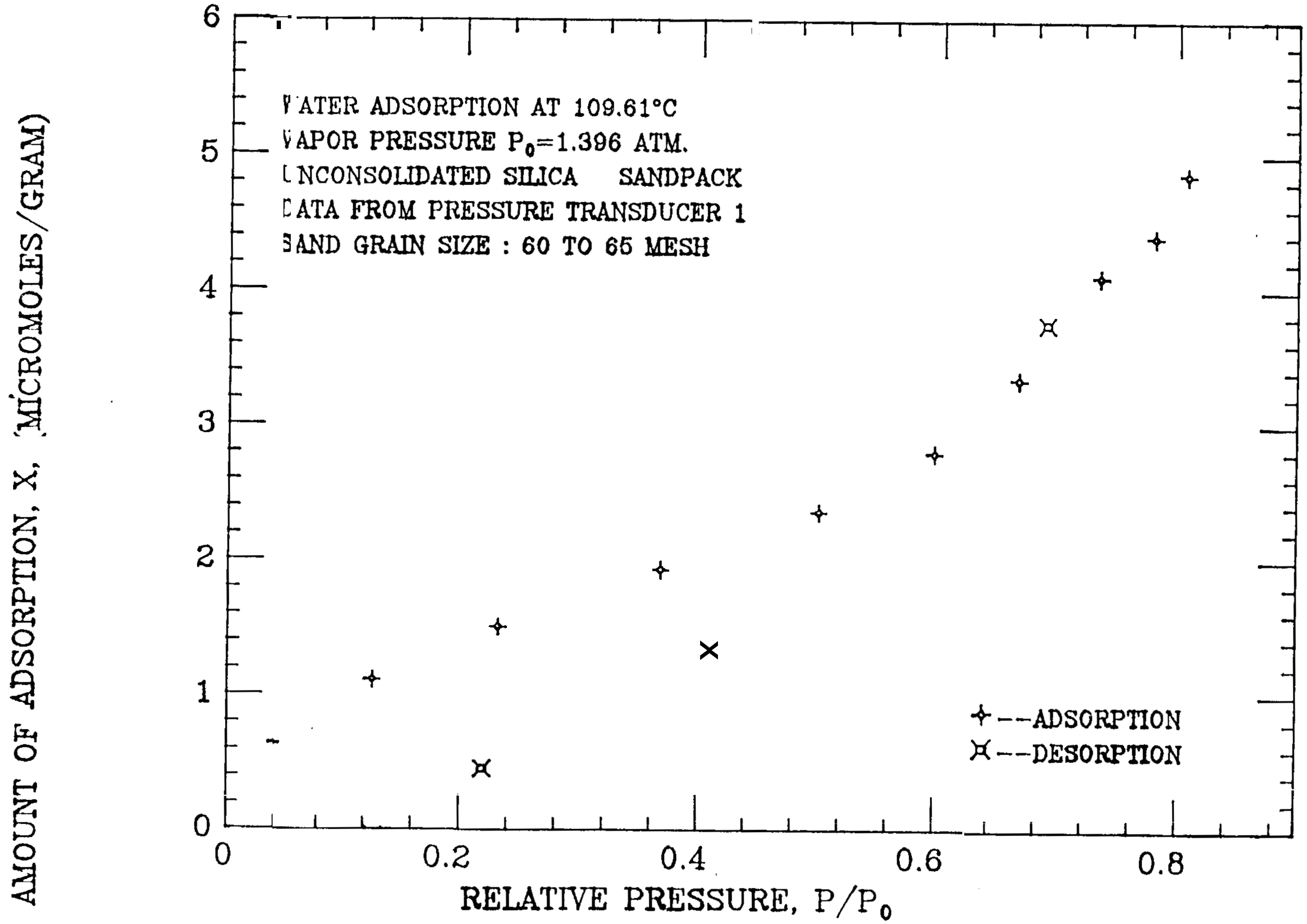


Figure 5.76 Water Adsorption Isotherm at Elevated Temperature



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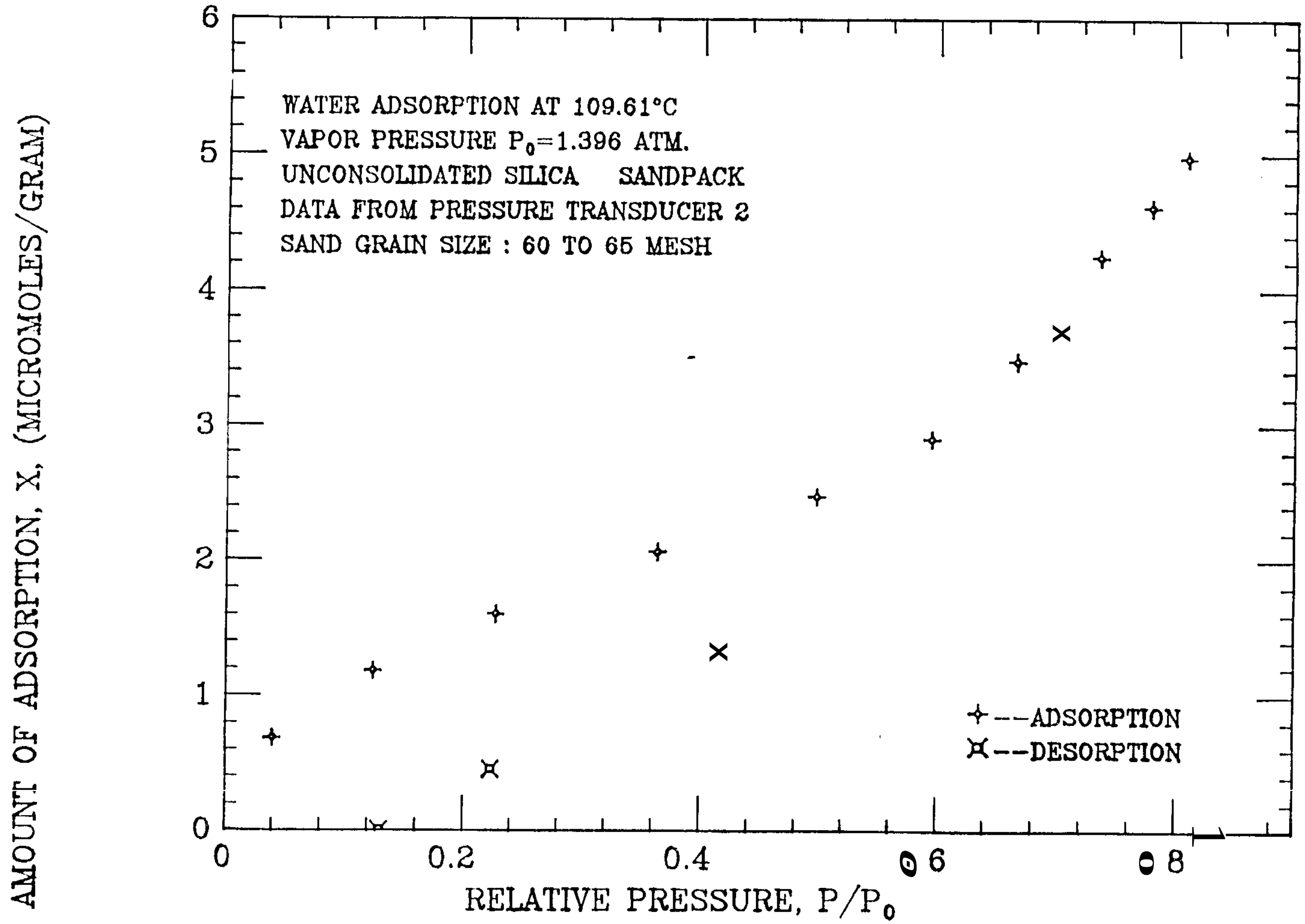

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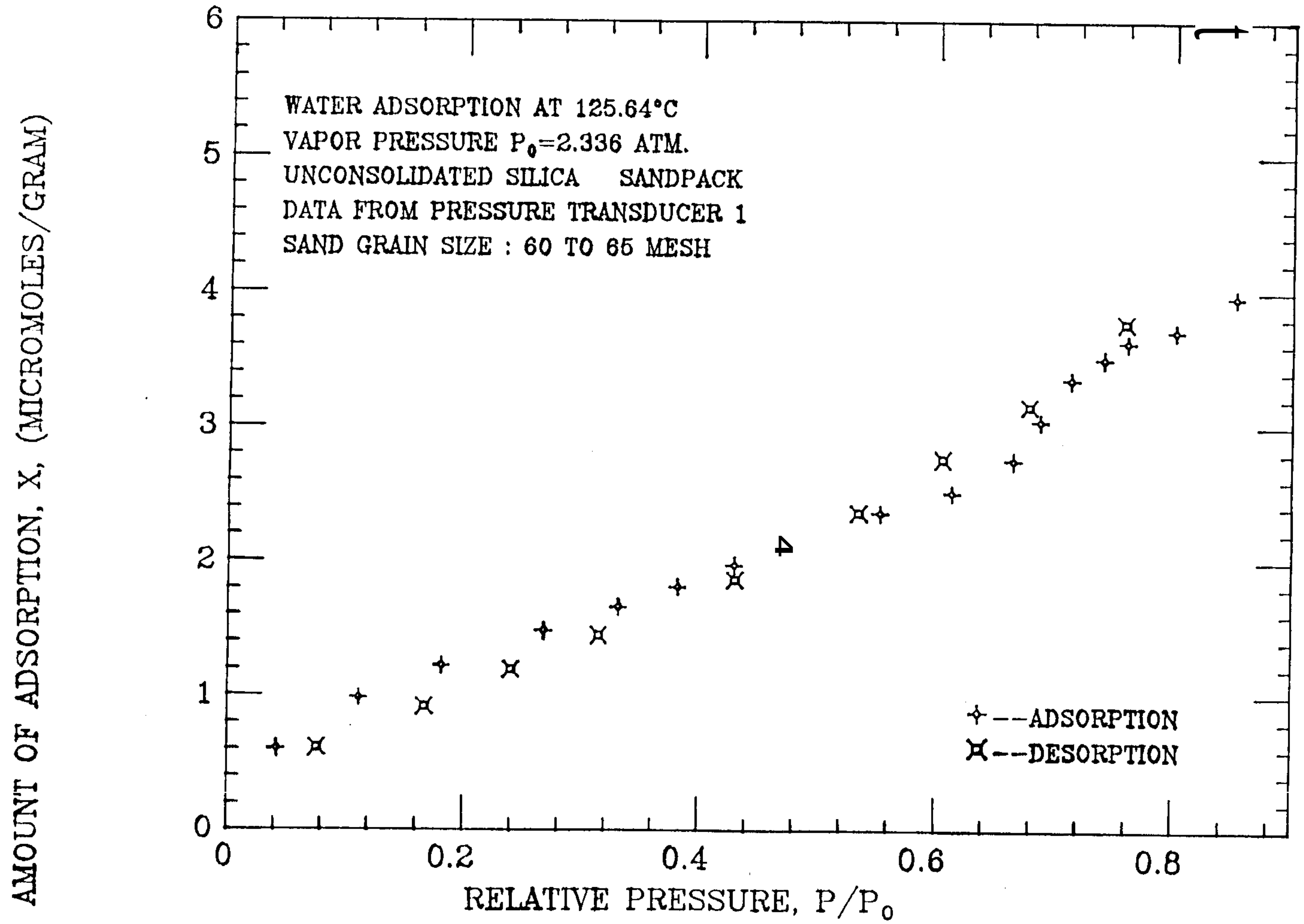

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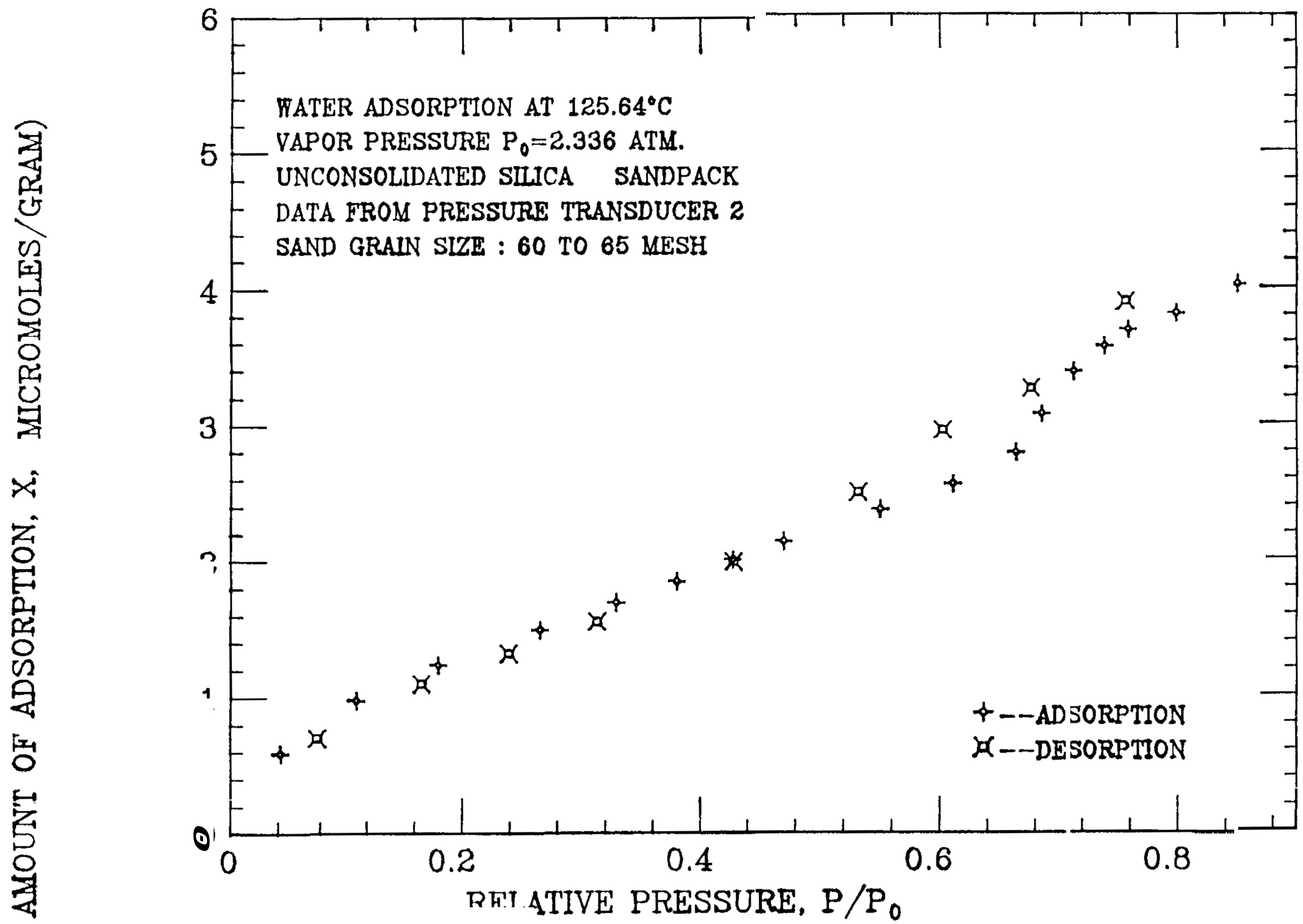
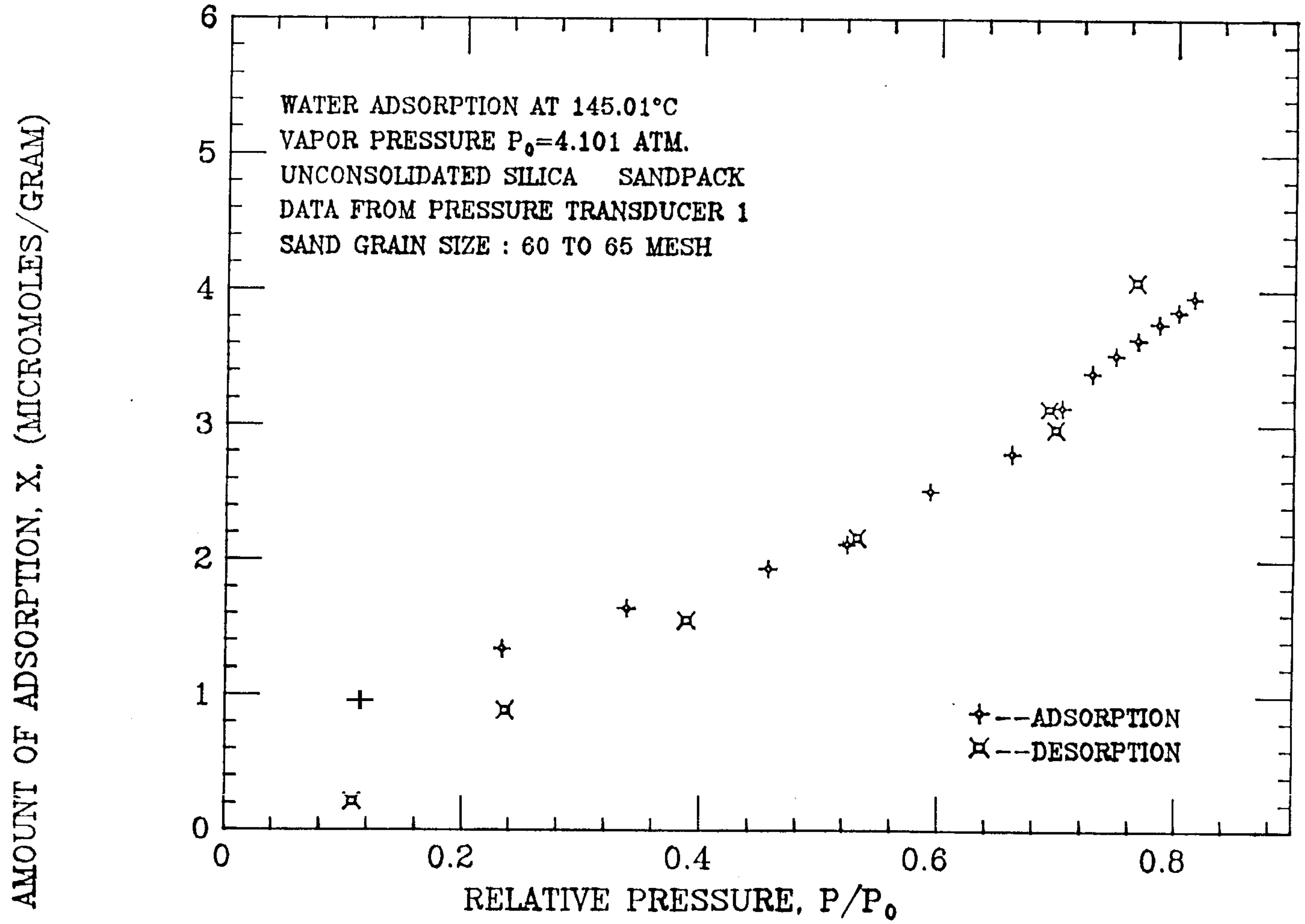


Figure 5 80 Water Adsorption Isotherm at Elevated Temperature



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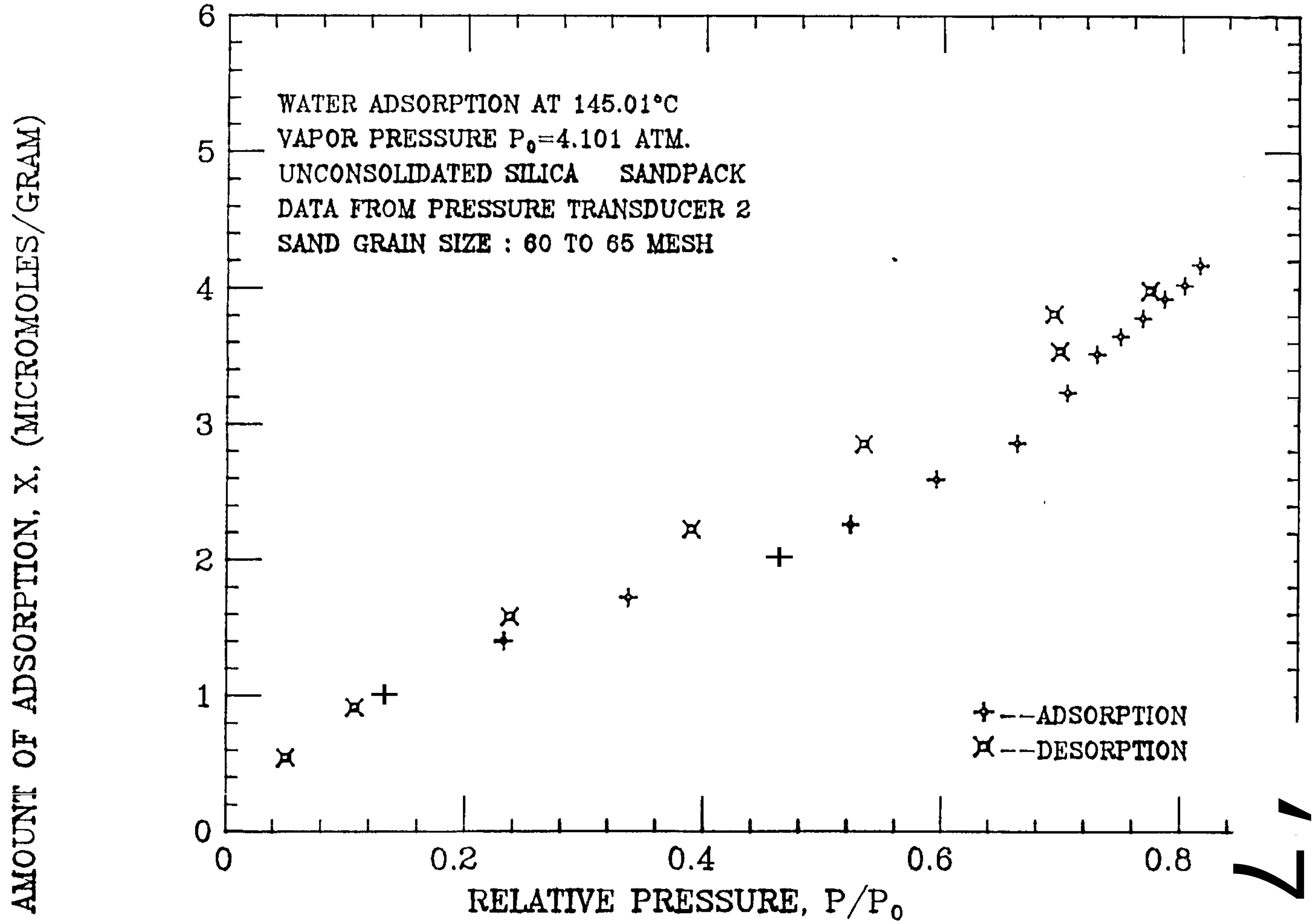

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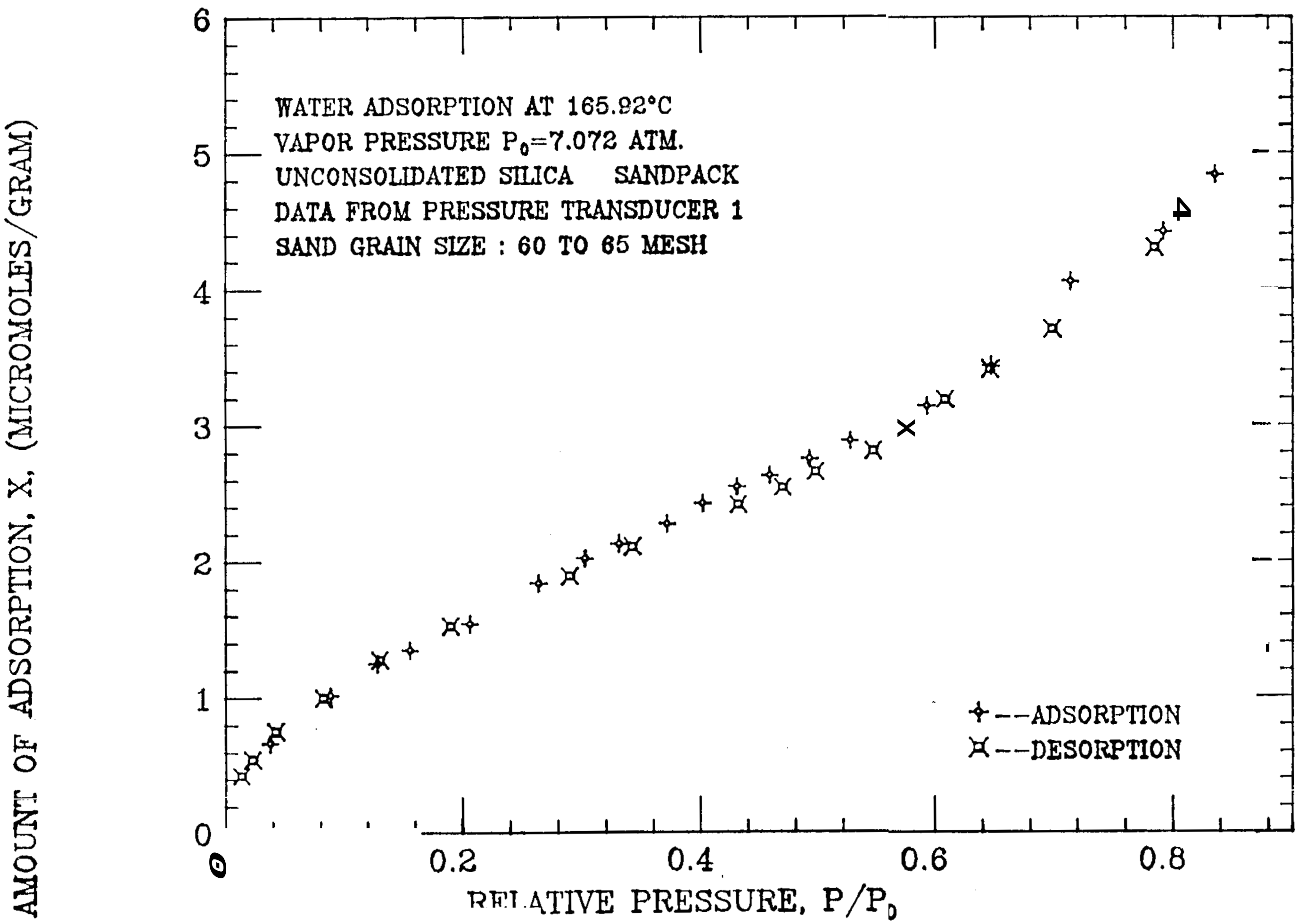

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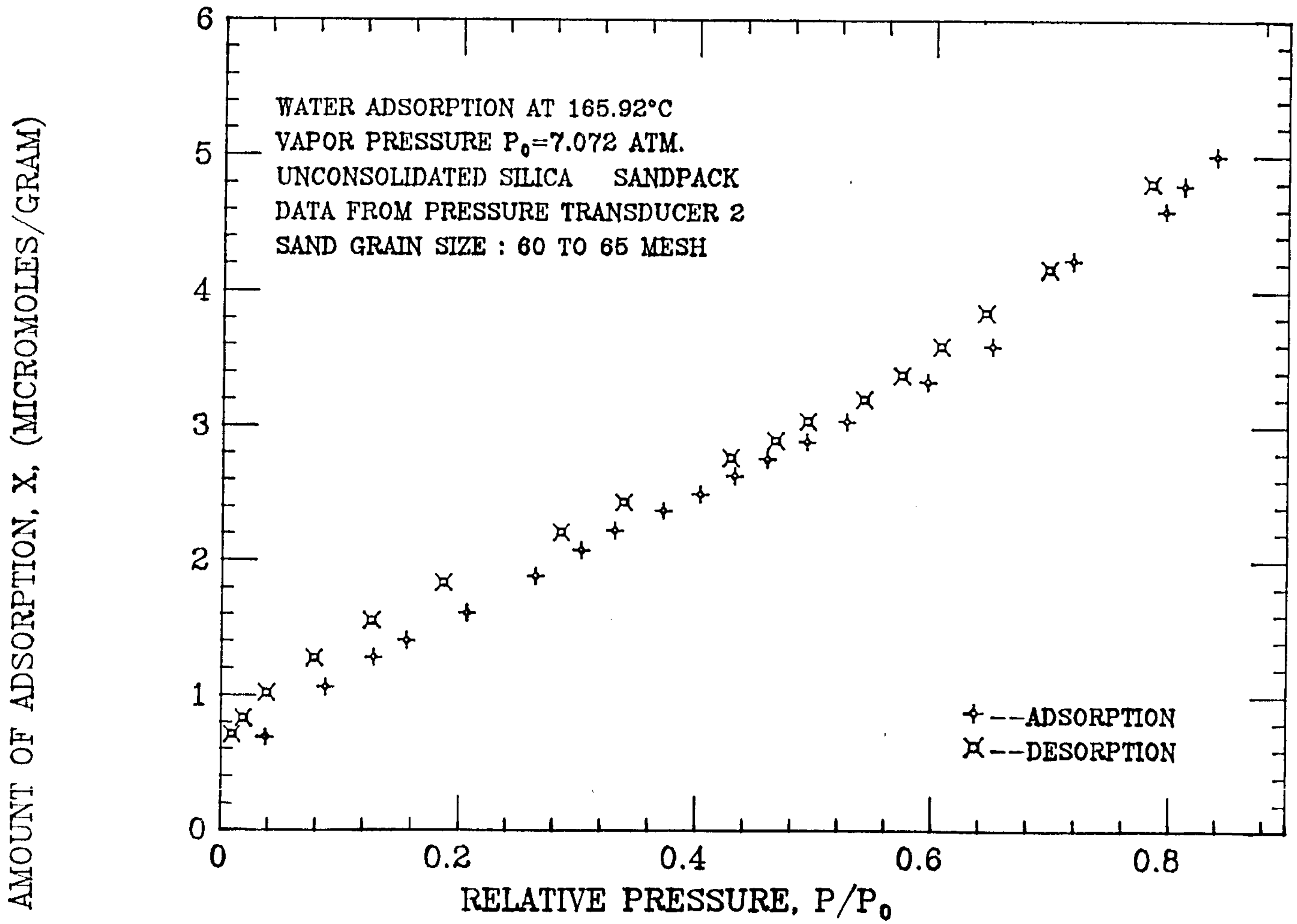

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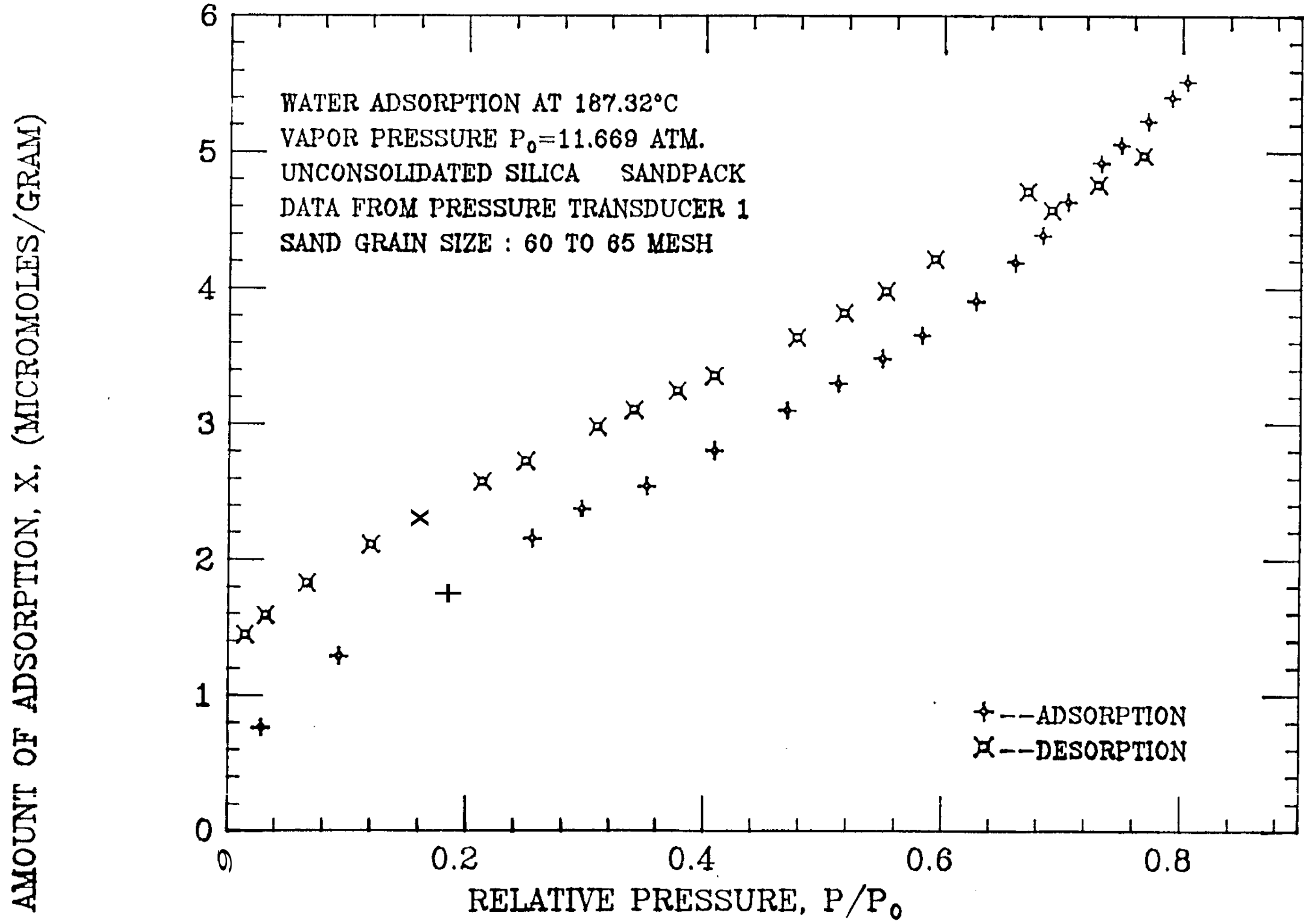

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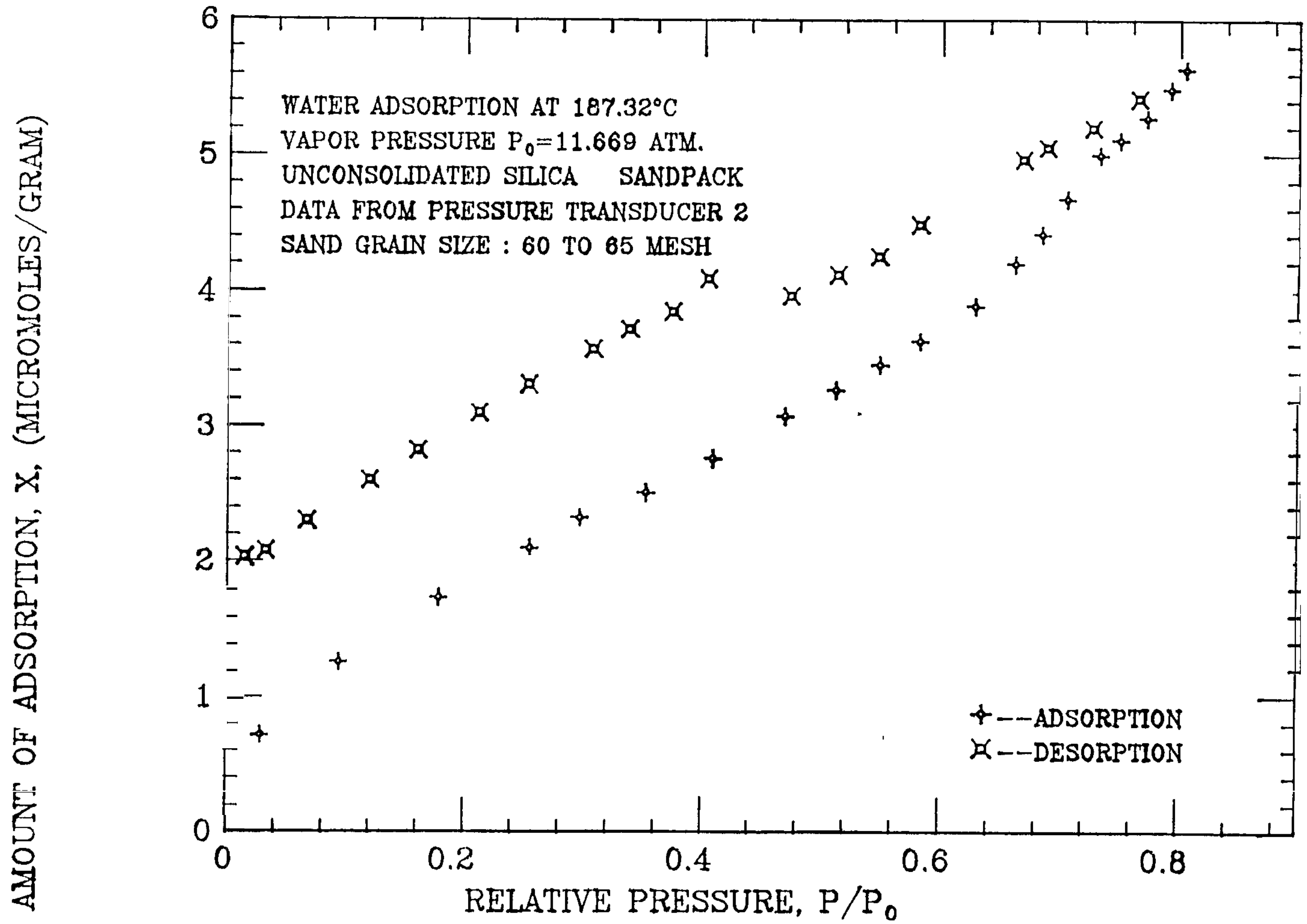

Figure 5 36 ter Adsorption Isotherm at Elevated Temperature

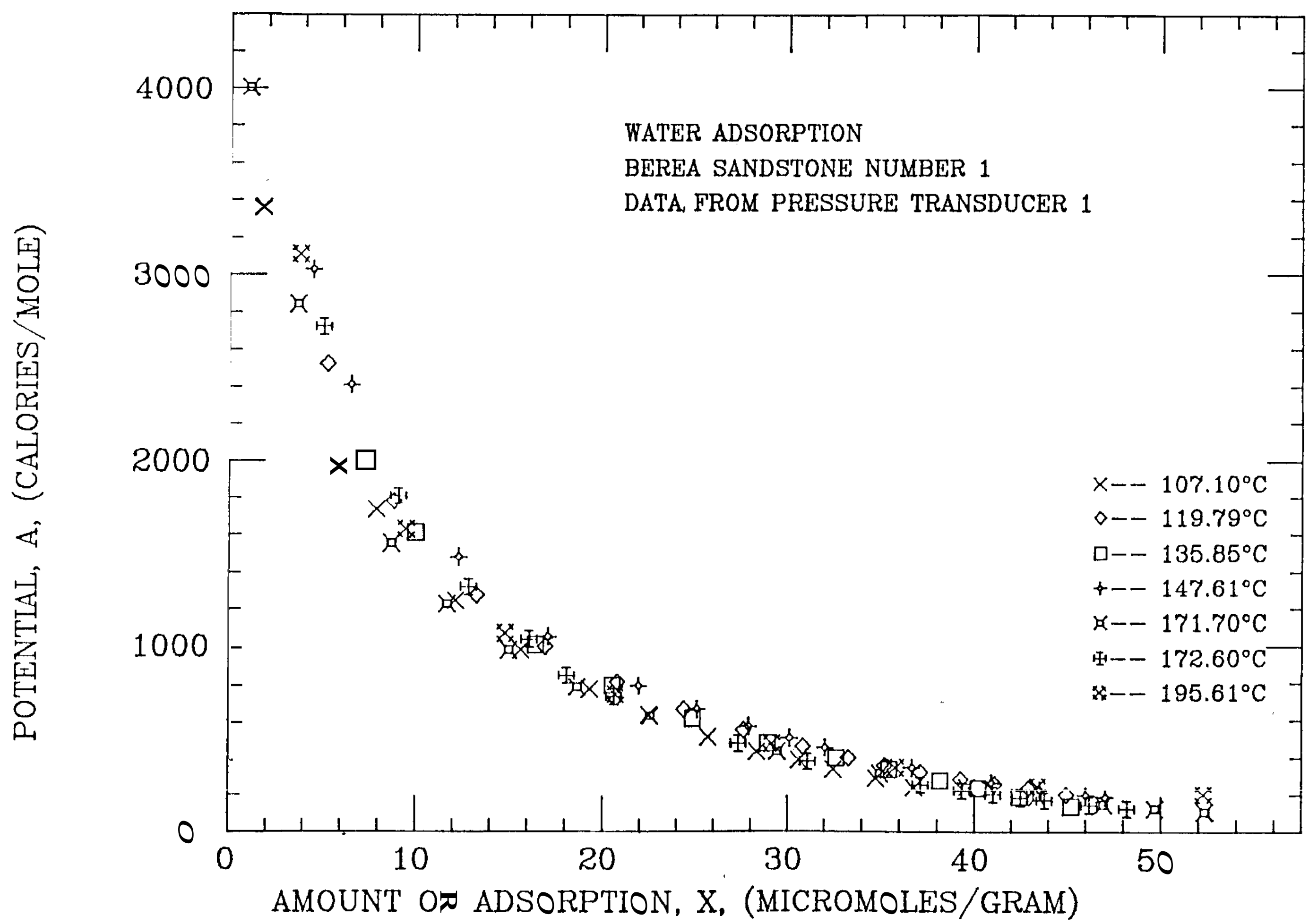

Figure 5.87 Characteristic Curve of Water Adsorption on Rock Sample

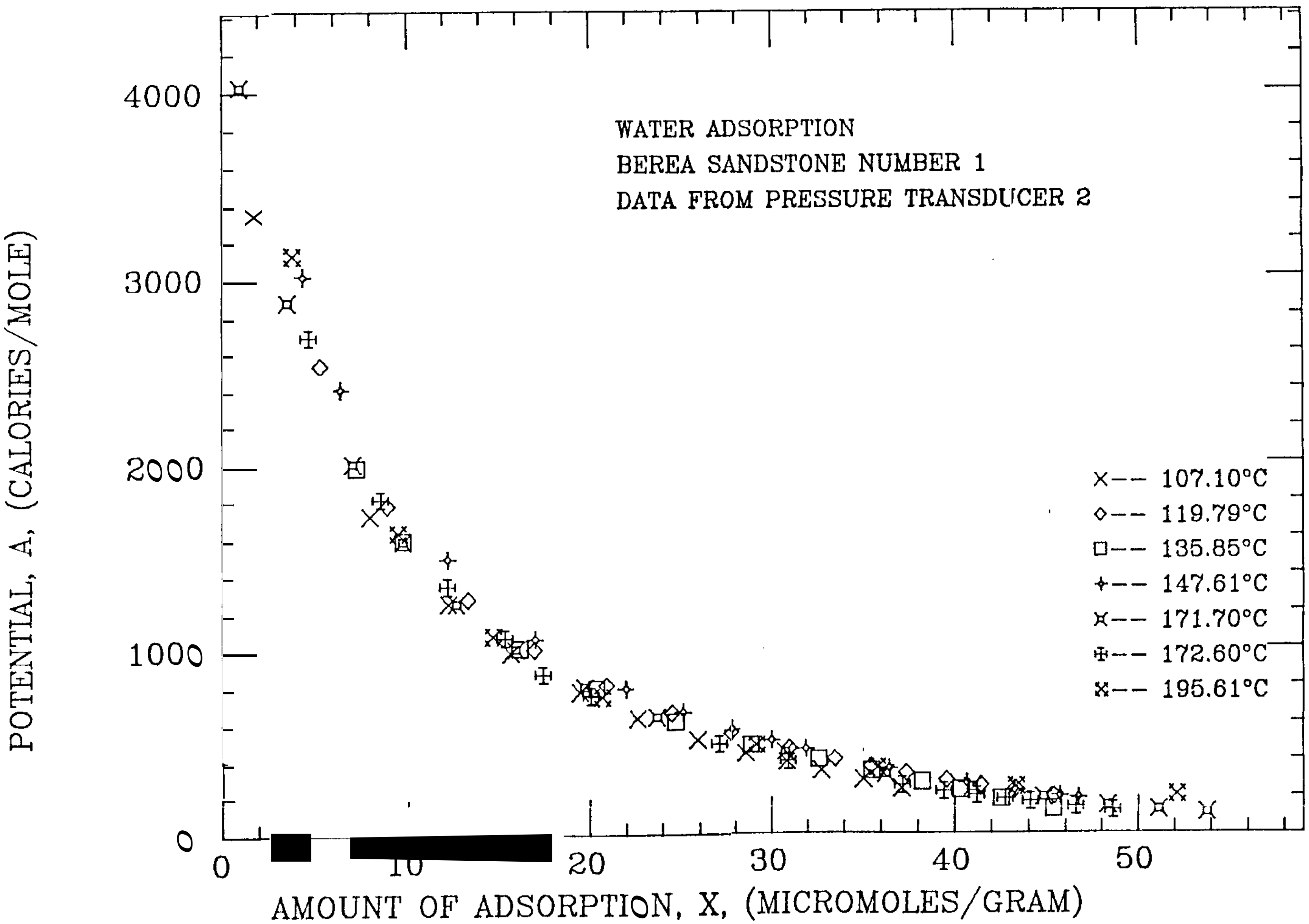

Figure 5.88 Characteristic Curve of Water Adsorption on Rock Sample

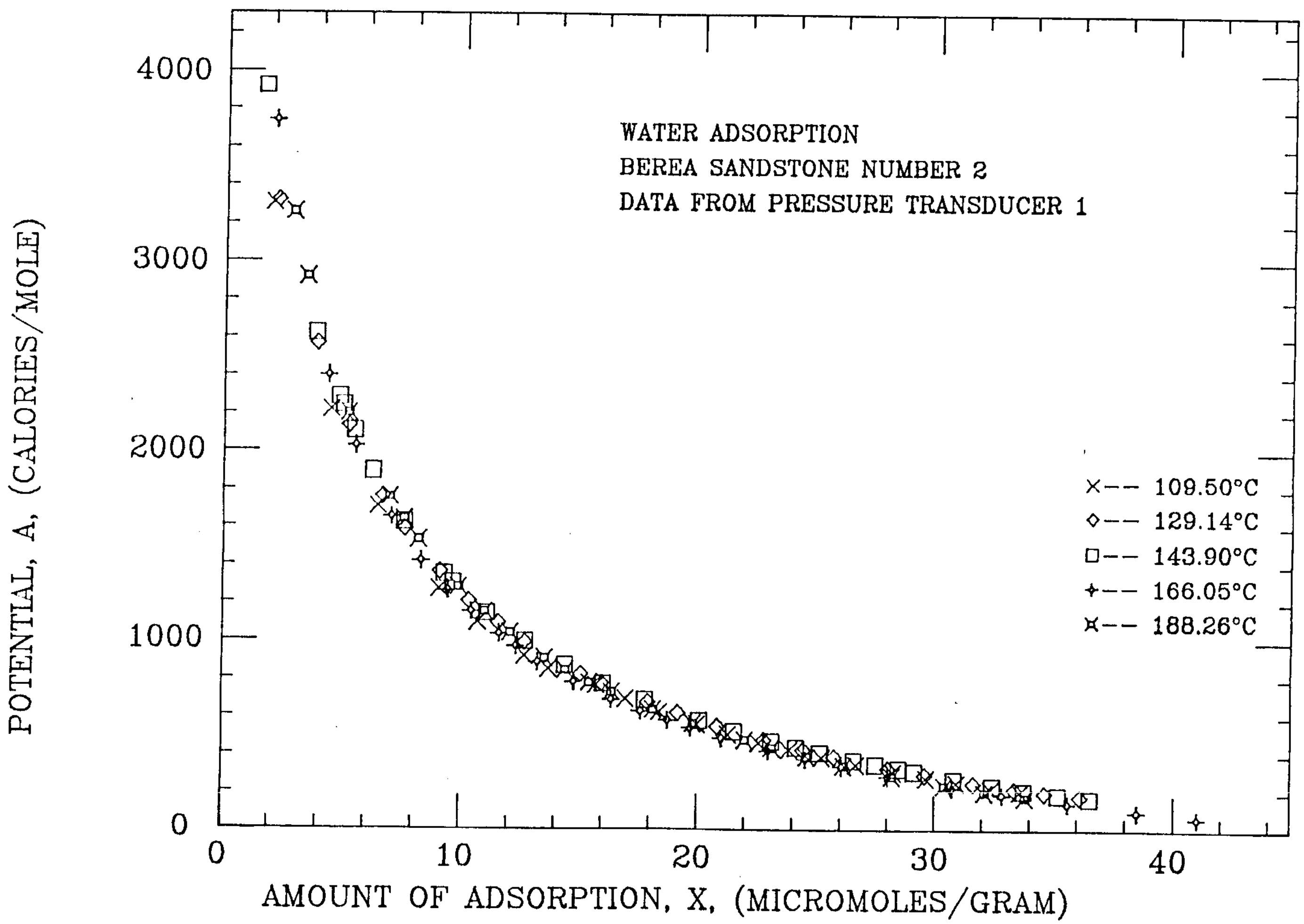

Figure 5.89 Characteristic Curve of Water Adsorption on Rock Sample

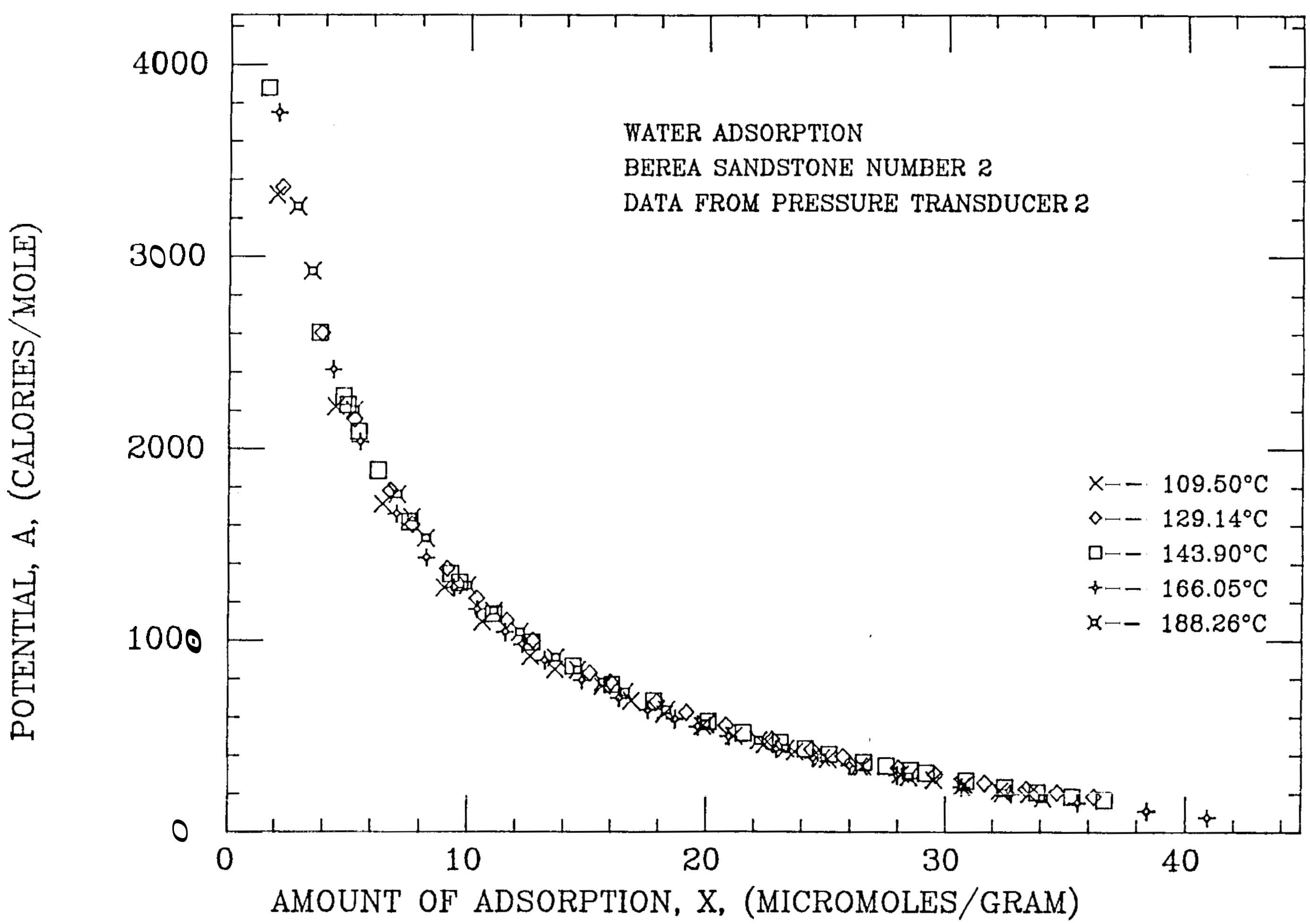

Figure 5.90 Characteristic Curve of Water Adsorption on Rock Sample

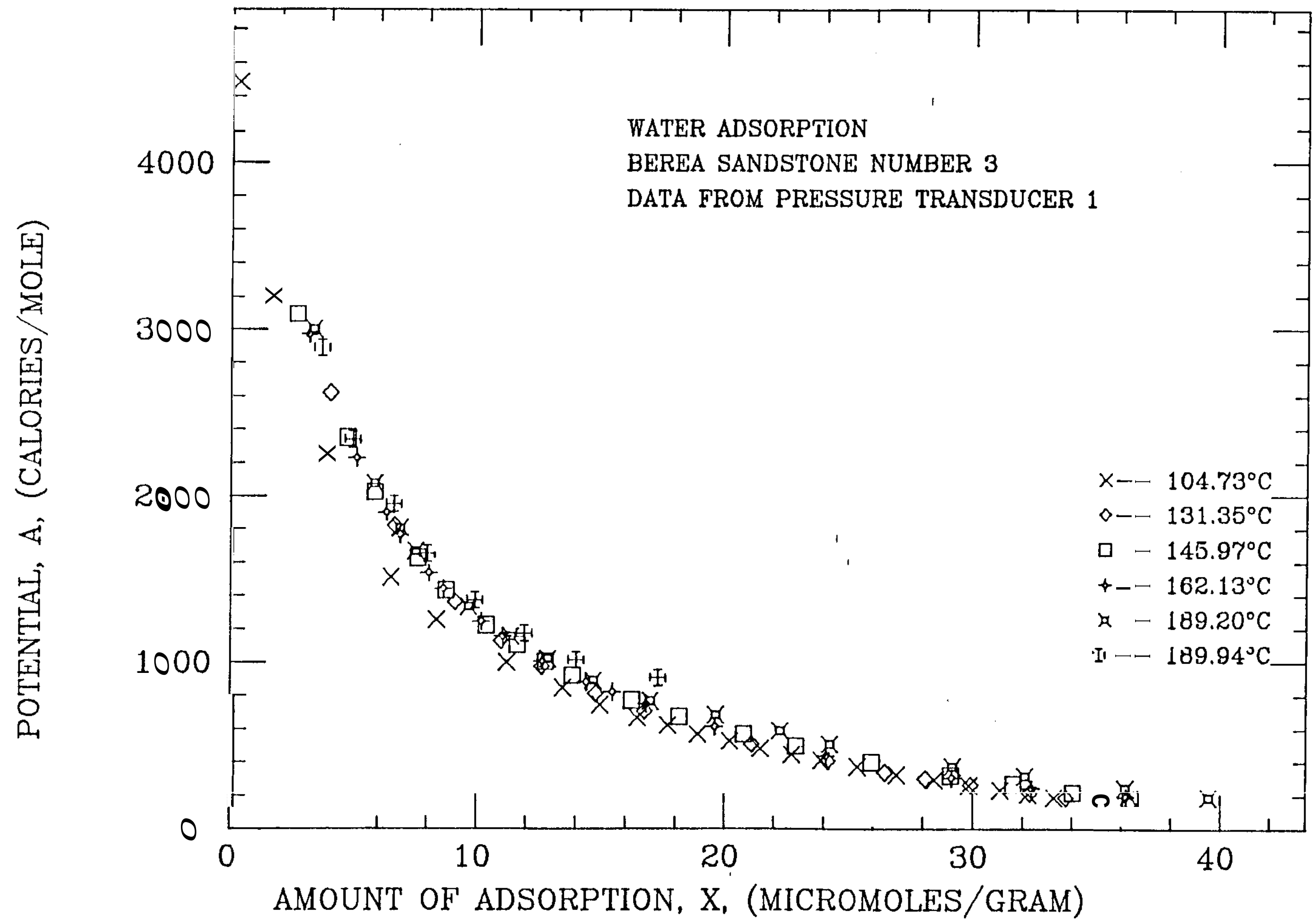

Figure 5.91 Characteristic Curve of Water Adsorption on Rock Sample

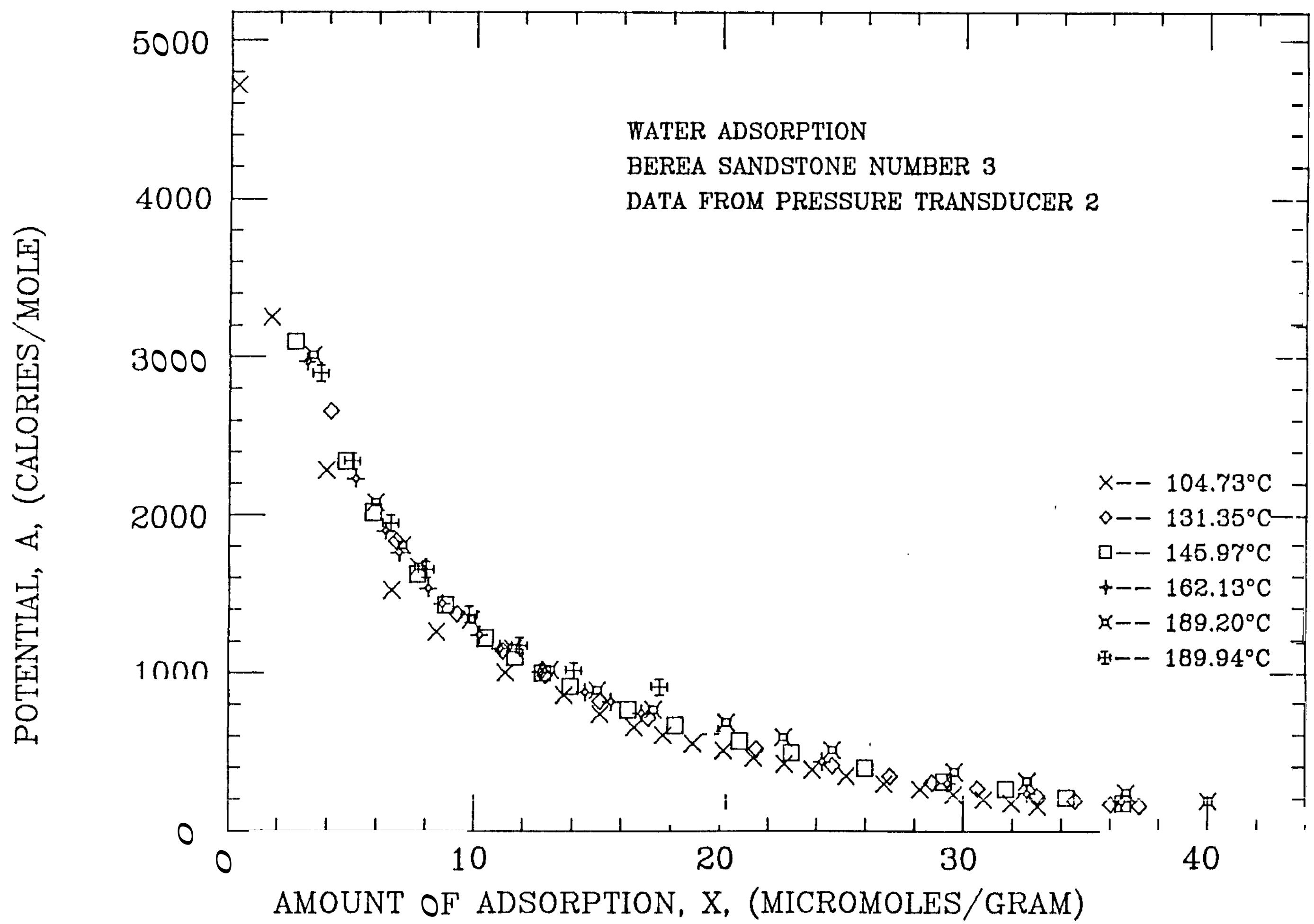

Figure 5.92 Characteristic Curve of Water Adsorption on Rock Sample

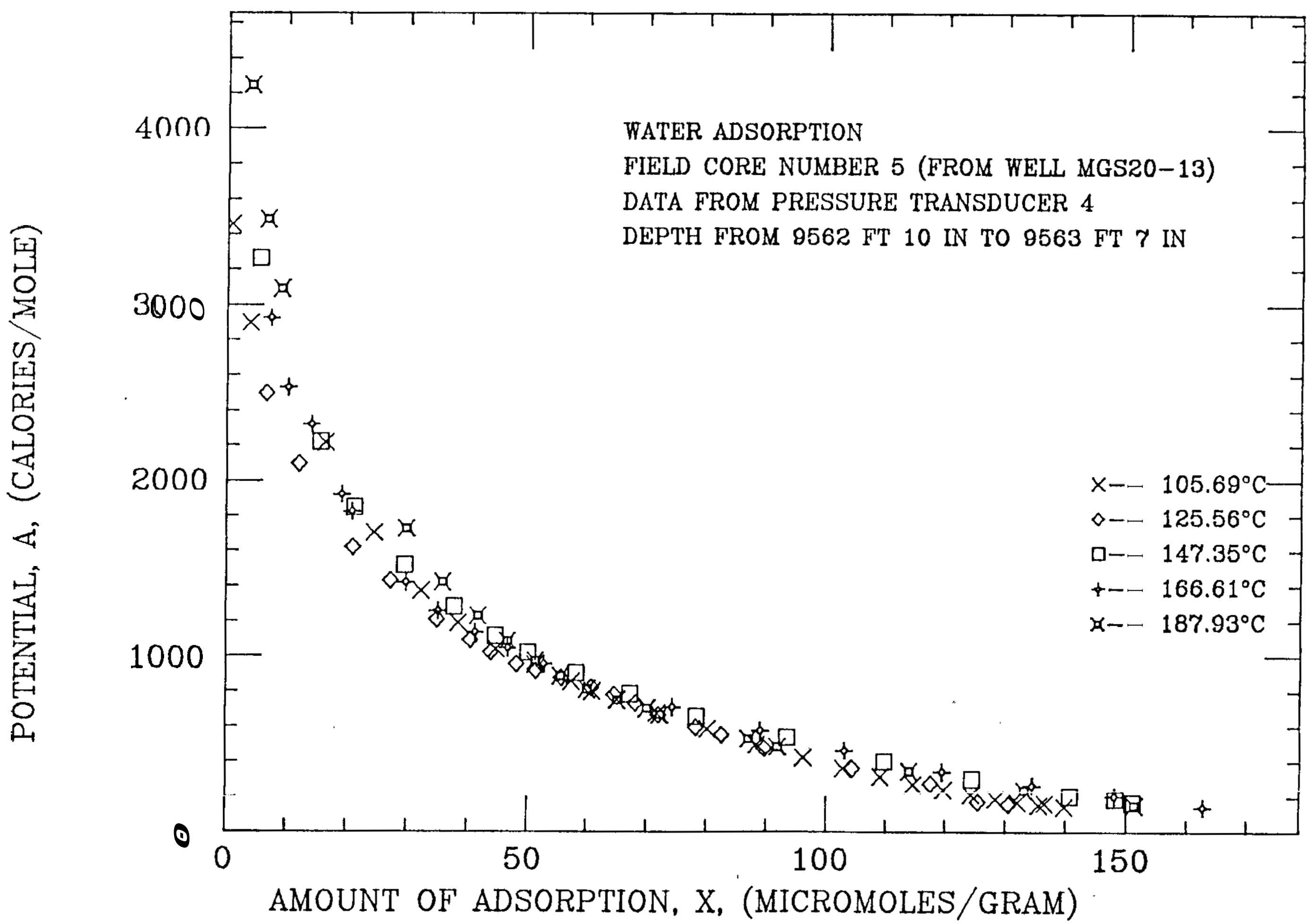

Figure 5 93 Characteristic Curve of Water Adsorption on Rock Sample

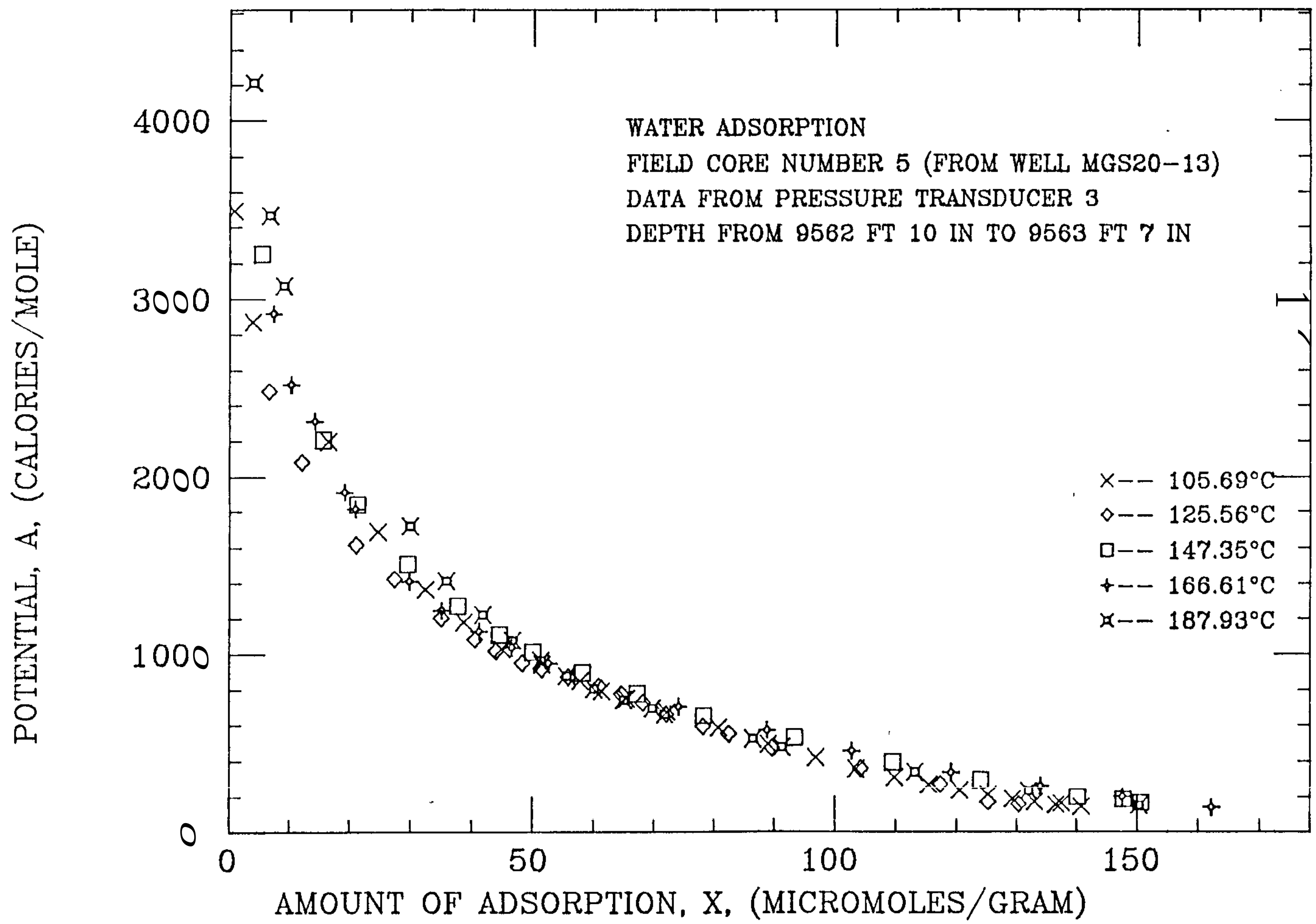

Figure 5.94 Characteristic Curve of Water Adsorption on Rock Sample

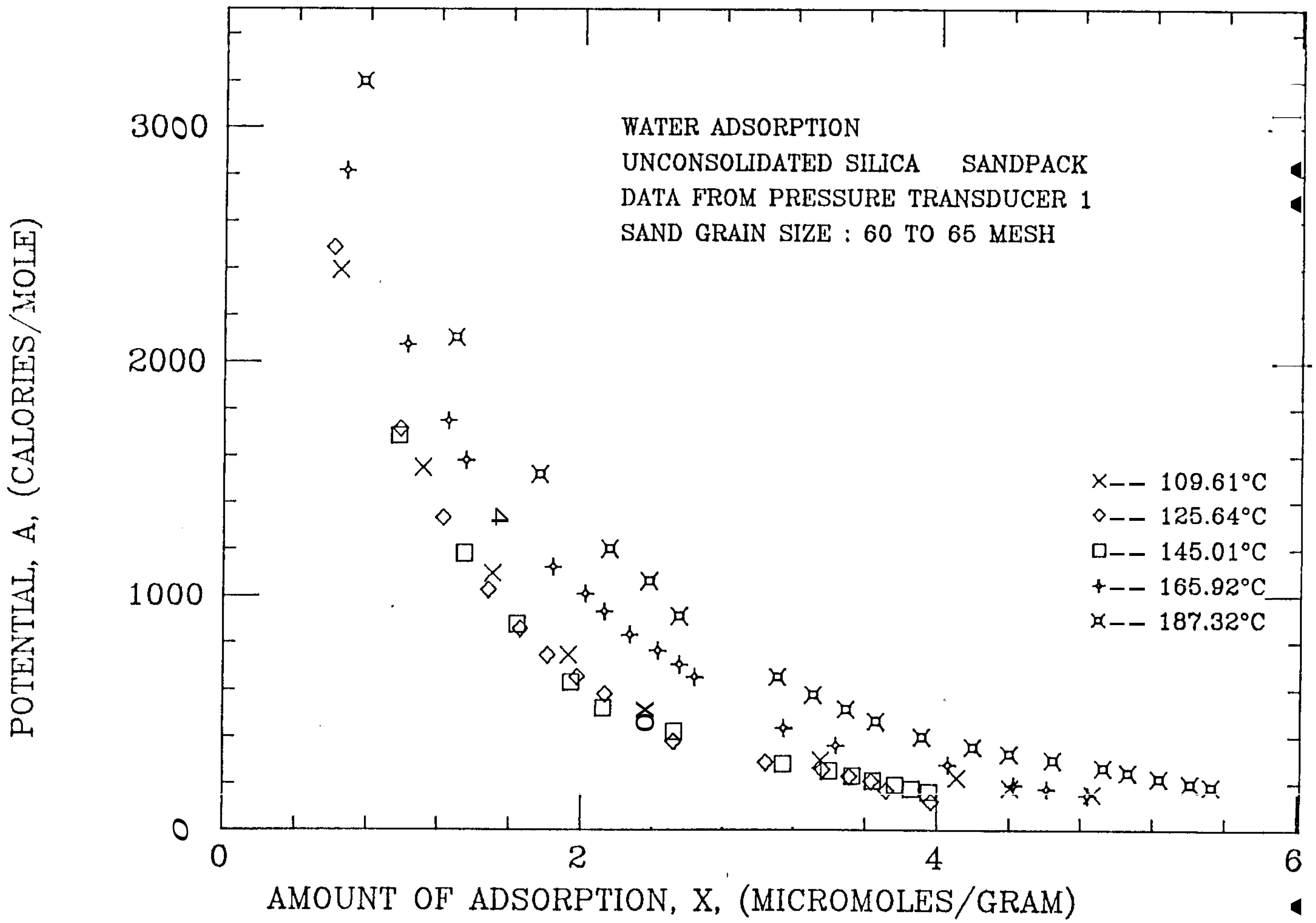

Figure 5.95 Characteristic Curve of Water Adsorption on Rock Sample

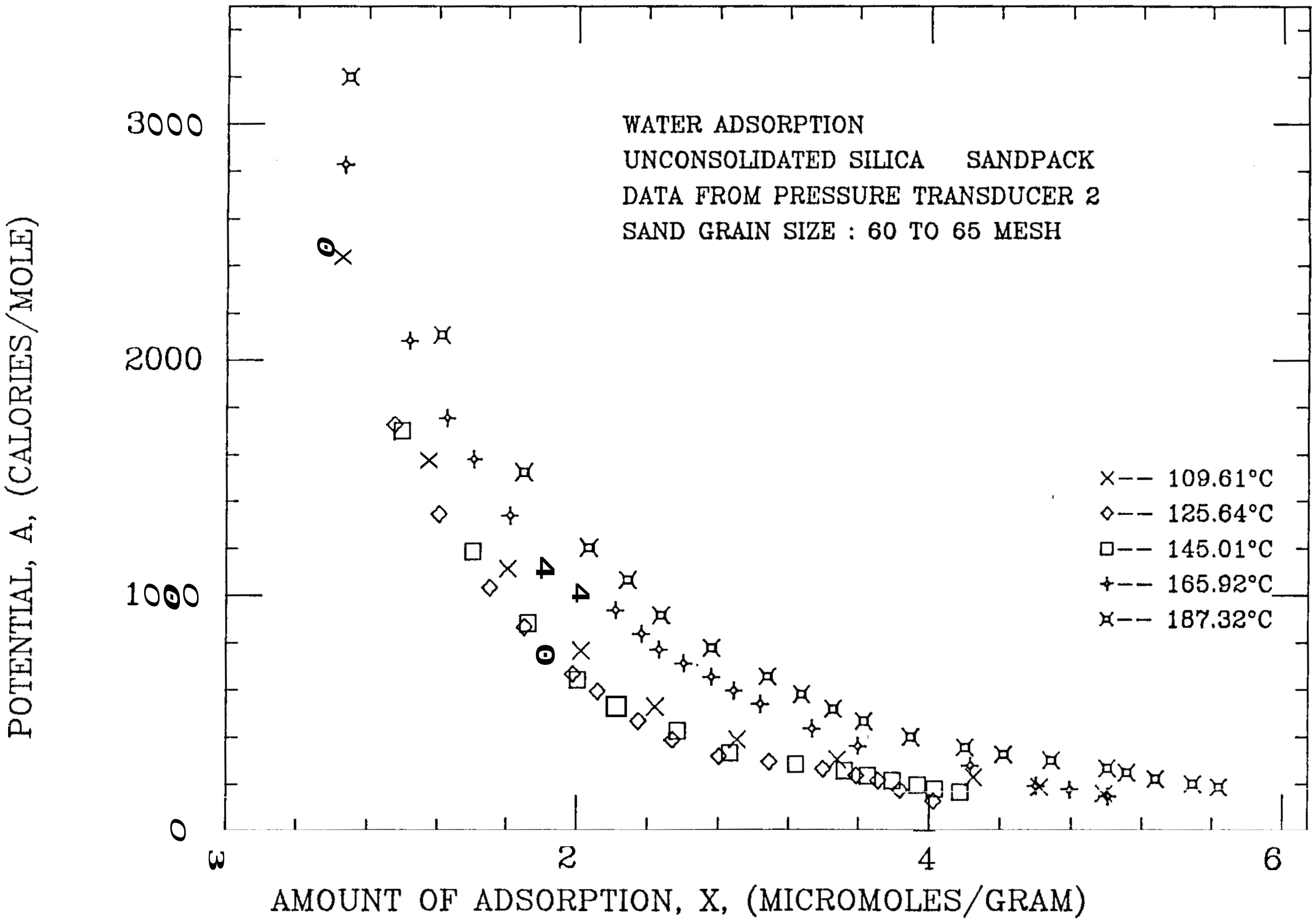

Figure 5.96 Characteristic Curve of Water Adsorption on Rock Sample

bulk liquid. From the characteristic curve for all Berea sandstone samples and field core Number 5, it was found that the curve for a sample is independent of temperature. This means that the dominant factor in water vapor pressure lowering for these rock samples is micropore adsorption. The unconsolidated silica sands do not show this temperature invariance characteristic curve; thus, there are none or very few micropores in unconsolidated sands. This is consistent with the results from nitrogen adsorption by Avery and Ramsay.[40]

The temperature invariant characteristic curve can be used to extrapolate from these experimental resuls to obtain adsorption isotherms at temperatures not studied in these experiment.

The isoteric heat of water adsorbed on the rock surface can be calculated by using the temperature invariant property. For simplifying the problem, the compressibility factor will be assumed to be 1; thus, Equation 2.73 can be rewritten as:

$$\frac{(\ln P)}{(\frac{1}{T})} = -\frac{q_{st}}{R} \tag{5.4}$$

The potential function A, which was defined as RT ln P_o/P, can be rewritten as:

$$\ln P = \ln P_o - \frac{A}{RT} \tag{5.5}$$

Substituting Equation 5.5 into Equation 5.4 one obtains:

$$q_{st} = -R\,\frac{\partial(\ln P_o)}{\partial(\frac{1}{T})} - \frac{A}{R} \tag{5.6}$$

For a particular temperature, the first term in Equation 5.6 is a constant, Figures 5.97–5.104 are the isoteric heat of water adsorption on rock samples at temperatures between 100°C and 200°C.

The entropy of the adsorbed water can also be calculated. The compressibility factor, Z, will also be assumed to be 1 in order to simplify the problem. Equation 2.79 can be rewritten as:

$$S_{ad} = S_g - \frac{q_{st}}{T} \quad R \ln P/P_o \tag{5.7}$$

Substituting Equation 5.6 into Equation 5.7, one obtains:

$$S_{ad} = S_g + R \frac{\partial(\ln P_o)}{\partial(\frac{1}{T})} \tag{5.8}$$

Figure 5.105 shows that the adsorption phase is less random than the bulk liquid water.

5–4 Surface Area

The surface area is an important property of a porous medium. The most important problem in making surface area calculations is that the surface area is not well defined. Determining the surface area of a porous medium is like determining the area of an island. On a small scale map, the area can be obtained easily, but perhaps not accurately enough. Thus, the results of surface area measurements using different methods, or from different experiments using the same method might be different.

BET analysis is often used to obtain the surface area of a fine-grained material. The standard method to obtain surface area is to apply BET

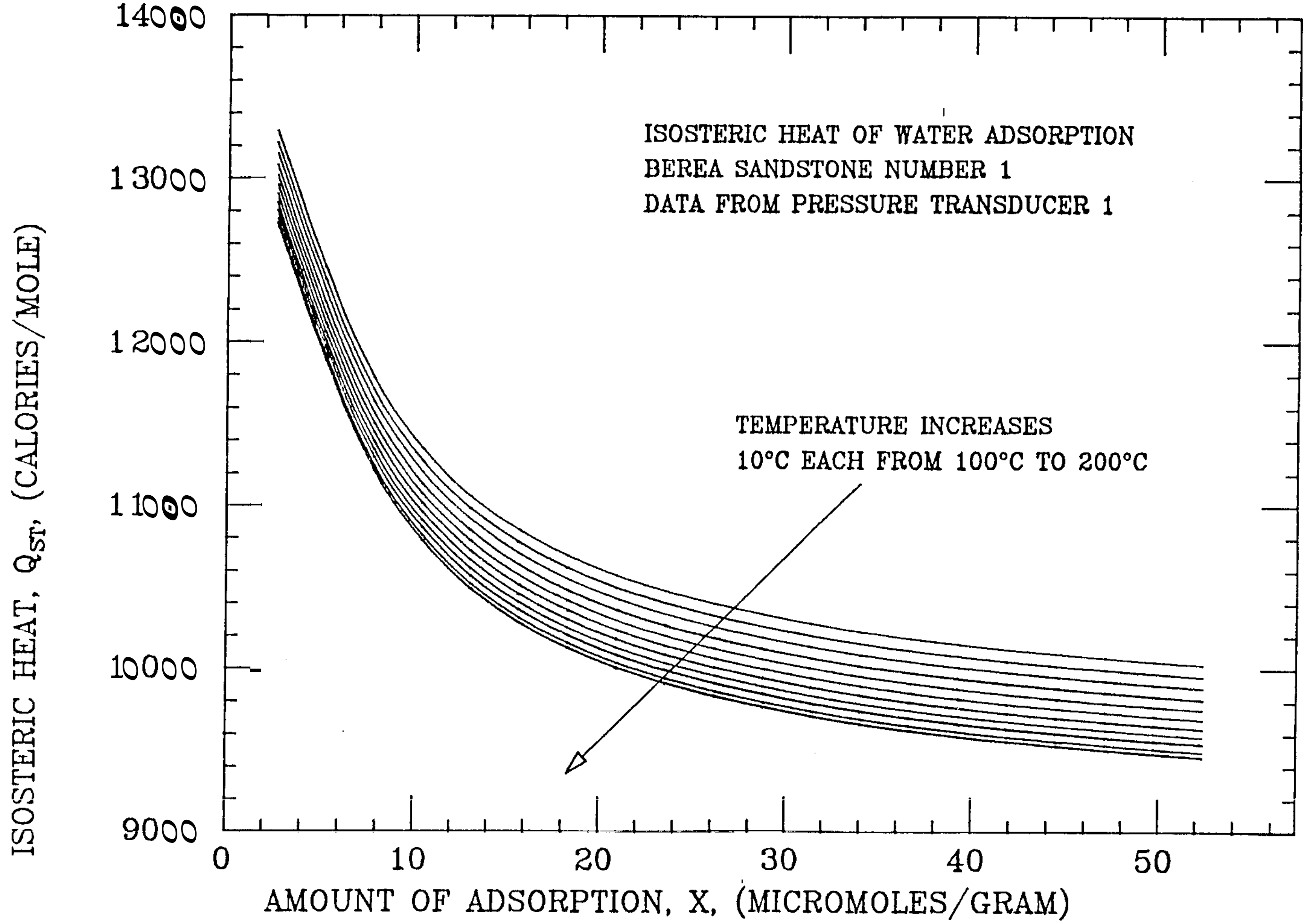

Figure 5.97 Isosteric Heats of Water Adsorption on Rock Sample

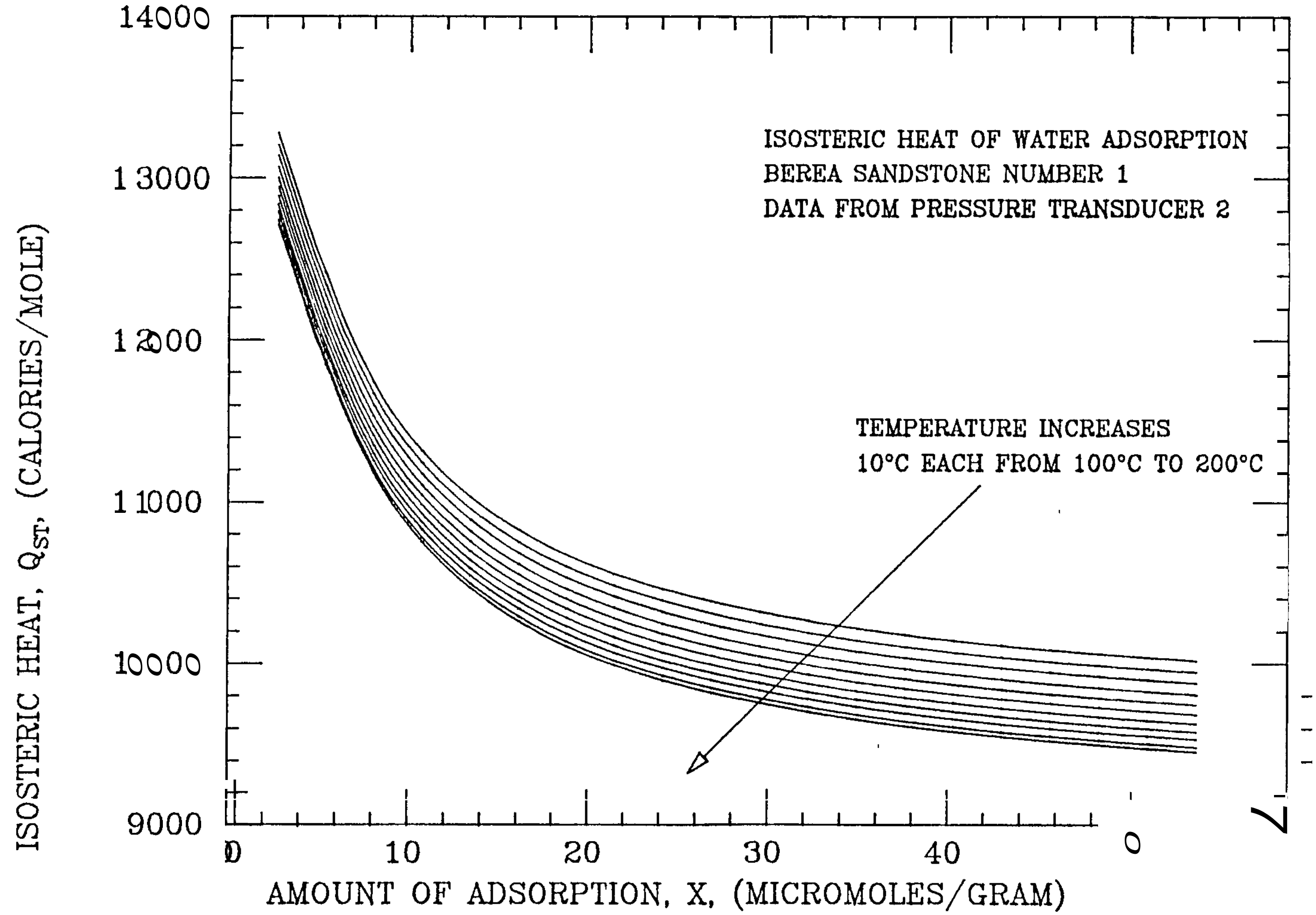

Figure 5.98 Isosteric Heats of Water Adsorption on Rock Sample

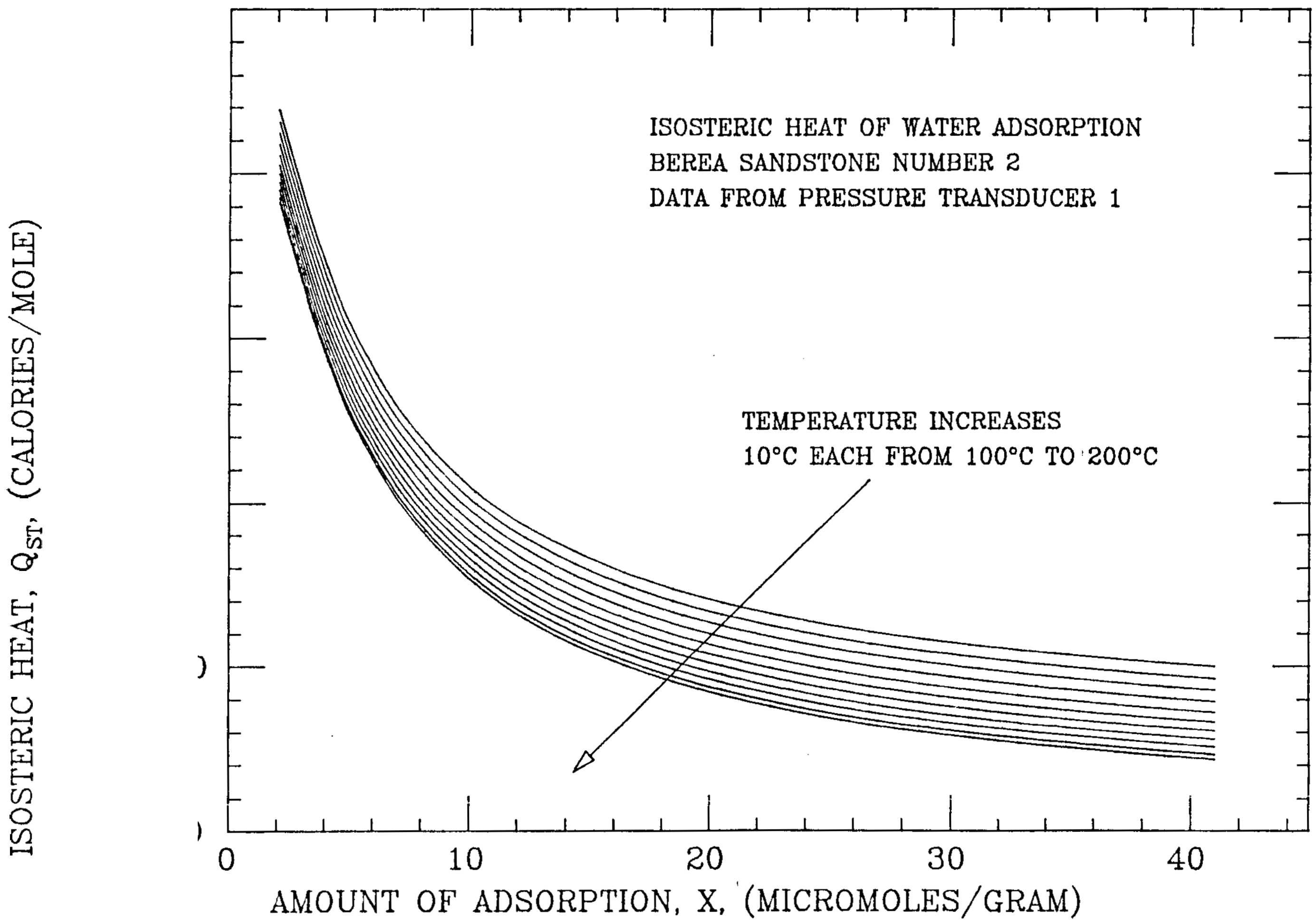

Figure 5.99 Isosteric Heats of Water Adsorption on Rock Sample

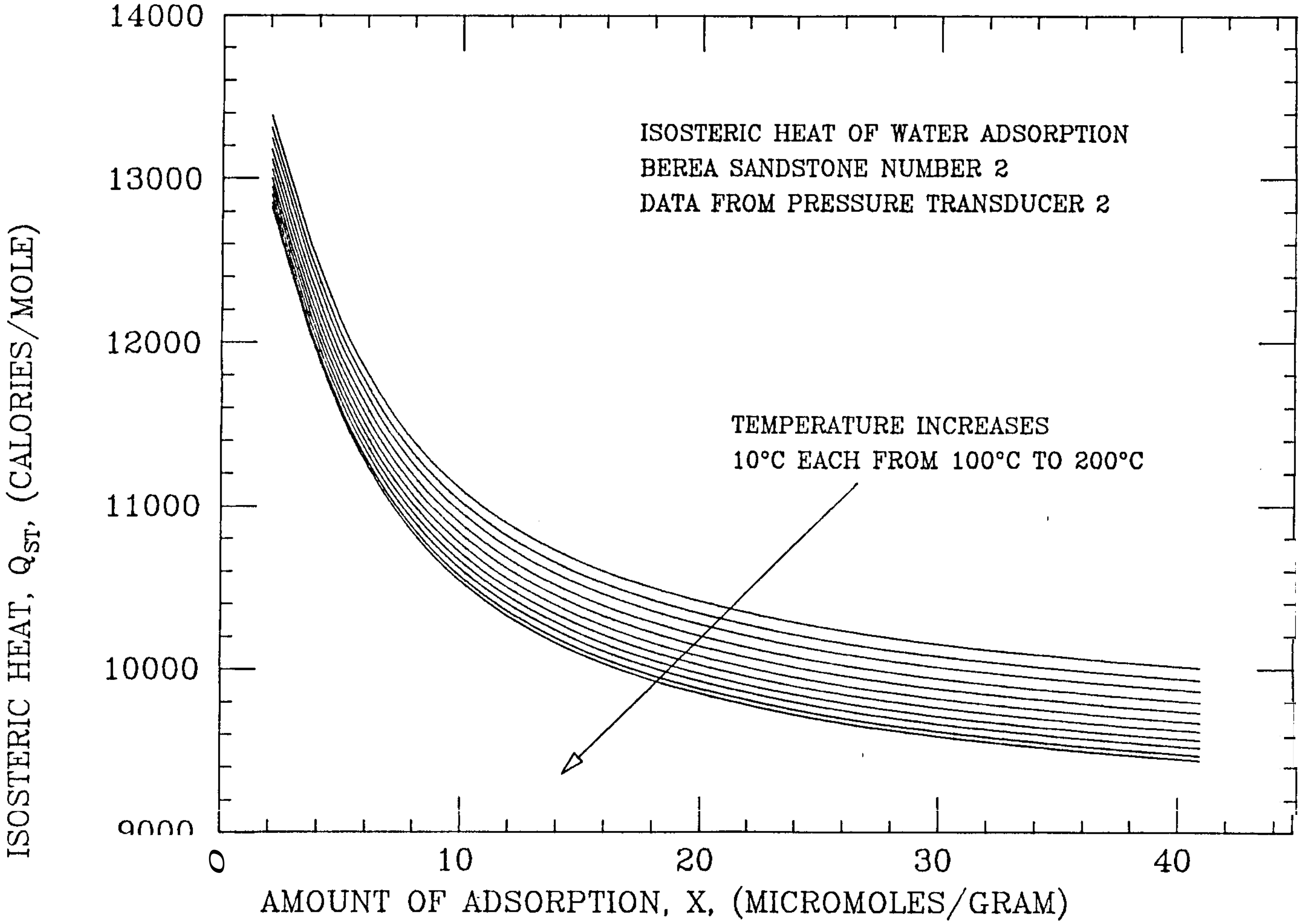

Figure 5 10C Isosteric Heats of Water Adsorption on ock Sample

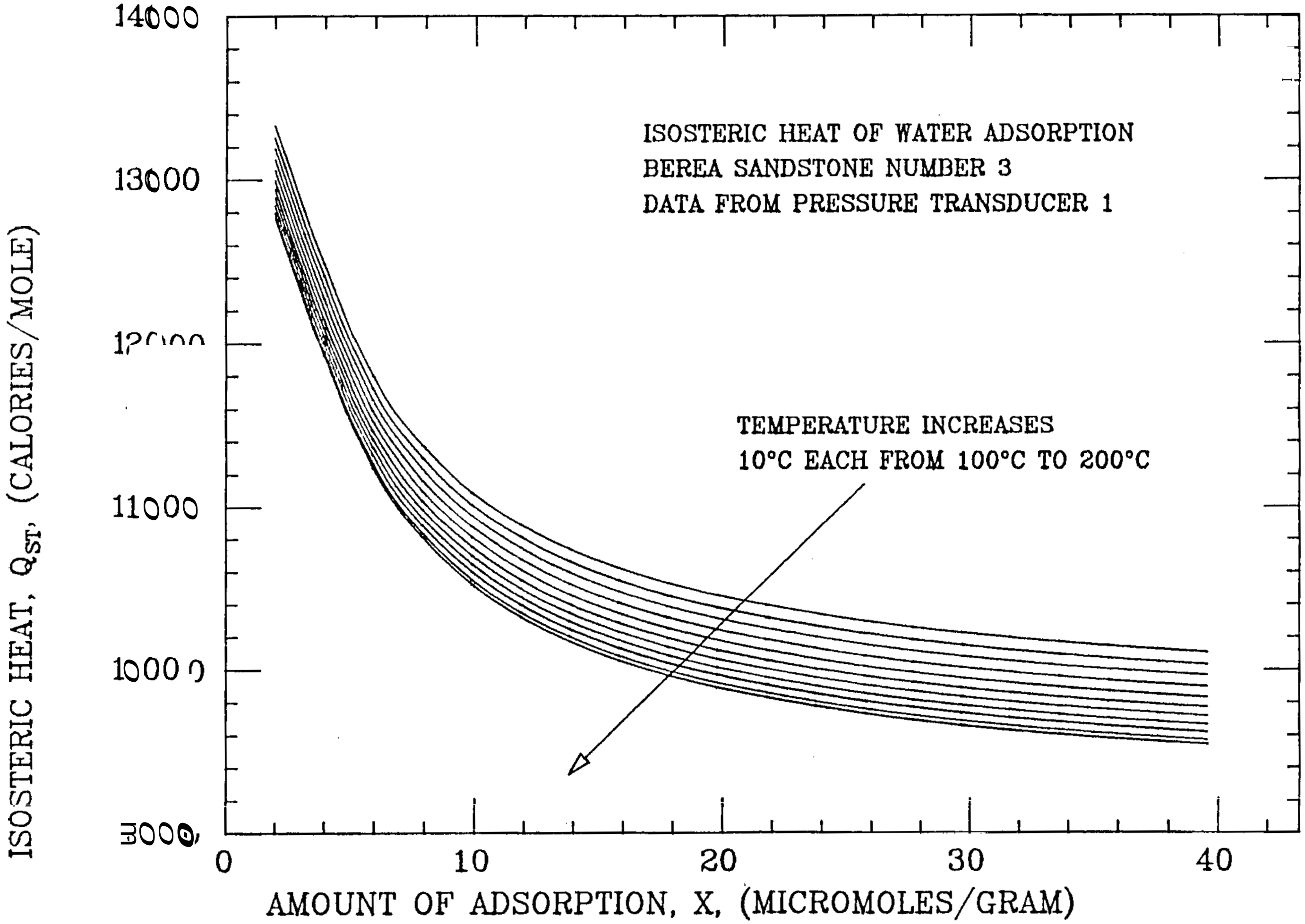

Figure 5.101 Isosteric Heats of Water Adsorption on Rock Sample

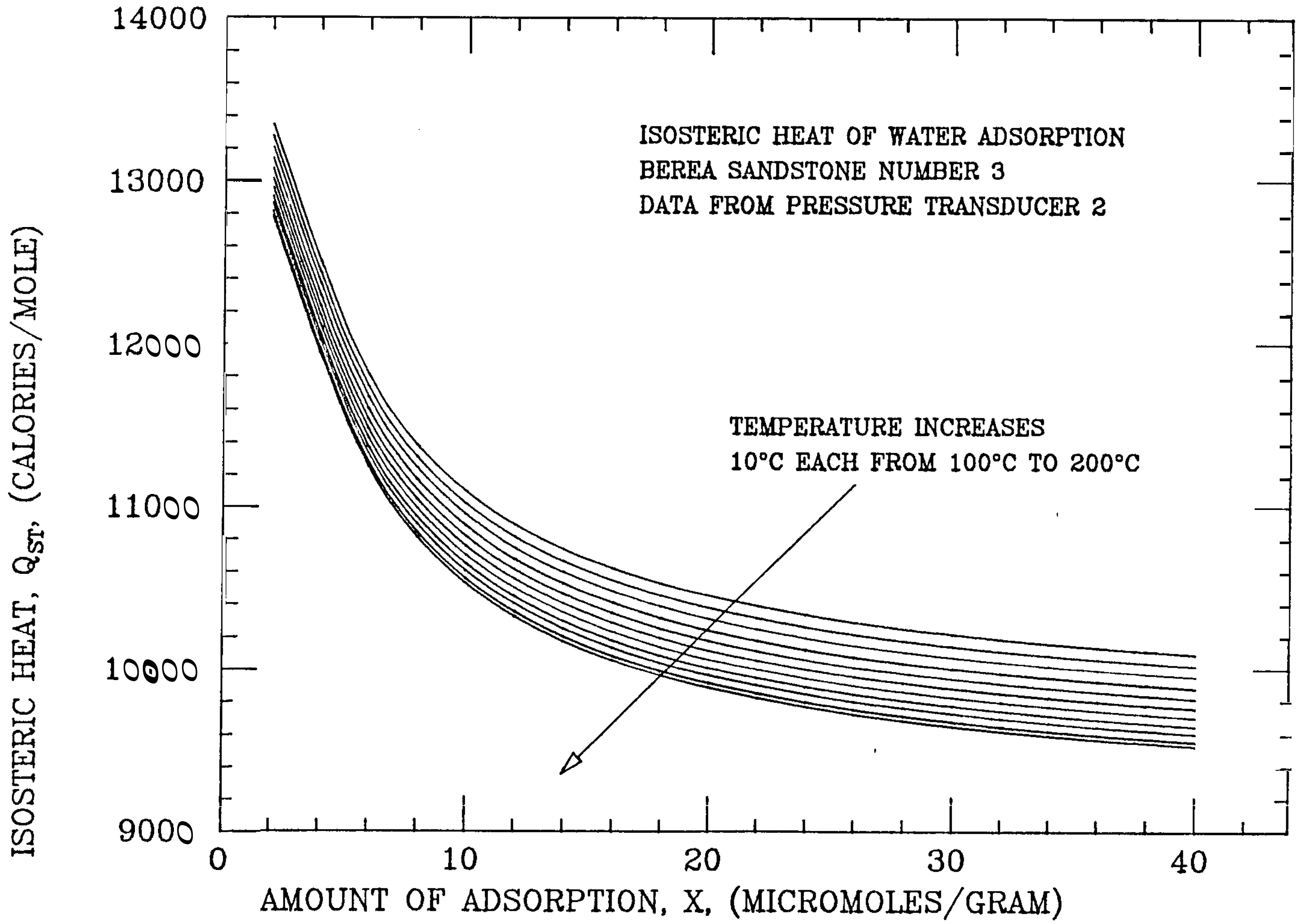

Figure 5.102 Isosteric Heats of Water Adsorption on Rock Sample

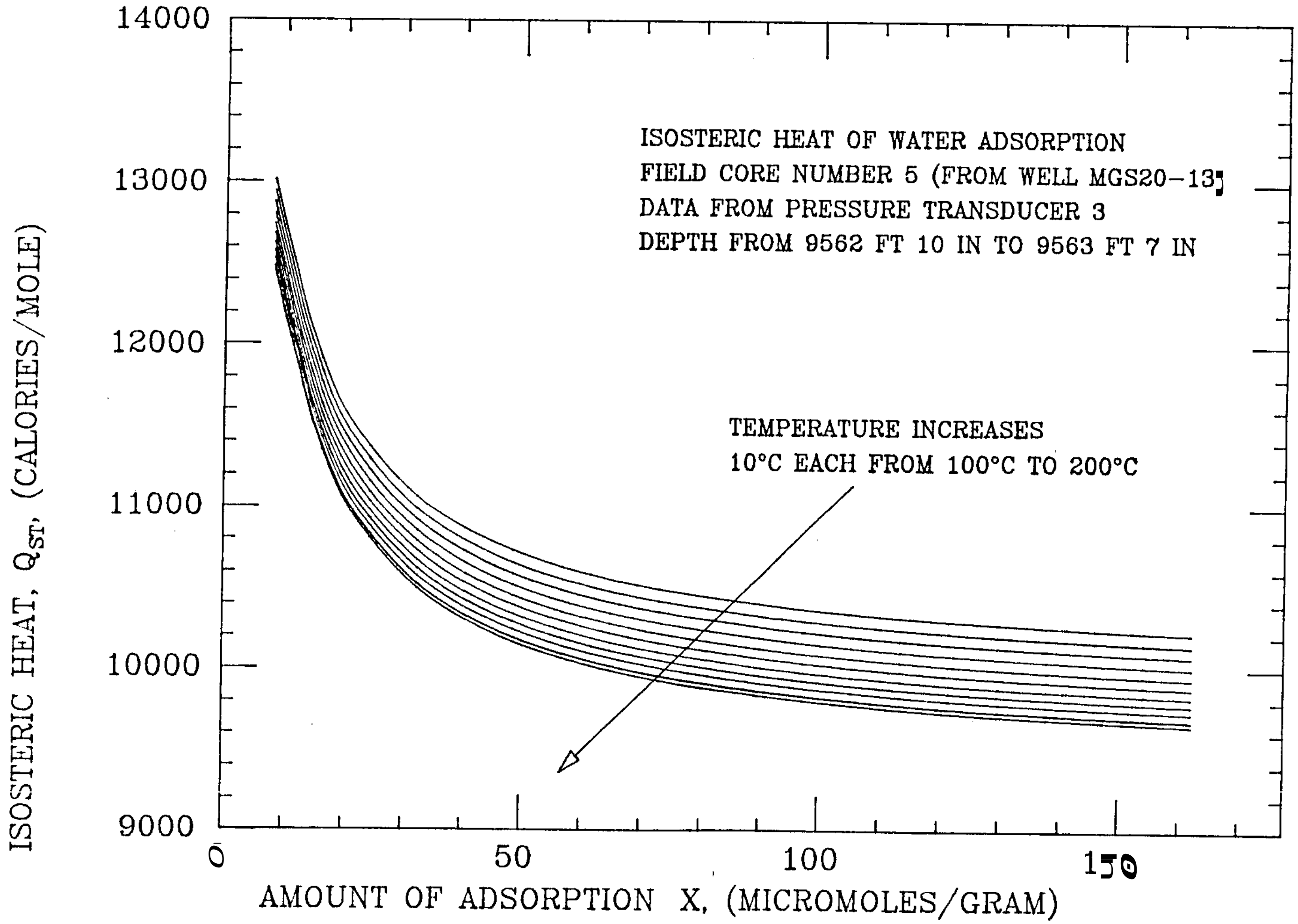

Figure 5.103 Isosteric Heats of Water Adsorption on Rock Sample

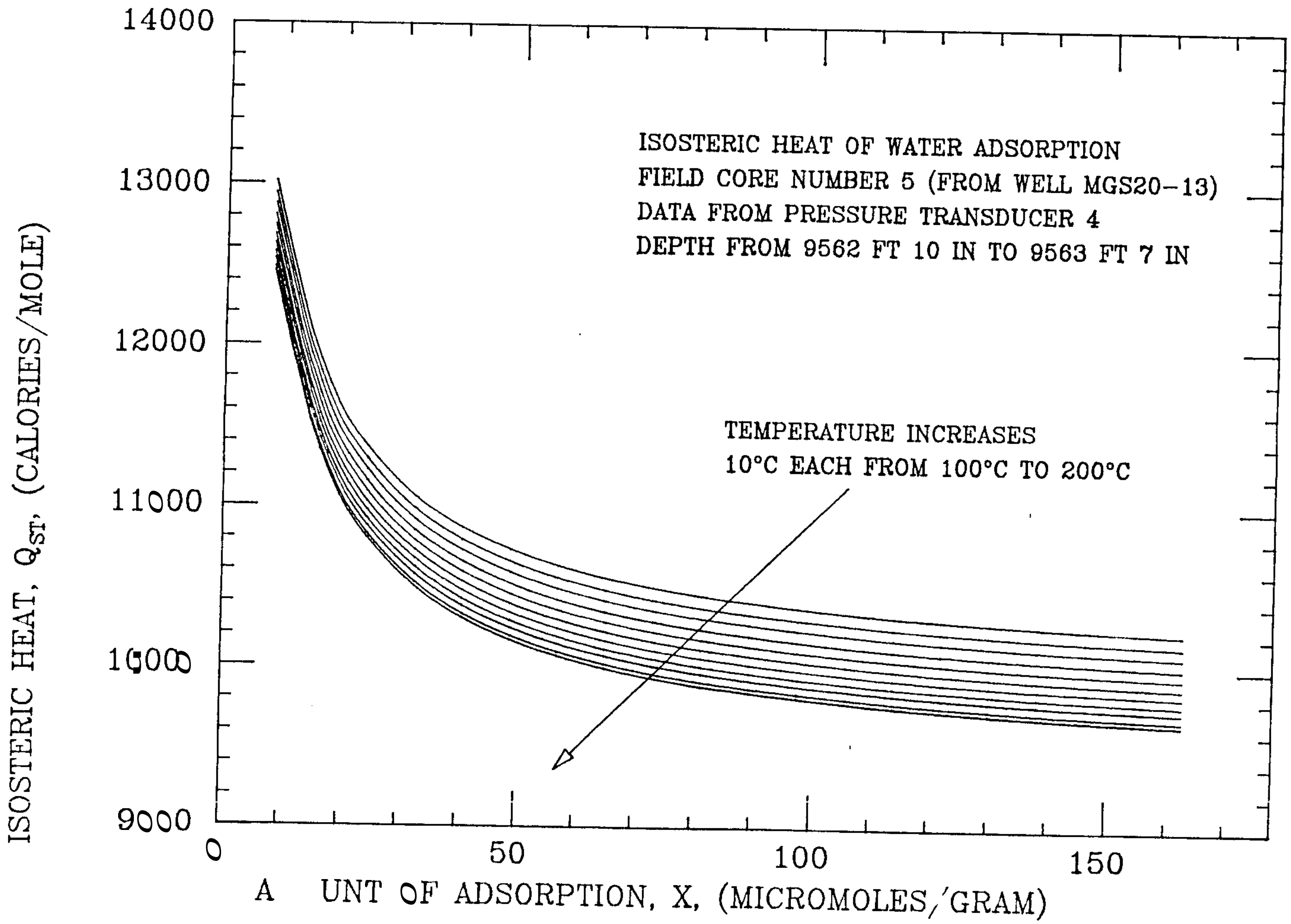

Figure 5.104 Isosteric Heats of Water Adsorption on Rock Sample

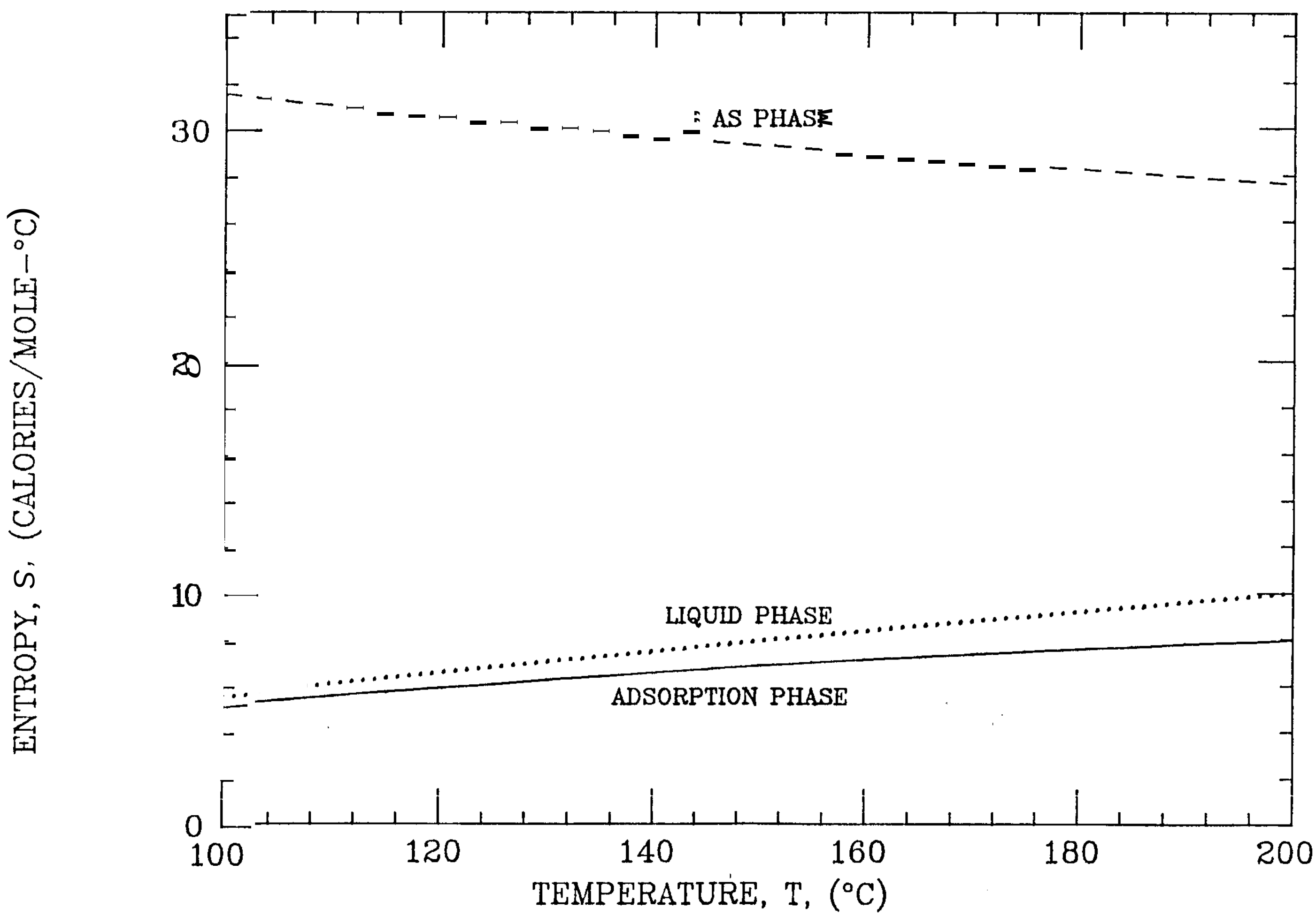

Figure 5.105 Entropy of Adsorbed Water at Temperature

analysis on nitrogen adsorption at 77.3^{o}K. The surface area obtained from the BET analysis on nitrogen adsorption isotherms at 77.3^{o}K is often comparable with other methods.

The theory of the BET analysis in determining the surface area is based on the assumption of a homogeneous surface. This may not be true for many porous system, but the assumption is reasonably accurate in most cases when the relative pressure is not too low. Another problem ofter raised concerns the surface area occupied by each adsorbed molecule. For nitrogen molecules at liquid nitrogen boiling temperature (77.3^{o}K), the area occupied by each nitrogen molecule has been generally recognized to be 16.2Å^2. This value was applied in analyzing nitrogen adsorption isotherms in this experiment. For water and ethane molecules, the density of the adsorbed phase is assumed to be the same as the density of the liquid phase, and such molecule is assumed to be a. sphere, The area occupied by each molecule, S_a, can be written as:

$$S_a = \pi \cdot \left(\frac{3V}{4\pi N_a}\right)^{2/3} \tag{5.9}$$

where V is the molar volume of liquid phase, N_a is Aveargadro's number.

The surface area of rock samples was obtained. by using BET analysis on nitrogen adsorption isotherms and given in Table 5.1. Experimental data is presented in Appendix A. The specific surface areas for Berea sandstones are on the order of 1 m^2/gm, which is consistent with that obtained in other investigations. The specific surface area was found to be larger if the permeability of the Berea sandstone was smaller.

BET analysis has also been applied to the adsorption isotherms of water and ethane. All these results are also listed in Table 5.1 for comparison. Since the critical temperature of methane is well below room temperature, the area occupied by each methane molecule is not known, and BET analysis cannot be applied.

From Table 5.1, it can be seen that the specific areas for field cores obtained from water adsorption are not consistent with that obtained from nitrogen adsorption. Since water adsorption can be modelled by micropore filling rather than layer-by-layer coverage, there is a good possibility that the surface area from water adsorption is not meaningful. This difference might also be due to the clay content of the field cores.

5-5 Capacitance Probe

In this experiment, 100 KHz was chosen as the frequency used for the capacitance probe. Figures 5.106-5.121 are experimental results and the numerical data are given in Appendix C. Experimental results showed that the capacitance probe is a very useful tool in water saturation detection.

It is hard to reach quantitative conclusions, since the geometrical shape and the glass probe guide are difficult to model. However, the results match published information.[37, 38, 43] From the experimental results, it seems that there is a temperature invariant relationship between the quantity of water adsorbed and the capacitance change. A more precise bridge is necessary for a more detailed study of the frequency response of the capacitance probe,

It was also found that the capacitance probe is sensitive to methane and ethane adsorption. Experimental data are given in Appendix B. Since

Table 5.1 [illegible]rface Area of Core Samples

Adsorbate	Berea Sandstone Number 1	Berea Sandstone Number 2	Berea Sandstone Number 3	Field Core Number 3	Field Core Number 5	Unconsolidated Silicate Sands
N_2	1 2[illegible] (0.0[illegible]) {[illegible]1[illegible]6}	0 7029 (0.01[illegible]5) {-196}	0 3[illegible] (0.0[illegible]9) {[illegible]196}	1.4225 (0.0153) {-196}	0.6079 (0.0213) {-196}	0.0814 (0.0053) {-196}
C_2H_6	0 0208 (0.005[illegible]) {2[illegible] [illegible]8}	0 0[illegible]52 (0.01[illegible]5) {[illegible].[illegible]2}	0 0276 (0.00[illegible]) {23 [illegible]9}		0.0309 (0.0211) {24.17}	
H_2O	1 1338 (0 0[illegible]43) {107.[illegible]}	0 9255 (0.1101) {109.[illegible]}	0 353[illegible] (0.0190) {10[illegible].[illegible]3[illegible]}	6 5197 (1.6050) {106.65}	4.1429 (0.3058) {105.69}	0.0537 (0 0609) {109.6[illegible]}
	1 [illegible]758 (0.03[illegible]4) {113.[illegible]9}	0 3421 (0.070[illegible]) {129 14}	0 3042 (0 0[illegible]3) {131 3[illegible]}	7 5197 (1.0303) {124.39}	4.9138 (0.0628) {125.56}	0 0921 (0 [illegible]27) {12[illegible].6[illegible]}
	1.1680 (0.03[illegible]3) {13[illegible].3[illegible]}	0 9094 (0.0[illegible]0[illegible]) {143.3[illegible]}	0 3[illegible]3 (0.0[illegible]01) {[illegible]4[illegible].3}	7 3894 (0.[illegible]111) {142.3}	4.5884 (0.3849) {147.35}	0.0593 (0 [illegible]936) {145.0[illegible]}
	1 2047 (0.0233) {14[illegible].61}	0 8524 (0.0[illegible]13) {166.0[illegible]}	0.3395 (0.0[illegible]11) {16[illegible] 13}		4.4424 (0.4488) {166.61}	0.1251 (0 [illegible]068) {165.[illegible]}
	1 [illegible]13[illegible] (0.120[illegible]) {1[illegible]2.6}	0.[illegible]764 (0.0[illegible]0[illegible]) {18[illegible].[illegible]0}	1 0383 (0.163[illegible]) {1[illegible]3.[illegible]}		3.9616 (0.8504) {187.93}	0 1646 (0 [illegible]211) {187 3[illegible]}
	1 1[illegible]81 (0.033[illegible]) {172 6}		0 3720 (0.007[illegible]) {133.34[illegible]}			
	1.3538 (0.323[illegible]) {195.61}					

Surface Area in m^2/gm rock

( ) Standard deviation of [illegible]rface area

{ } Temperature in $^{\circ}C$

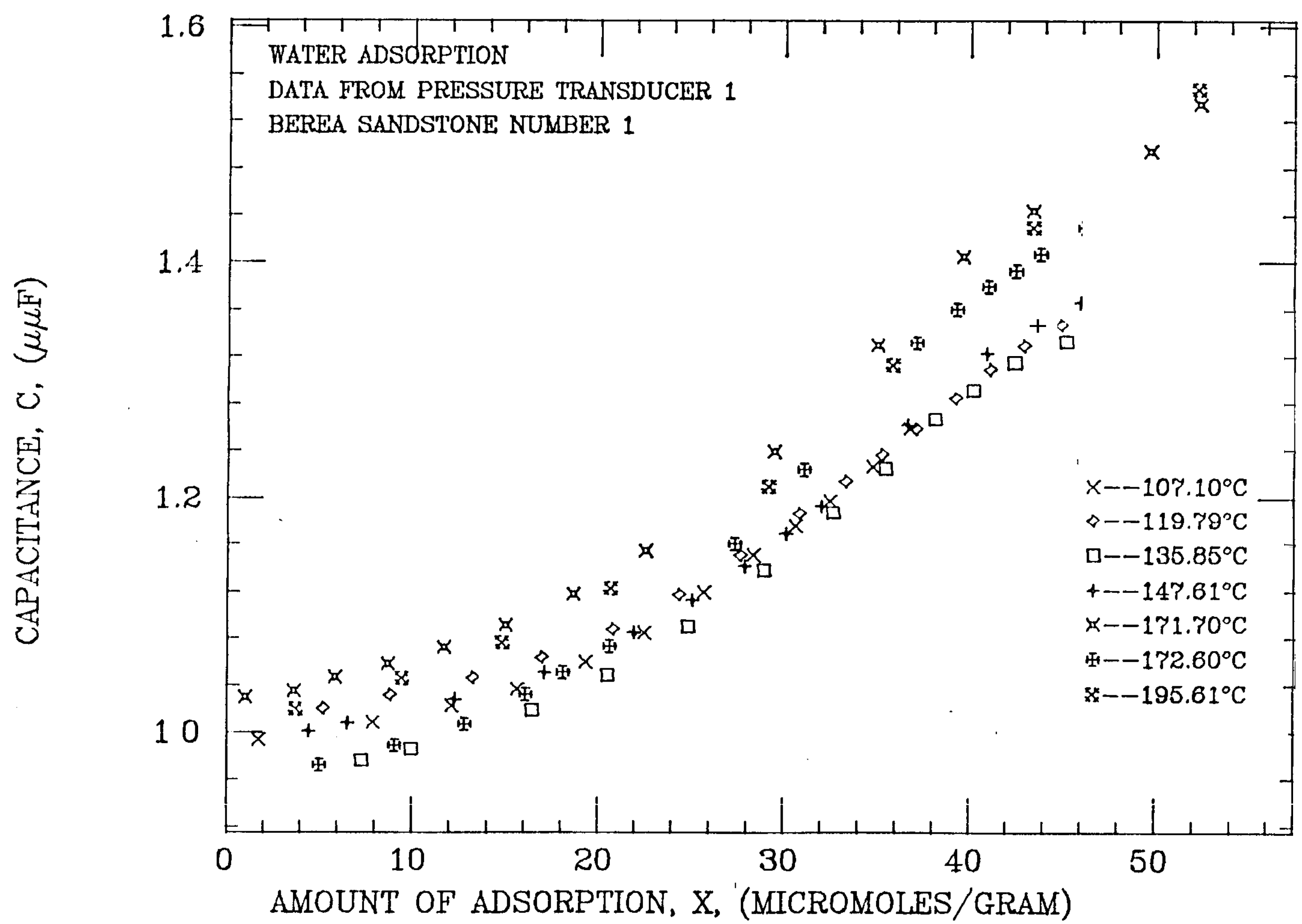

Figure 5.106 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

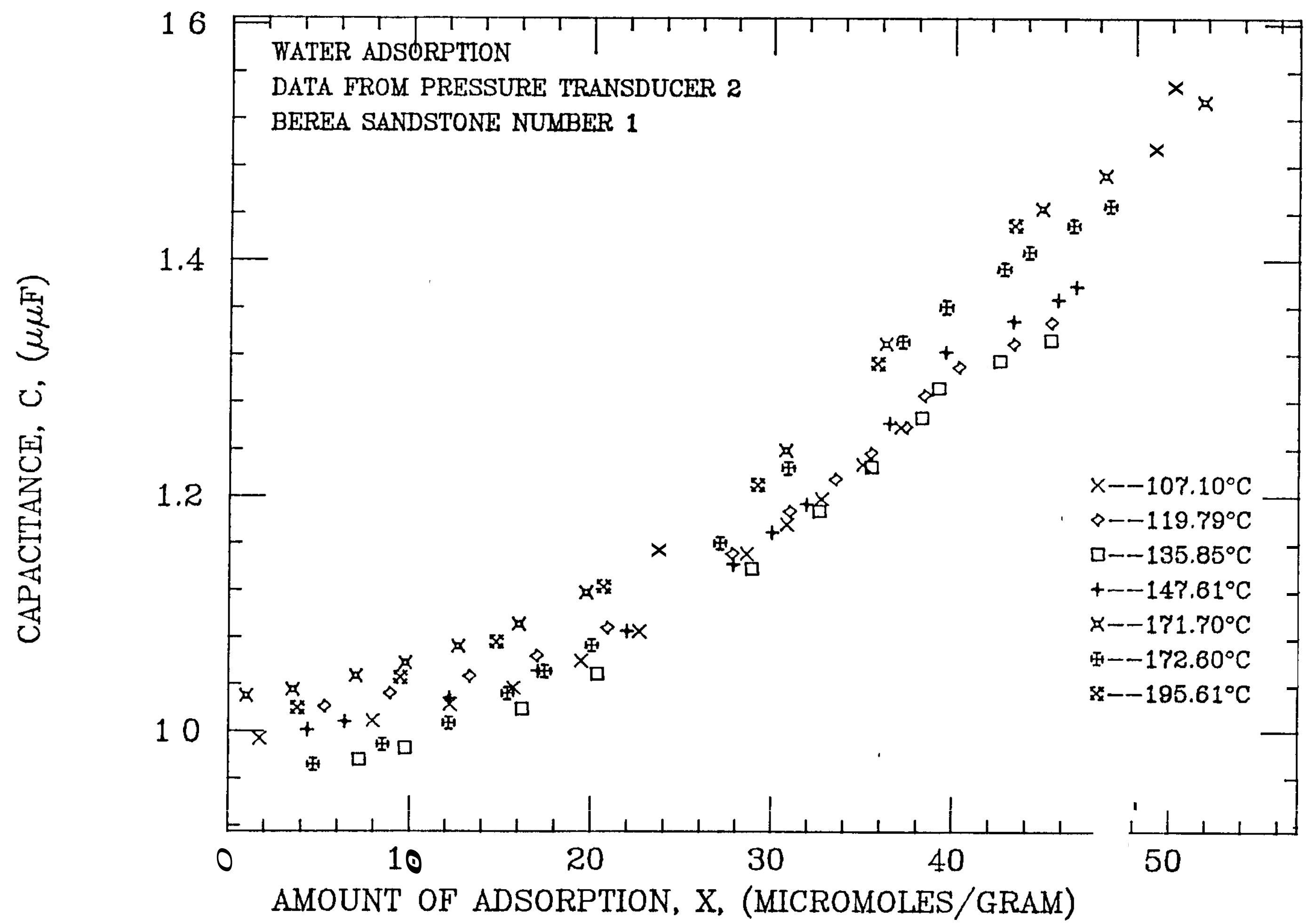

Figure 5.107 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

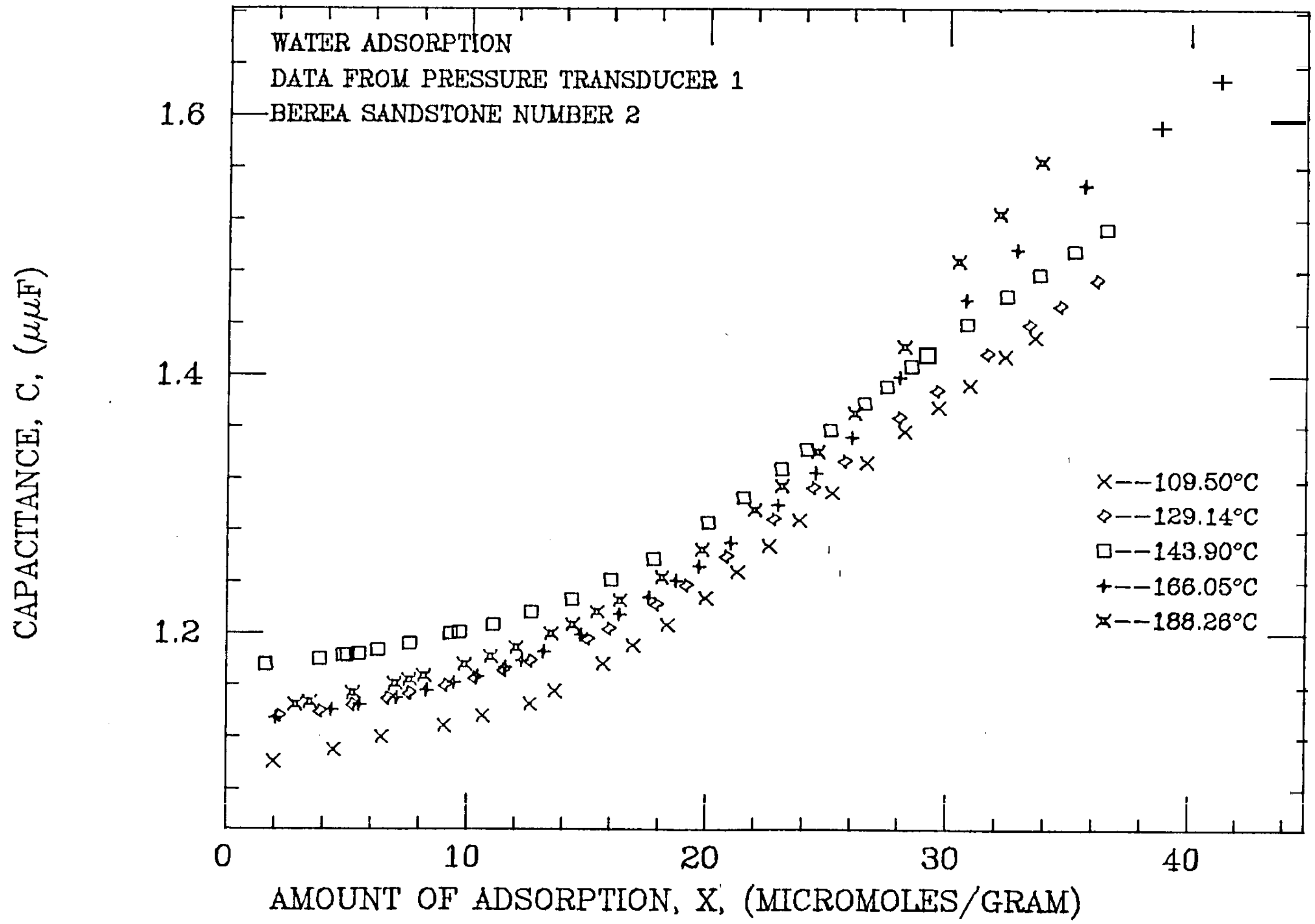

Figure 5.108 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

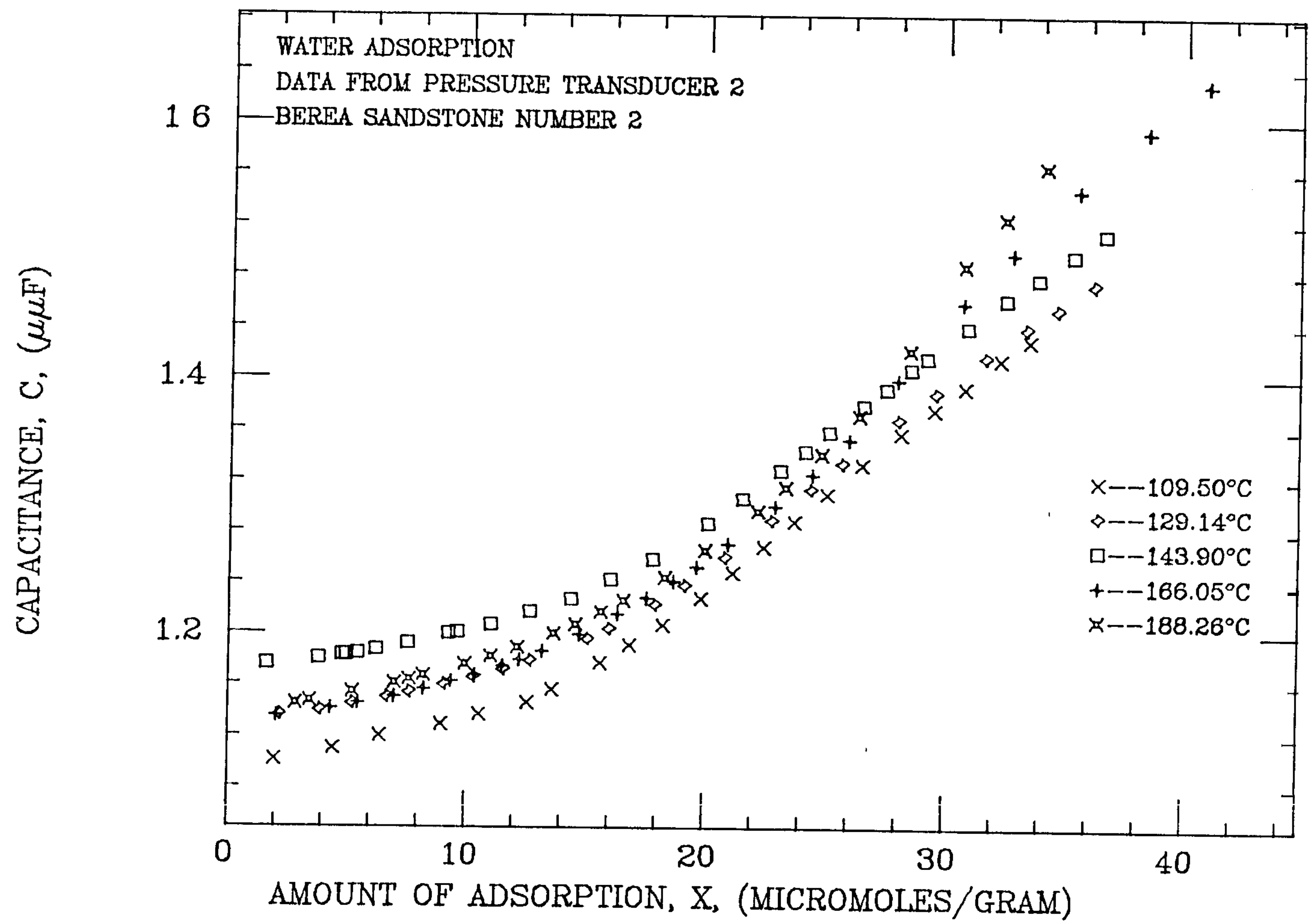

Figure 5.109 Responses of the Capacitance Probe to the Quanticy of Water Adsorption at Different Temperatures

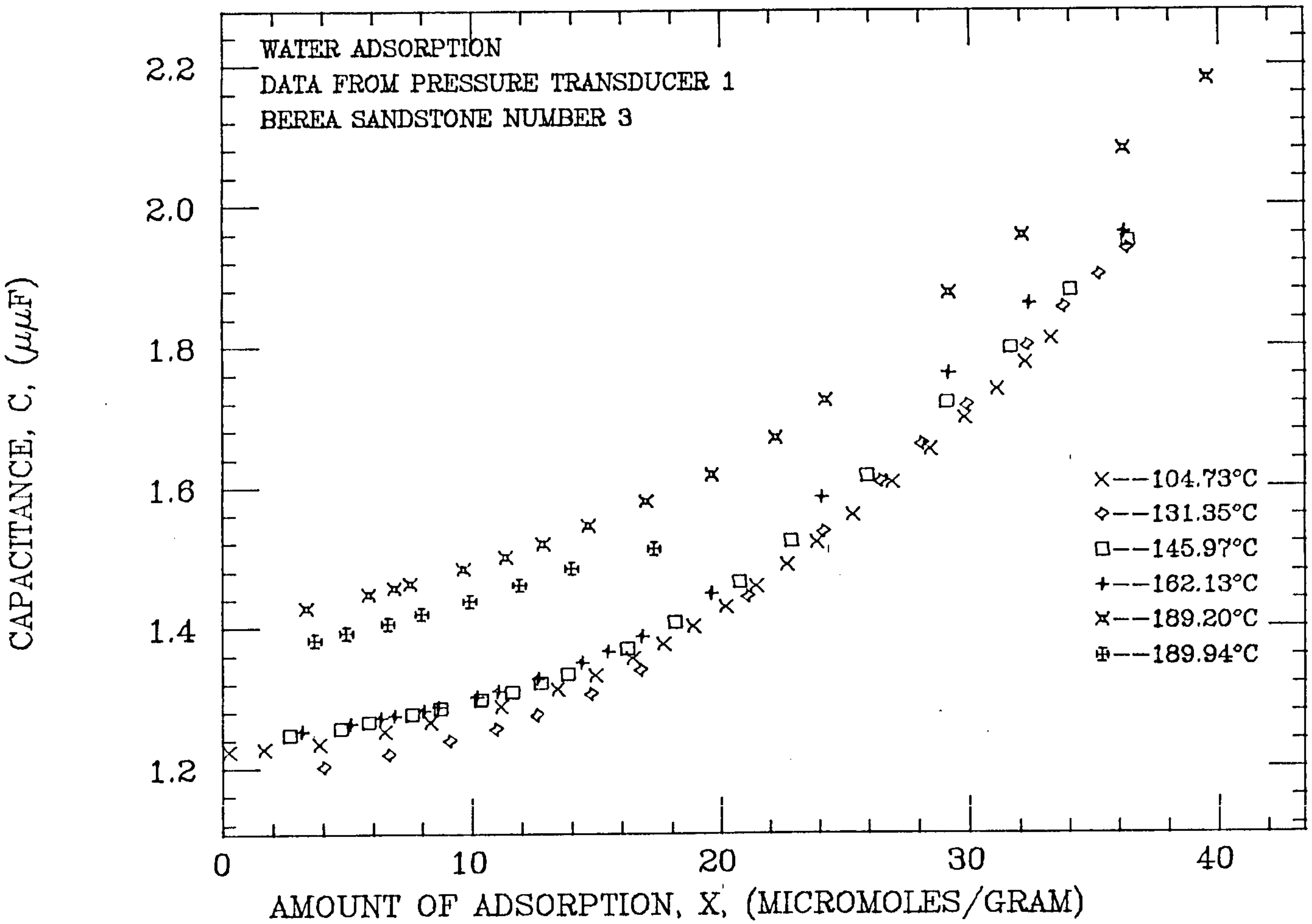

Figure 5.110 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

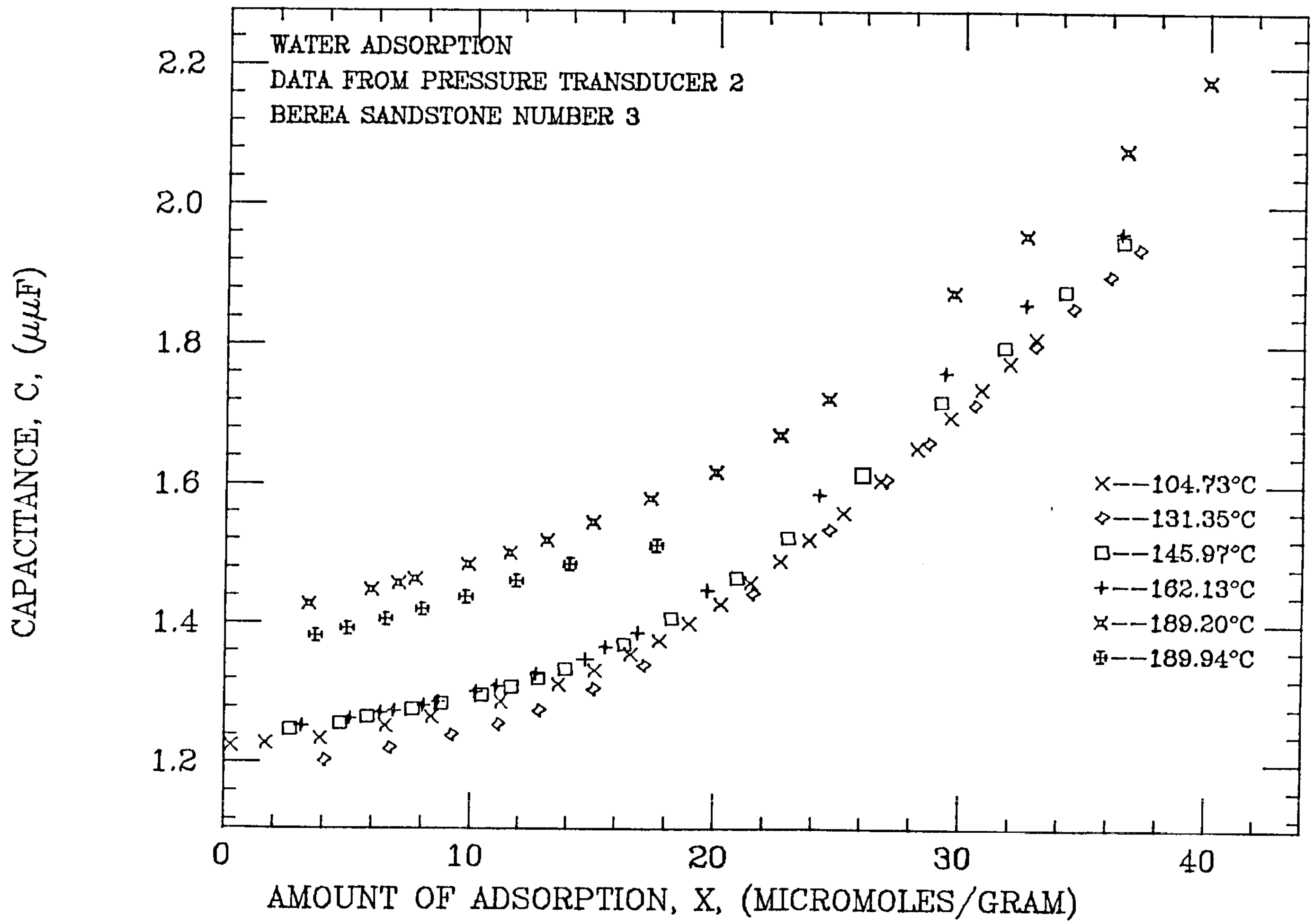

Figure 5.111 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

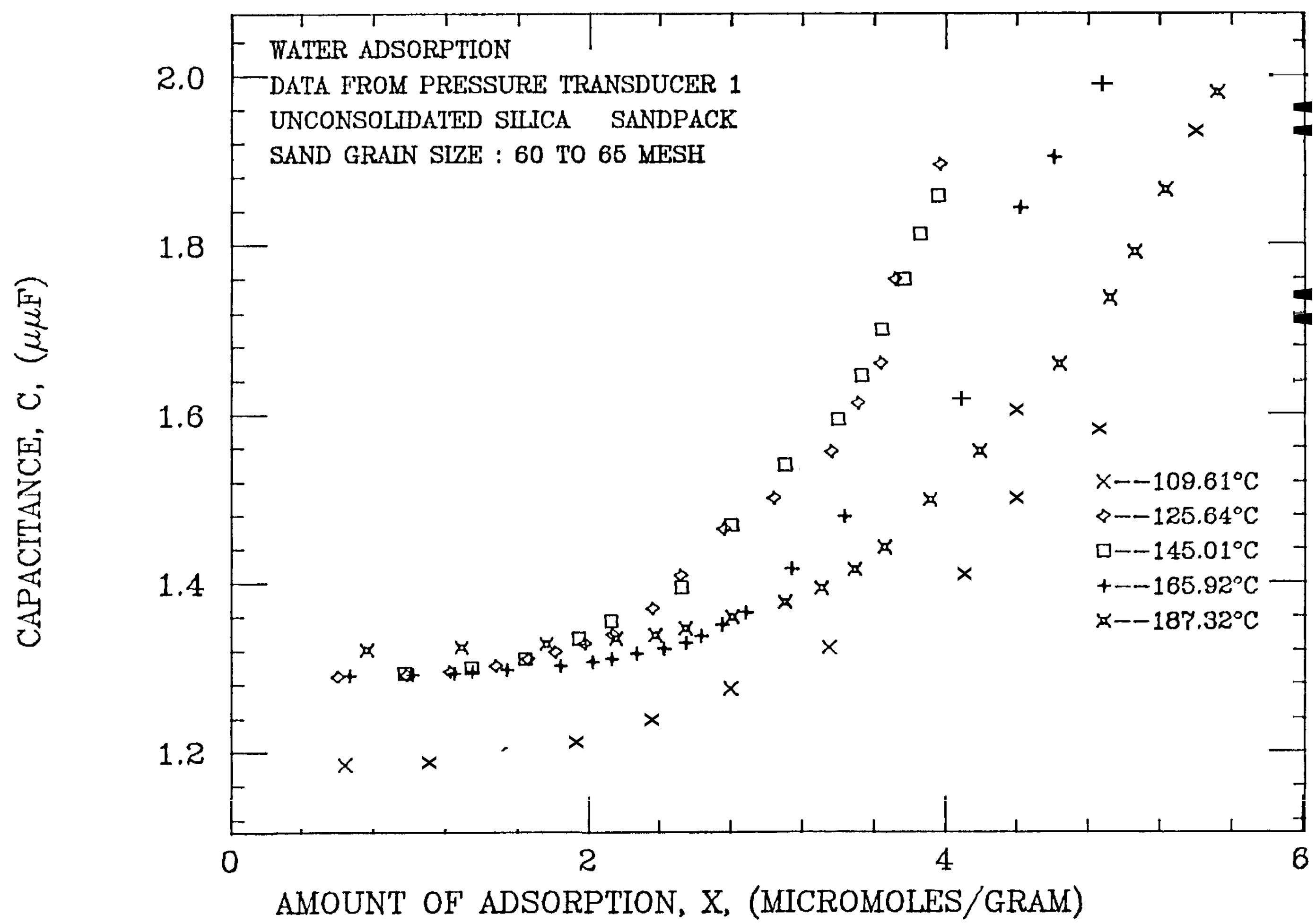

Figure 5.112 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

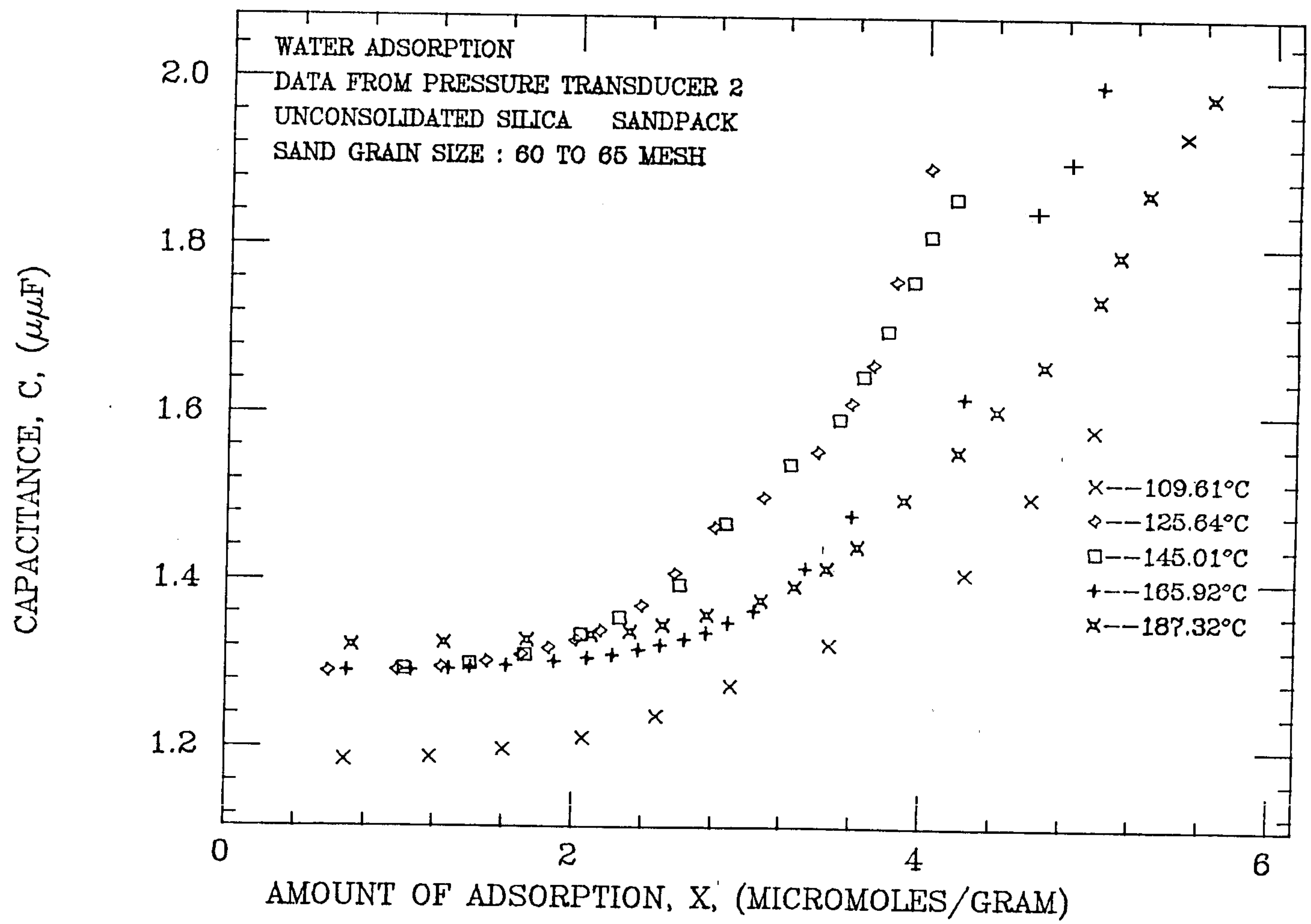

Figure 5.113 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

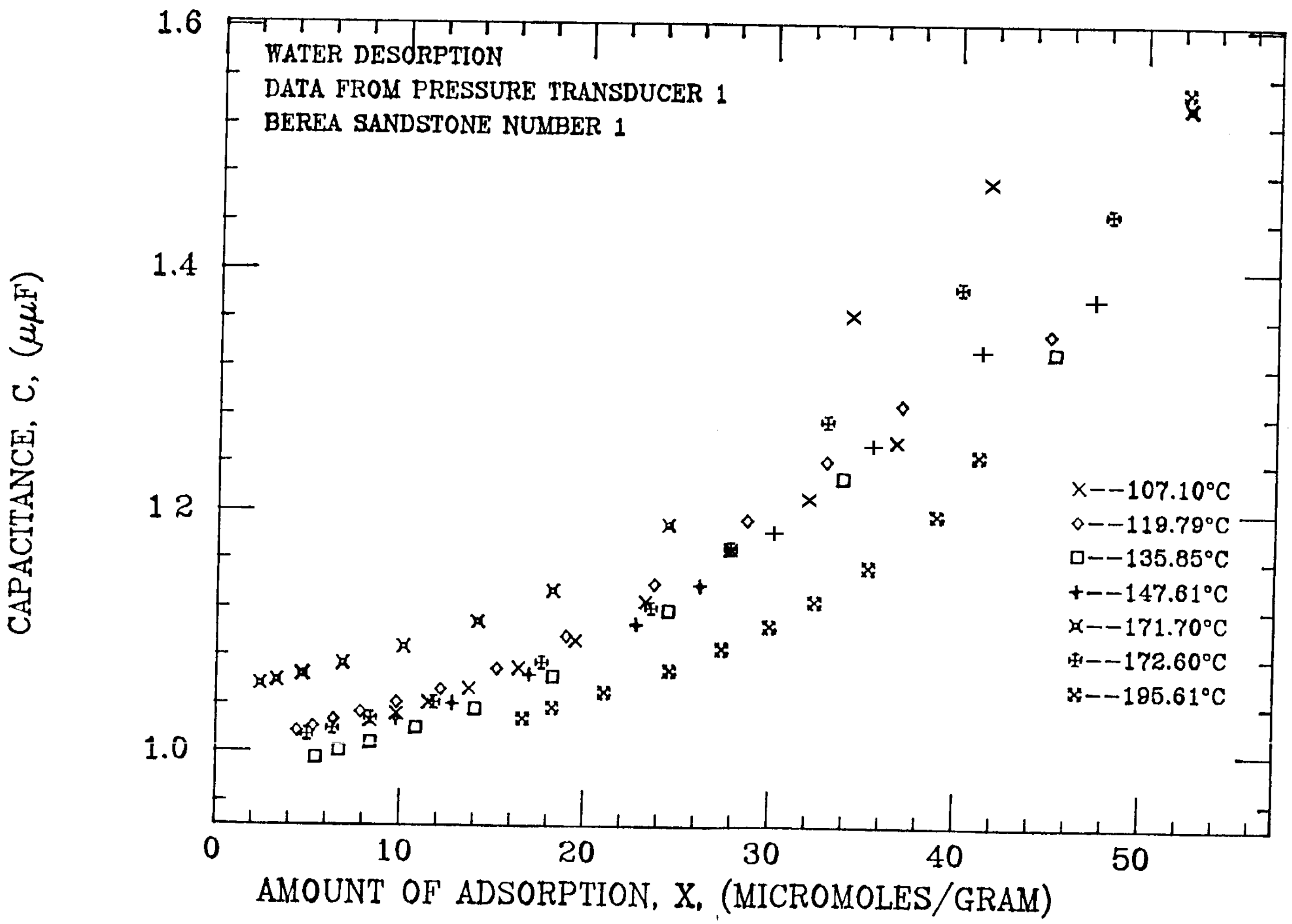

Figure 5.114 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

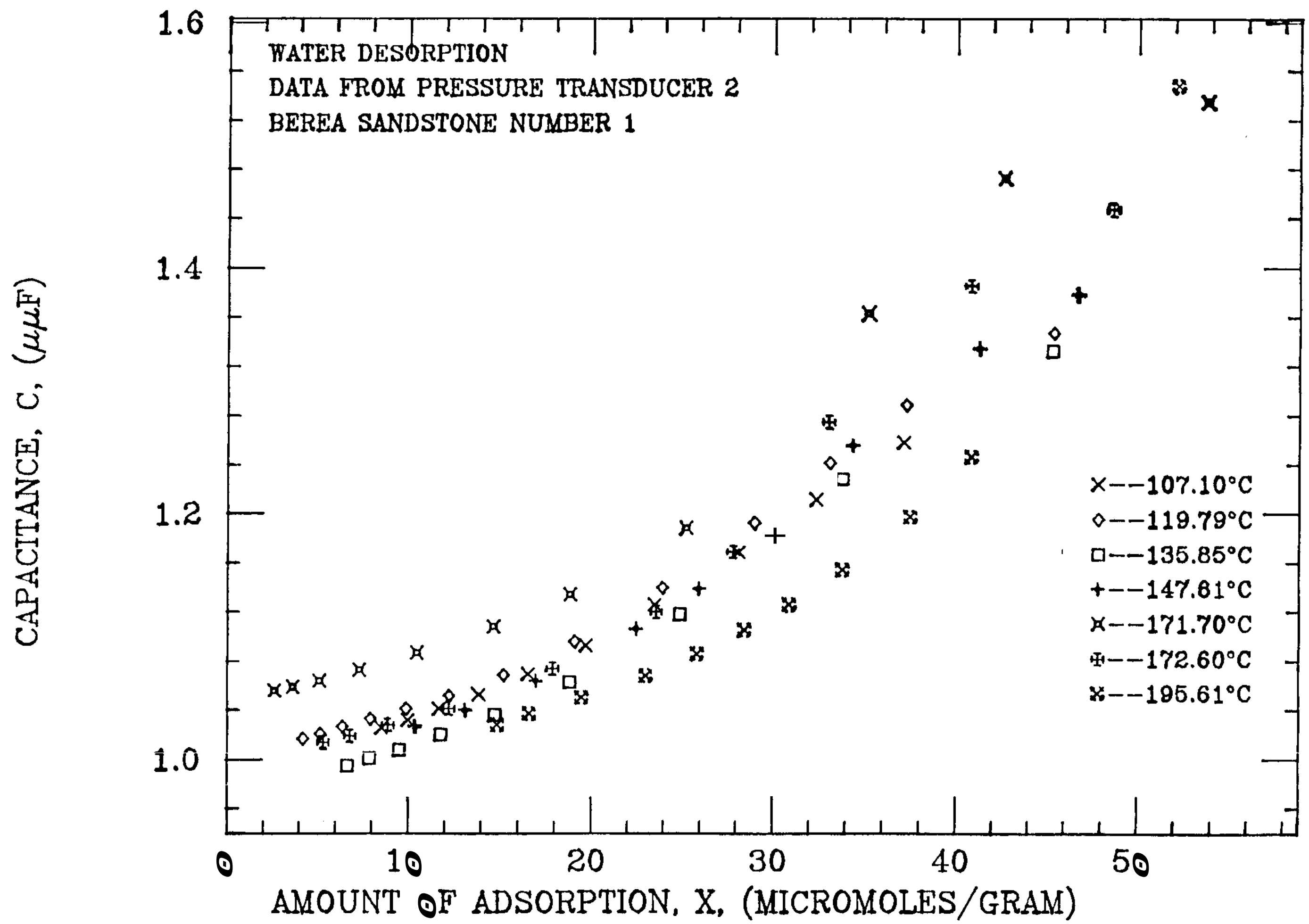

Figure 5.115 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

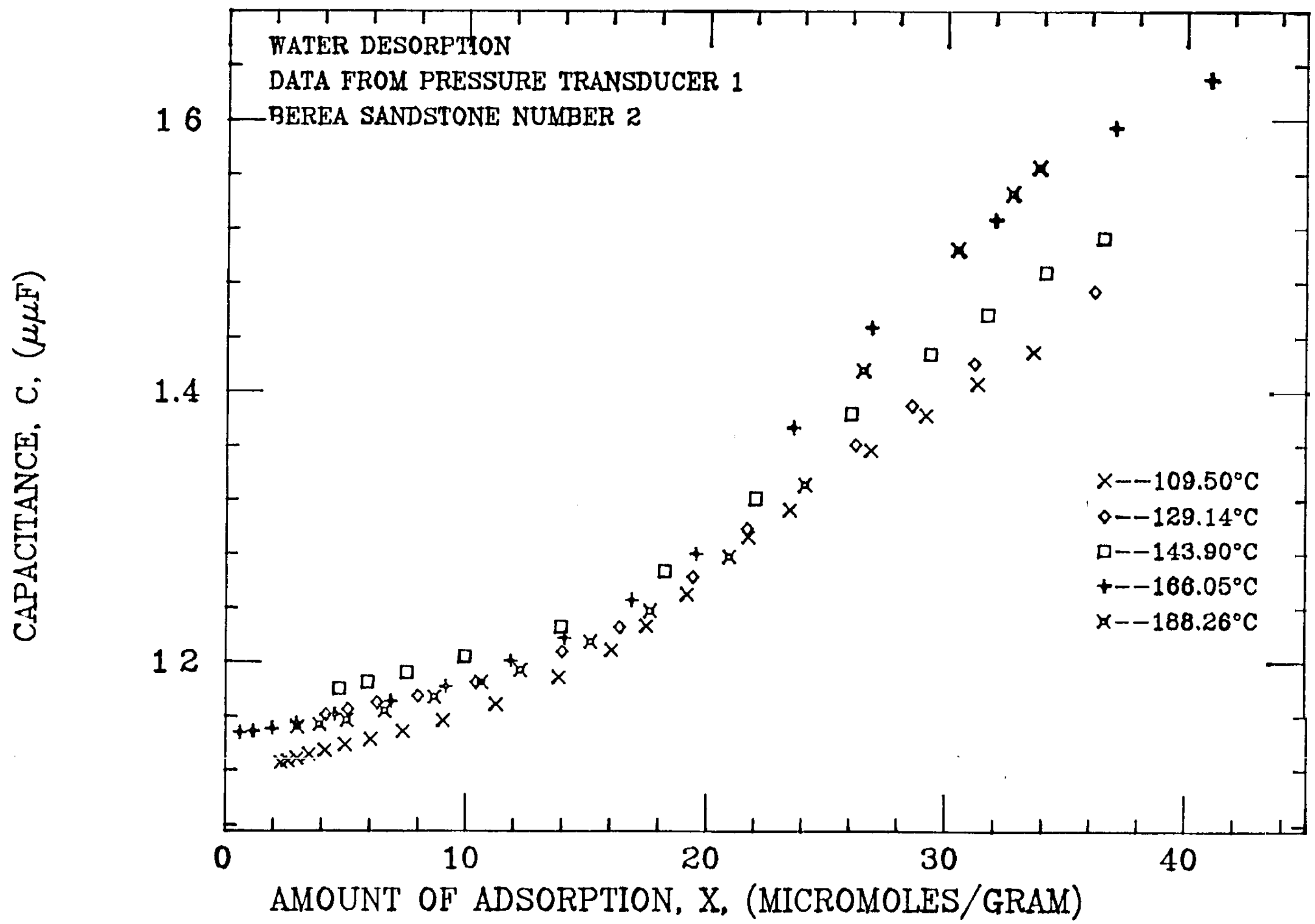

Figure 5.116 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

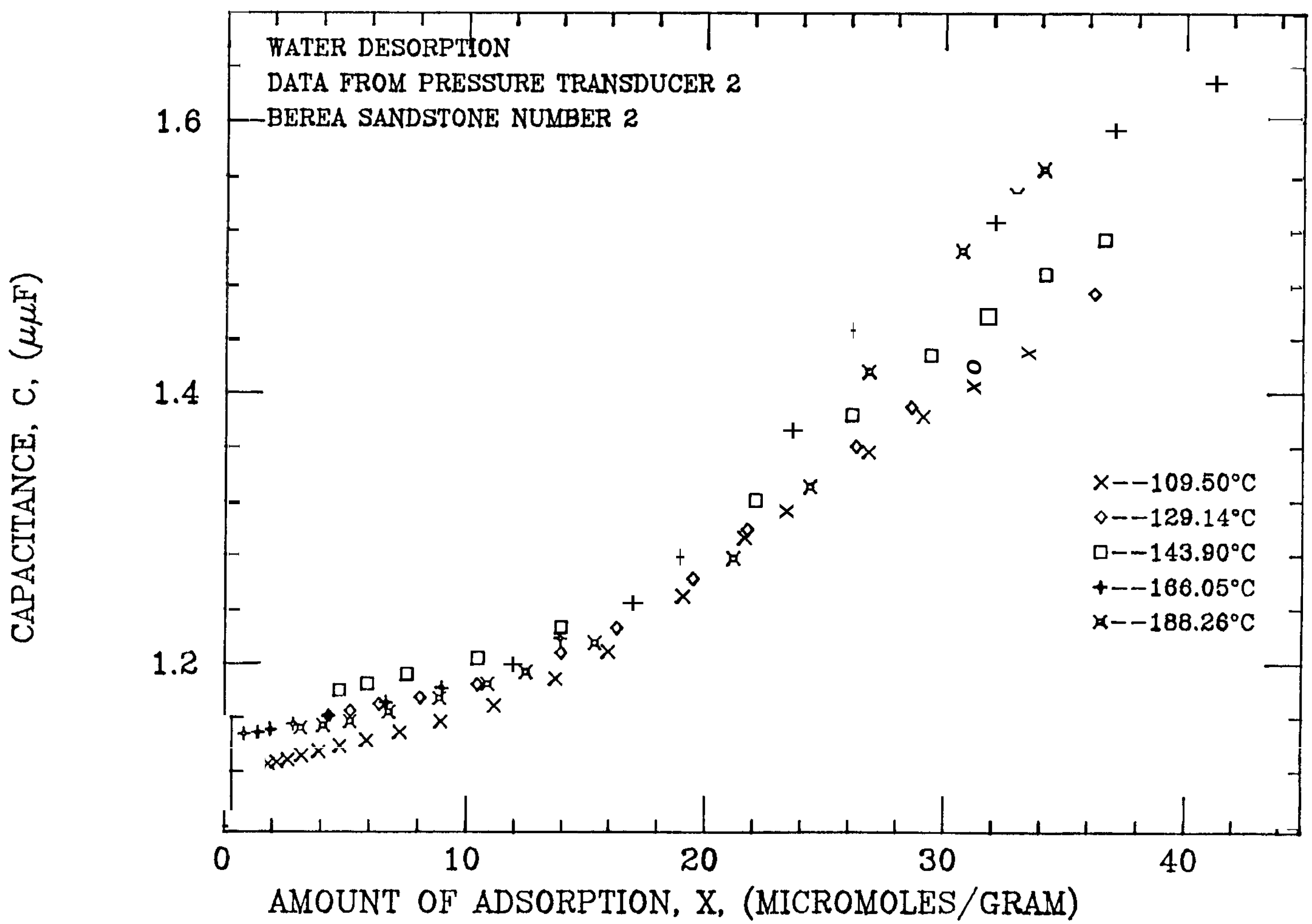

Figure 5.117 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

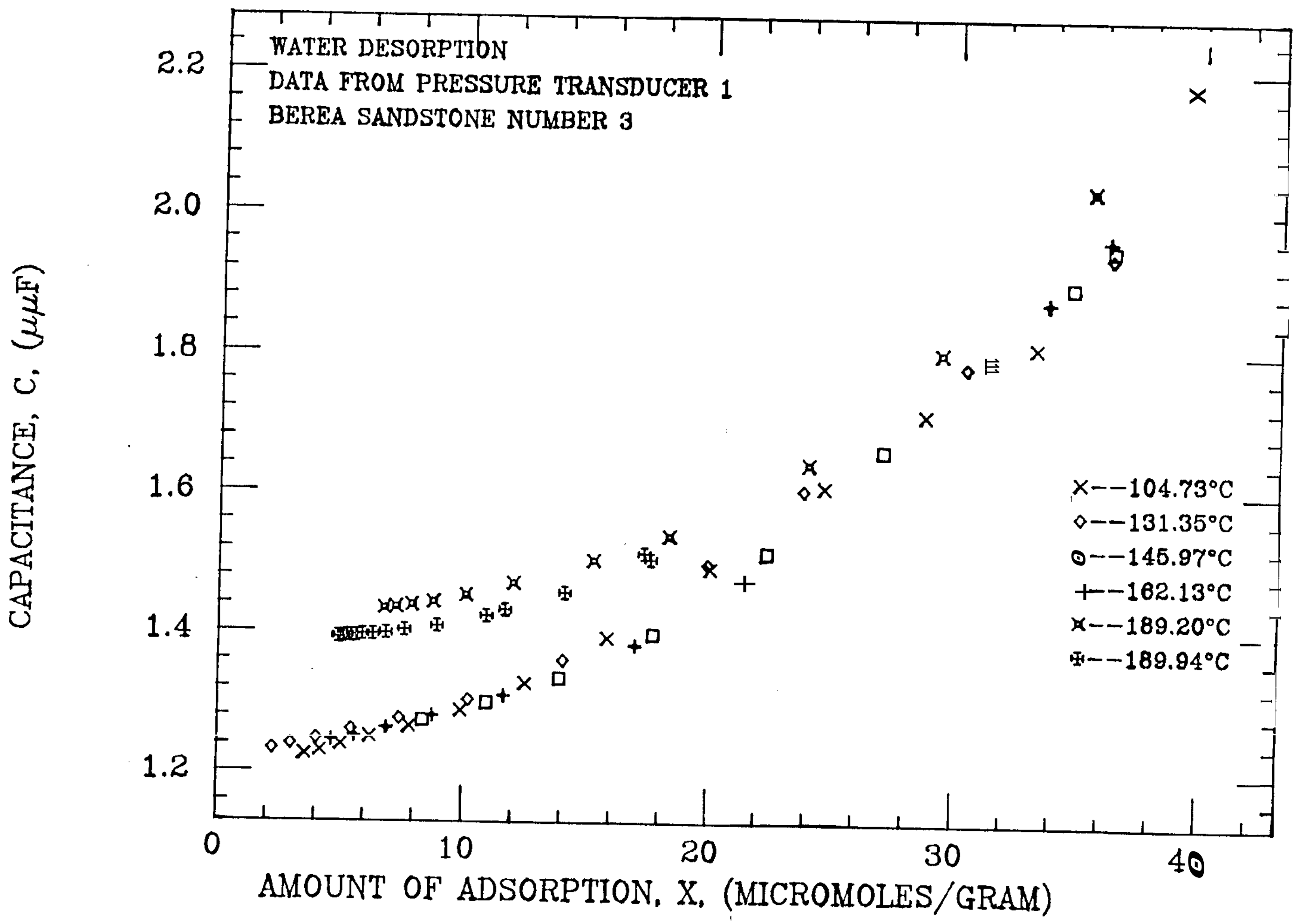

Figure 5.118 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

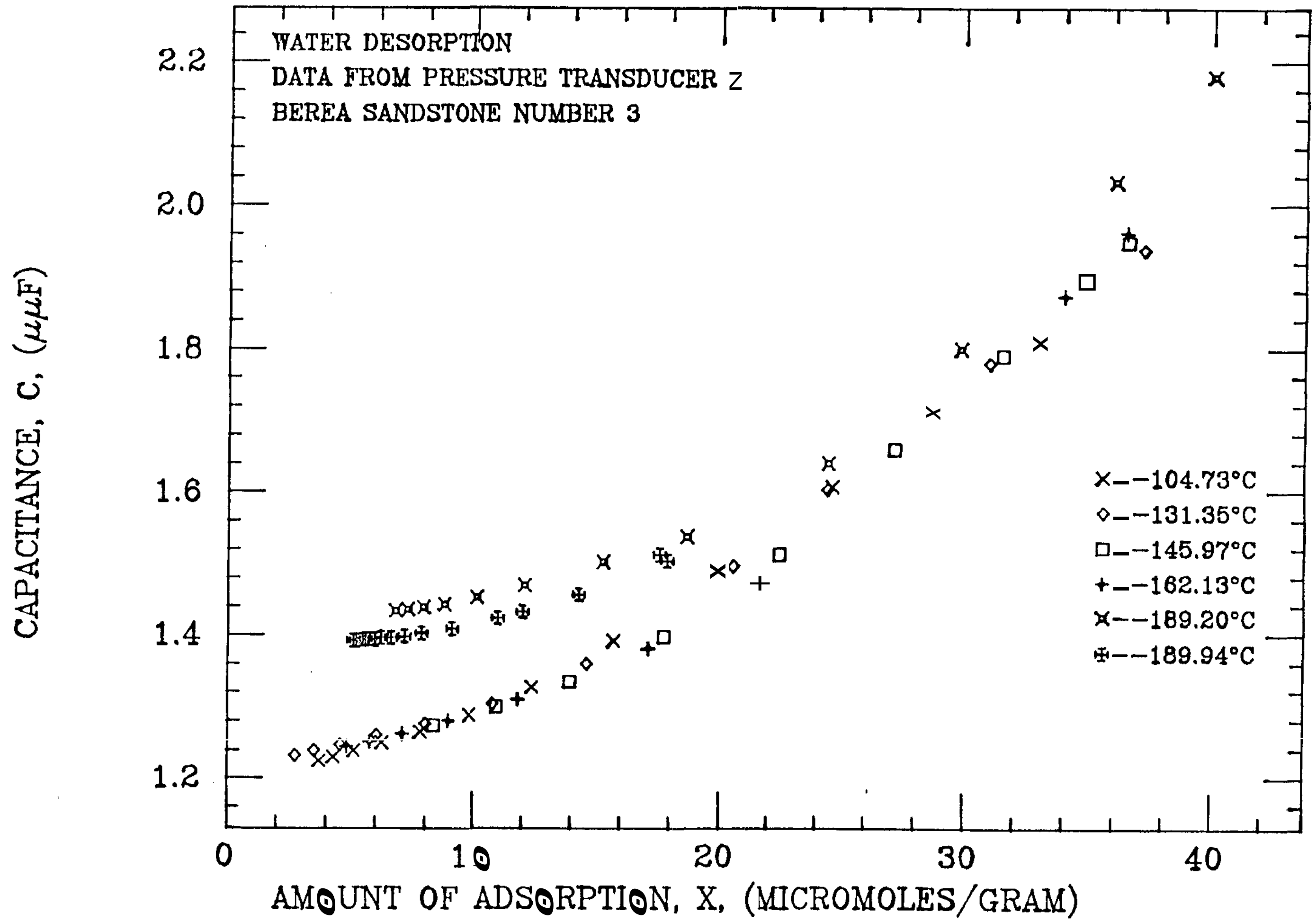

Figure 5.119 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

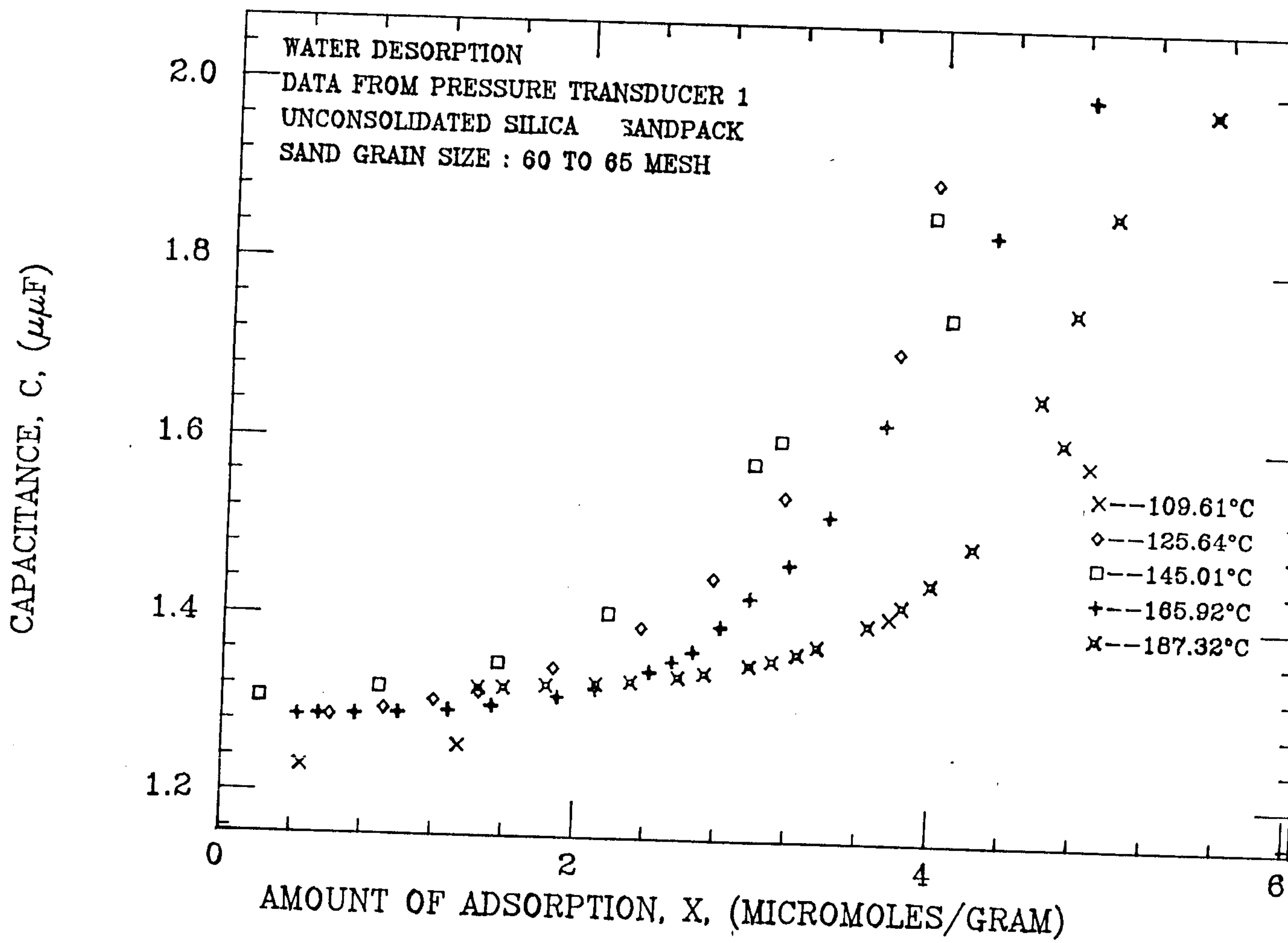

Figure 5.120 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

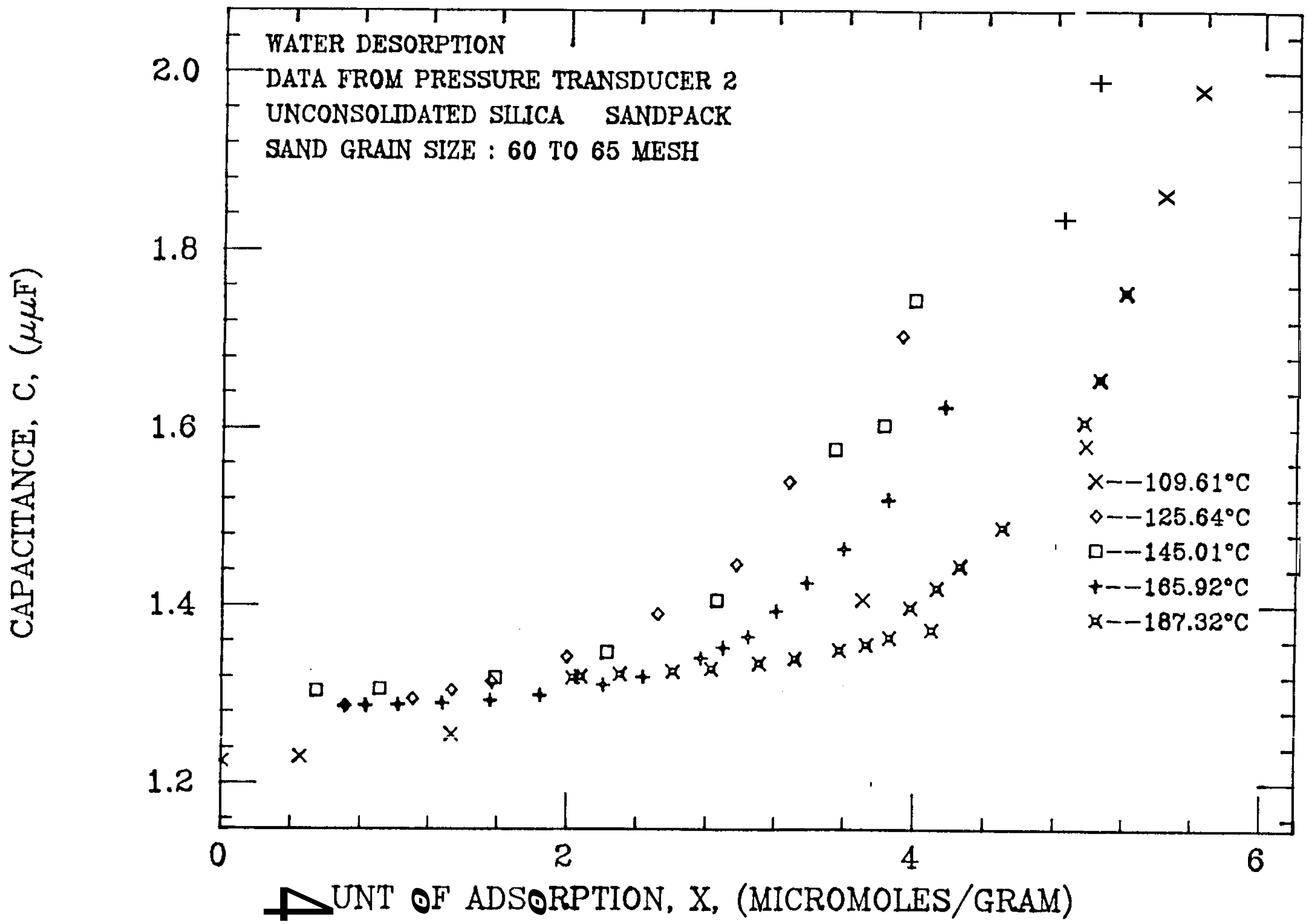

Figure 5.121 Responses of the Capacitance Probe to the Quantity of Water Adsorption at Different Temperatures

the capacitance change is not significant, the quantity of methane and ethane adsorption is small. No further interpretation has been made.

5-6 Material Balance and Energy Balance Equations

Material balance and energy balance equations[44] become complicated when adosrption is included. It is helpful to include some assumptions to simplify these equations for reservoir simulation studies. The most important finding is that the adsorption effect should not be neglected because the mass of water adsorbed on the rock surface is much more than that of rhe superheated steam in the pore space.

6. CONCLUSIONS

The adsorption of methane and ethane should be done at much higher pressure levels. When pore pressure is not high, the quantity of gas adsorbed is not very significant. However, the adsorption of methane and ethane should be carefully studied on rocks containing water or heavier hydrocarbons since the quantity of methane or ethane adsorption on wet rocks might be very different from that on dry rocks.

The adsorption of water at elevated temperatures on consolidated rocks was found to be very important. Adsorbed water may be an important source of steam in vapor dominated geothermal systems. The temperature invariant characteristic adsorption curves showed that water vapor pressure lowering is related to micropore filling. Thus, it is believed that the clay content of rocks is an important factor in water vapor pressure lowering. Further study is needed to prove this point.

The temperature invariant characteristic curve for consolidated cores is the most important finding of this investigation. It not only proves that the water vapor pressure lowering in rock is dominated by micropore adsorption, but also serves as a useful tool in the research of dry steam geothermal reservoirs.

Finally, the capacitance probe is a promising tool in detecting water saturation. Further study of the frequency response to the water saturation is needed. It is believed that a capacitance logging tool can be derived from this probe.

NOMENCLATURE

A	= potential function = $RT \ln (P_o/P)$
$\tilde{A}$	= surface area
a	= coeefficient of condensation
b	= coefficient of evaporation
d	= density
E	= energy
H	= molar enthalpy
I	= current
K	= Boltzman constant
m	= dipole moment
N	= number of molecules
N_a	= rate of condensation
N_d	= rate of evaporation
P	= pressure
P_o	= saturation vapor pressure
P_c	= capillary pressure
q	= heat
q_{st}	= isosteric heat
R	= gas constant
r	= distance between molecules
r_M	= mean radius of curvature
r_1, r_2	= principal radii of curvature
S	= molar entropy
S_a	= surface area occupied by each molecule
T	= temperature
T_c	= critical temperature
V	= molar volume
V_d	= dead volume
X_m	= number of adsorption sites per unit surface area
Z	= compressibility factor
β	= relative pressure
Θ_i	= fraction of surface which is covered by i layers of molecules
γ	= surface tension
	= surface tension over flat liquid vapor interface
μ	= chemical potential
α', β', G, n', T_x, δ, α, C	= constant

Subscript

ℓ	= liquid phase
v	= vapor phase
S	= surface phase
F	= inflection point
ad	= adsorption phase
g	= gas phase

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Appendix A

Data for Nitrogen Adsorption at $77.3^{o}K$

This appendix presents all the nitrogen adsorption data obtained in the laboratory. The starting pressure of the experiment was zero (vacuum). In the first part of the data, total amount of gas in the coreholder was obtained by the pressure change of a known volume sampling bottle, which was described in Section 4.3. The amount of gas in the void space of the coreholder is listed under the title of dead volume, which was calculated by using Equation 4.1. The amount of nitrogen adsorbed on the rock surface is the difference between the amount of nitrogen in the coreholder and that in the void space. Data with relative pressure lies between 0.1 and 0.35 were chosen to do the BET analysis (Equation 2.57). The specific surface area was calculated by least squares fit and assuming that surface area occupied by each nitrogen molecules is 10.6 $\mathring{A}^2$.

Index:

Data for Berea Sandstone Number 1	215
Data for Berea Sandstone Number 2	219
Data for Berea Sandstone Number 3	223
Data for Berea Sandstone Number 4	227
Data for Silica Sandpack	233
Data for Field Core Number 3	237
Data for Field Core Number 5	241

EEREA SANDSTONE NUMBER 1
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 1

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0003375	260.2913	1.0804	259.2107
2	0.0020248	915.5977	6.4823	909.1152
3	0.0110236	1531.8500	35.2926	1496.5580
4	0.0416198	1966.1050	133.2477	1832.8570
5	0.1052866	2494.7230	337.0806	2157.6420
6	0.1778402	3019.6030	569.3636	2450.2390
7	0.2247469	3352.7680	719.5376	2633.2310
8	0.2775028	3733.9560	888.4380	2845.5180
9	0.3203600	4049.7440	1025.6470	3024.0970
10	0.3668165	4393.0000	1174.3790	3218.6200
11	0.4149605	4757.3670	1326.5150	3428.6510
12	0.4781775	5243.9410	1530.9070	3713.0330
13	0.5287962	5446.4840	1692.9650	3955.5180
14	0.5626546	5930.0740	1801.3640	4128.7070
15	0.6040494	6292.7610	1933.8920	4356.8470
16	0.6332958	6563.5150	2027.5260	4535.9680
17	0.6727762	6957.9560	2153.9310	4804.0350
16	0.7044995	7308.1360	2255.4880	5052.6410
19	0.7325064	7648.7730	2345.1600	5303.6130
20	0.7629921	8057.0540	2442.7550	5614.2560
21	0.7867265	8412.8280	2518.7420	5834.0850
22	0.6043567	8713.2920	2575.2820	6133.0070
23	0.8255342	9089.6210	2642.9360	6446.6320
24	0.8463441	9526.3040	2709.6100	6816.6910
25	0.8501688	9663.4570	2721.8550	6041.6010
26	0.6317209	9291.2350	2662.7930	6628.4410
27	0.E143932	9022.3470	2607.3340	6415.0110
28	0.7946005	8728.0460	2543.9510	6184.0930
29	0.7660292	6330.4140	2452.4760	5877.9330
30	0.7341956	7929.4170	2350.5620	5578.6550
31	0.6999997	7534.9600	2241.0820	5293.8750
32	0.6640043	7159.5620	2125.8410	5033.7160
33	0.6322833	6829.1990	2024.2840	4804.9140
34	0.5776153	6339.8200	1849.2620	4490.5540
35	0.5283464	5922.9410	1691.5250	4231.4140
36	0.4899886	5540.4450	1566.7210	3971.7230
37	0.4535432	5161.3120	1452.0400	3709.2720
36	0.4101235	4603.2320	1313.0290	3490.2630
39	0.3670413	4475.9170	1175.1000	3300.8170
40	0.3005999	3989.7170	963.3450	3026.3720
41	0.2457617	3591.3380	786.8616	2804.4570
42	0.2001125	3268.2630	640.6694	26C7.5330
43	0.1624296	3007.4110	520.0259	2487.3850
44	0.1323959	2795.6690	423.8718	2372.0170
45	0.1084364	2623.0470	347.1643	2275.8820
46	0.0899887	2480.2880	283.1033	2192.1850
47	0.0755905	2361.4470	242.0067	2119.4400

BEREA SANDSTONE NUMBER 1
NITROGEN ADSCRPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 1

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.1052668	54.5394
0.1778402	88.2805
0.2247469	110.0933
0.2775028	134.9801
0.3203600	155.6704

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	100.2559	
THE MONOLAYER ADSORPTION IS	2104.9130	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	161.3000	CRAMS
THE TOTAL SURFACE AREA IS	205.3819	SQUARE IIETERS
SPECIFIC SURFACE AREA IS	1.2733	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3008999	142.2193
0.2457617	116.1993
0.2001125	95.2109
0.1624296	77.9652
0.1323959	64.3331
0.1084364	53.4408
0.0899887	45.1031
0.0755905	38.5817

THE VALUE OF "C" FACTOR IN GET ANALYSIS IS	126.8747	
THE MONOLAYER ADSORPTION IS	2161.4390	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	161.3000	GRAMS
THE TOTAL SURFACE AREA IS	210.6973	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.3075	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
NITROGEN ADSORPTION AT 77.3°K
DATA FFOM PRESSURE TRANSDUCER 2

NUMBER	FRESSURE OF SYSTEM (ATfl.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROHOLES)
1	0.0005554	266.2859	2.7357	265.5471
2	0.0033361	964.1523	10.6807	953.4714
3	0.0132592	1590.5310	42.4499	1543.0510
4	0.0459557	2031.0430	147.0693	1883.9740
5	0.1117194	2567.7570	357.6748	2210.0820
6	0.1859709	3076.9390	575.3943	2501.5450
7	0.2336183	3435.2810	747.9399	2687.3410
8	0.2874251	3817.2470	920.2048	2897.0420
9	0.3379510	4121.1990	1082.0620	3030.1370
10	0.3783574	4459.2530	1211.3280	3247.9250
11	0.4272026	4613.0820	1367.7090	3445.3720
12	0.4903336	5281.4450	1569.0250	3711.6190
13	0.5393499	5670.3710	1726.7530	3743.6170
14	0.5786141	5030.4140	1652.4600	4077.9530
15	0.6129170	6277.9920	1962.2620	4315.7070
16	0.6410607	6537.6000	2052.3850	4485.5030
17	0.6791273	6915.3060	2174.2580	4761.0450
18	0.7098375	7249.8120	2272.5780	4977.2340
19	0.7366980	7574.0370	2353.5730	5216.3630
20	0.7660393	7064.2920	2452.5100	5511.7810
21	0.7890503	8303.0580	2526.1810	5776.8750
22	0.8063303	8588.6790	2561.5040	6007.1710
23	0.8272583	8947.6250	2646.6020	6299.0190
24	0.8474764	9363.2650	2713.2350	6650.0270
25	0.8509837	9488.4530	2724.4640	6763.98E0
26	0.8202736	9131.6360	2626.1440	6505.4920
27	0.8041058	8873.7220	2574.3820	6299.3390
28	0.7853720	8591.2260	2514.4050	6076.8200
29	0.7580838	8209.2570	2427.0400	5782.2140
30	0.7281436	7822.8820	2331.1850	5491.6950
31	0.6051239	7441.1990	2225.4710	5215.7260
32	0.6600512	7075.4250	2113.1840	4963.2380
33	0.6295977	6753.9960	2015.6560	4738.3080
34	0.5772453	6265.1670	1848.0770	4417.0890
35	0.5295545	5645.5420	1696.3530	4149.1870
35	0.4932419	5457.0390	1579.1350	3877.9020
37	0.4565438	5071.6040	1461.6460	3410.1580
38	0.4124036	4708.0230	1320.3290	3387.6940
39	0.3689476	4374.9370	1181.2020	3193.7340
40	0.3017106	3879.0060	965.0407	2913.0660
41	0.2455087	3472.3140	786.0076	2686.3070
42	0.1992301	3141.9310	637.8442	2504.0860
43	0.1613345	2674.6300	516.5198	2358.1200
44	0.1313943	2656.9410	4C0.6648	2236.2760
45	0.1071001	2479.6000	342.8857	2136.7140
46	0.0677673	2333.9460	280.0910	2052.9550
47	0.0727117	2213.1610	232.7899	1980.3710

BEREA SANDSTONE NUMBER 1
NITROGEN ADSORPTICII AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.1117194	56.9075
0.1859709	91.3264
0.2336183	113.4329
0.2874251	139.2321
0.3379810	167.9854

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	399.0872	
THE MONOLAYER ADSORPTION IS	2050.2270	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	161.3000	CRAMS
THE TOTAL SURFACE AREA IS	200.0460	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.2402	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.301 7106	148.3217
0.2455087	121.1314
0.1092301	99.3568
0.161 3345	81.57751
0.131 3943	67.6438
0.1071001	56.1359
0.0877673	46.8648
0.0727117	351.5052

THE VALUE OF "C" FACTOR IN PET ANALYSIS IS	90.0708	
THE MONOLAYER ADSORPTION IS	2090.5420	MICROMOLES
THE KEIGHT OF THE SAMPLE IS	161.3000	GRAMS
THE TOTAL SURFACE AREA IS	203.9796	SQUARE IIETERS
SPECIFIC SURFACE AREA IS	1.2646	SQUARE METERS/GRAM

EEREA SANDSTONE NUMBER 2
NITROGEN ADSCRPTION AT 77.3°K
DATA FROM FRESSURE TRANSDUCER 1

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0000000	107.6295	0.0000	107.6295
2	0.0005624	312.4243	2.0109	310.4133
3	0.0071991	665.7703	25.7390	640.0313
4	0.0385527	1003.7930	137.9449	865.8489
5	0.0700787	1221.8550	250.5530	971.3025
6	0.1275590	1577.8170	455.0627	1121.7550
7	0.1784027	1874.9200	637.8442	1237.0750
8	0.2037120	2024.2180	728.3330	1295.8850
9	0.2311586	2185.1020	826.4629	1358.6320
10	0.2671541	2396.2500	955.1577	1441.0920
11	0.3206972	2709.7950	1146.5900	1563.2040
12	0.3744655	3027.5370	1335.8230	1690.6760
13	0.4537681	3509.9150	1622.3500	1867.5540
14	0.5390199	4048.9960	1926.8030	2122.1920
15	0.6087735	4524.7300	2176.5520	2348.1760
16	0.6529806	4849.2960	2334.6050	2514.6910
17	0.7107985	5321.1090	2541.3220	2779.7870
18	0.7569178	5749.3820	2706.2120	3043.1690
19	0.7953879	6158.2220	2843.7550	3314.4670
20	0.8376824	6635.3320	2994.9710	3693.3600
21	0.6649042	7104.8320	3092.2970	4012.5340
22	0.8874015	7520.0270	3172.7320	4347.2920
23	0.6678284	7233.7610	3102.7520	4131.0070
24	0.6449340	6923.2030	3021.1120	3902.0900
25	0.8003369	6390.6280	2861.4490	3533.1790
26	0.7512932	5904.0820	2686.1030	3217.9760
27	0.6925756	5355.3670	2476.1690	2909.1970
28	0.6555675	5083.4060	2343.6540	2739.5510
29	0.6147351	4774.7160	2197.8660	2576.8520
30	0.5798644	4523.9570	2073.1950	2450.7630
31	0.5263213	4153.4540	1881.7600	2276.7040
32	0.4852639	3519.6930	1734.9670	2084.7260
33	0.4263211	3384.1300	1524.2280	1859.0000
34	0.3542178	2942.5880	1266.4370	1676.1510
35	0.2913330	2571.3040	1041.6220	1529.6810
36	0.2336333	2234.2150	835.3103	1398.9040
37	0.1817772	1933.3750	649.9092	1283.4660
38	0.1415073	1699.2440	505.9319	1193.3120
39	0.1106861	1516.1240	305.7358	1120.3870
40	0.0870641	1371.8710	311.2808	1060.5100
41	0.0689538	1257.7010	246.5312	1011.1700

BEREA SANDSTONE NUMBER 2
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 1

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0700787	77.5863
0.1275590	130.3398
0.1784027	175.5278
0.2037120	197.4148
0.2311586	221.2936
0.2671541	252.9632
0.3206972	302.0061

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	57.0514	
THE MONOLAYER ADSORPTION IS	1103.0190	MICROMOLES
THE WEIGHT OF THE SAIIPLE IS	152.1000	GRAMS
THE TOTAL SURFACE AREA IS	107.6243	SQUARE METERS
SFECIFIC SURFACE AREA IS	0.7076	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.2913380	268.7551
0.2336333	217.9264
0.1817772	173.0945
0.1415073	138.1300
0.1106861	111.0886
0.0870641	89.9188
0.0689538	73.2424

THE VALUE OF "C" FACTOR IN PET ANALYSIS IS	65.2994	
THE HONOLAYER ADSORPTICN IS	1123.9810	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	152.1000	GRAMS
THE TOTAL SURFACE AREA IS	109.6698	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.7210	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 2
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0000856	109.7016	0.3061	109.3954
2	0.0017965	317.0261	6.4230	310.6030
3	0.0094098	676.2563	33.6427	642.6135
4	0.0414885	1020.9920	146.3339	872.6584
5	0.0739093	1242.8110	254.2485	978.5627
6	0.1326775	1605.0250	474.3628	1130.6620
7	0.1845167	1907.5570	659.7034	1247.8540
8	0.2103508	2059.3210	752.0561	1307.2530
9	0.2383232	2222.7360	852.0784	1370.6580
10	0.2551066	2437.1660	983.5908	1453.5750
11	0.3295979	2755.1570	1178.4130	1576.7790
12	0.3842600	3076.3240	1373.8470	1704.4770
13	0.4648416	3549.5290	1661.0500	1897.5760
14	0.5511549	4065.7650	1970.5470	2098.2170
15	0.6192473	4524.4500	2213.9980	2310.4910
16	0.6618477	4535.6790	2366.3070	2469.3710
17	0.7177074	5266.1360	2566.0230	2720.1120
18	0.7621899	5694.2460	2725.0620	2969.1640
19	0.7992301	6084.0270	2857.4920	3226.5340
20	0.8401198	6589.4560	3003.6850	3585.7910
21	0.8662105	6987.2140	3096.9670	3190.2470
22	0.8855963	7384.1010	3173.4280	4210.6710
23	0.8551753	7110.9800	3057.5130	4053.4660
24	0.8334472	6813.5620	2979.5290	3833.7330
25	0.7909322	6303.9880	2327.1250	3476.1630
26	0.7441401	5818.4290	2660.5290	3157.9000
27	0.6891094	5303.4570	2460.2010	2843.2550
26	0.6526656	5004.9020	2334.1940	2670.7080
29	0.6137722	4676.2570	2194.4230	2501.6340
30	0.5502393	4443.3160	2074.5330	2368.7830
31	0.5266694	4072.2910	1683.0750	2189.2150
32	0.4852008	3728.2660	1734.7400	1993.5250
33	0.4254062	3285.1970	1520.9570	1764.2390
34	0.3521811	2635.4480	1259.1550	1576.2930
35	0.2885370	2456.0400	1031.6080	1424.4320
36	0.2300254	2111.3040	822.4111	1288.8930
37	0.1766467	1804.2240	631.5559	1172.6580
38	0.1358426	1564.6430	435.6787	1078.9640
39	0.1044463	1376.9280	373.4346	1003.4530
40	0.0803251	1229.0010	297.1858	941.8145
41	0.0618476	1112.0520	221.1247	690.9275

BEREA SANDSTONE NUMBER 2
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2

*** AIIALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0739093	81.5562
0.1326775	135.2955
0.18451 67	181.3245
0.2103508	203.7745
0.2383232	228.2791
0.2751068	261.0894
0.3295979	311.8022

THE VALUE OF "C" FACTOR I N PET ANALYSIS IS	58.1866	
THE MONOLAYER ADSORPTION IS	1057.5180	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	152.1000	GRAMS
THE 'TOTAL SURFACE AREA IS	107.0877	SQUARE IIETERS
SPECIFIC SURFACE AREA IS	0.7041	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.2885370	294.7129
0.2300254	231.7834
0.1766467	182.9563
0.1358426	145.6920
0.1044483	116.2240
0.0803251	92.7366
0.0618478	73.9060

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	50.9020	
THE MONOLAYER ADSORPTION I S	1058.4360	MICROMOLES
THE "EIGHT OF THE SAMPLE I S	152.1000	GRAMS
THE TOTAL SUQFACE AREA I S	103.2744	SQUARE METERS
SPECIFIC SURFACE AREA I S	0.6790	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
NITROGEN ADSCRPTION AT 77.3°K
DATA FROM FRESSURE TRANSDUCER 1

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0000000	144.6271	0.0000	144.6271
2	0.0003375	395.2019	1.1778	394.0239
3	0.0025872	644.2817	9.0295	635.2522
4	0.0276715	1193.2660	96.5761	1096.6900
5	0.0993251	1685.8100	346.6533	1342.1570
6	0.1553431	2034.6690	542.1609	1492.7080
7	0.1858267	2220.4170	648.5515	1571.8660
8	0.2304837	2496.2180	894.4082	1691.8100
9	0.2607424	2689.8020	910.0142	1779.7870
10	0.2875141	2657.7650	1003.4490	1854.3'260
11	0.3030370	2960.7430	1057.6250	1903.1170
12	0.3173226	3052.4890	1107.4840	1945.0050
13	0.3400447	3200.2930	1186.7860	2013.5070
14	0.3951629	3561.6740	1379.1530	2182.5200
15	0.4404947	3365.8740	1537.3650	2326.5100
16	0.4839141	4154.7530	1685.9030	2465.8500
17	0.5295836	4466.0540	1848.2930	2617.7600
18	0.5640044	4703.9210	1968.4250	2755.4950
19	0.6025868	4986.6320	2103.0310	2883.5510
20	0.6403922	5242.6250	2234.9900	3007.6340
21	0.6761528	5544.3980	2359.8330	3184.5640
22	0.7086611	5840.1910	2473.2500	3366.9010
23	0.7380201	6128.6950	2575.7550	3552.9390
24	0.7595047	6354.2300	2650.7390	3703.4910
25	0.7815521	6591.3470	2727.6850	3863.6610
26	0.8044991	6876.1170	2807.7730	4068.3430
27	0.8372326	7311.3040	2922.0160	4399.2850
28	0.8611922	7715.4720	3005.6370	4709.8320
29	0.8307646	8114.5970	3073.9470	5040.6480
30	0.8968502	8476.9100	3130.0870	5346.8200
31	0.9145104	8943.6750	3191.7220	5751.9490
32	0.9301461	9457.9020	3246.2920	6211.6090
33	0.9105734	9250.8630	3177.9820	6072.8780
34	0.9031495	9044.7570	3152.0720	5892.6830
35	0.8881888	8724.4840	3099.8570	5624.6250
36	0.8767152	8409.6280	3059.8140	5349.8120
37	0.8398198	7811.5600	2931.0450	4830.4530
38	0.8014620	7275.9650	2797.1730	4478.7920
39	0.7546680	6676.3430	2633.8580	4042.4840
40	0.7056240	6163.2340	2462.6900	3700.5430
41	0.6516557	5663.2030	2275.0340	3388.1680
42	0.5962878	5188.3980	2081.0970	3107.3010
43	0.5326206	4693.0720	1858.8930	2835.0790
44	0.4823394	4208.5150	1683.4070	2525.1070
45	0.4253091	3720.6330	1484.3660	2235.2660
46	0.3668165	3317.0220	1280.2210	2036.8000
47	0.3160852	2981.6140	1103.1650	1878.4490
48	0.2726660	2700.2080	951.6284	1748.5800
49	0.2368953	2467.9450	826.7859	1641.1570
50	0.2043869	2263.8970	713.3281	1550.5690
51	0.1614173	20C0.6160	563.3606	1437.2560
52	0.1303712	1110.2090	455.0071	1355.2020
53	0.1023622	1634.1900	357.2532	1276.9370
54	0.0805399	1494.4210	281.0913	1213.3300
55	0.0635545	1382.4940	221.8110	1160.6830

BEREA SANDSTONE NUMBER 3
NITROGEN ADSORPTICN AT 77.3°K
DATA FEOM PRESSURE TRANSDUCER 1

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0993251	82.1650
0.1553431	123.2072
0.1858267	145.2030
0.2304837	177.0397
0.2607424	198.1743
0.2875141	217.6177
0.3030370	223.4652
0.31 73226	238.9816
0.3400447	255.8988

THE VALUE OF "C" FACTOR I N 6ET ANALYSIS I S	64.41 18	
THE MONOLAYER ADSORPTIGN I S	1371.2470	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	154.5000	GRAMS
THE TOTAL SUPFACE APEA I S	133.7962	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8660	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.31 60852	246.0382
0.2726660	214.3934
0.2368953	189.1566
0.2043869	165.6760
0.161 4173	133.9275
0.1303712	110.6224
0.1023622	69.3035
0.0205399	72.1936
0.0635545	53.4723

THE VALUE OF "C" FACTOR I N EET ANALYSIS I S	57.3331	
THE MONOLAYER ADSORPTION IS	1336.7090	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	154.5000	GRAMS
THE TOTAL SURFACE AREA I S	129.4505	SGURRE HETERS
SPECIFIC SURFACE AREA I S	0.6379	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSOEPTION (MICROMOLES)
1	0.0000000	148.3529	0.0000	140.3529
2	0.0004277	404.4177	1.4928	402.9248
3	0.0024507	658.9199	8.6578	650.2620
4	0.0282293	1218.5110	93.5226	1119.9890
5	0.1015397	1723.3940	354,3823	1369.0120
6	0.1583403	2076.3720	552.6218	1523.7500
7	0.1893070	2265.6500	660.6980	1604.9520
8	0.2349015	2546.2990	819.8269	1726.4720
9	0.2658681	2742.8240	927.9031	1614.9210
10	0.2928142	2913.9130	1021.9470	1691.9660
11	0.3091530	3017.7680	1078.9710	1938.8170
12	0.3236954	3110.6640	1129.7250	1991.1380
13	0.3466207	3261.2060	1209.7370	2051.4670
14	0.4024605	3627.8260	1404.6920	2223.1320
15	0.4485884	3935.1890	1565.6130	2359.5760
16	0.4925575	4224.7690	1719.0690	2505.7190
17	0.5387509	4532.2920	1880.2680	2652.0040
18	0.5738236	4766.6130	2002.6950	2763.9160
19	0.6127458	5039.6710	2138.5360	2901.3340
20	0.6494439	5325.2070	2266.6160	3055.5900
21	0.6840033	5614.5230	2367.2310	3227.2910
22	0.7155543	5397.1600	2497.6960	3399.4630
23	0.7436268	6173.2610	2595.3230	3577.9370
24	0.7639562	6359.3940	2566.3790	3723.0140
25	0.7850299	6617.3200	2739.8230	3877.4960
26	0.8065011	6590.2920	2814.7600	4075.5320
27	0.8374679	7306.6440	2922.8370	4353.6040
28	0.8605645	7692.4450	3003.4460	4688.9960
29	0.8803249	8072.1360	3072.4120	4999.7220
30	0.8055516	8418.7180	3125.5540	5293.1640
31	0.9124036	8865.0540	3184.3690	5680.6630
32	0.9277160	9356.5780	3237.8110	6116.7650
33	0.8982890	9152.0930	3135.1030	6016.9840
34	0.8899913	8956.4170	3106.140	5650.2650
35	0.8755346	8650.7570	3055.6930	5595.0620
36	0.8601369	8350.0700	3001.9530	5348.1130
37	0.8248929	7763.9020	2676.9490	4884.9490
33	0.7880239	7237.7030	2750.2750	4487.4290
39	0.7431137	6641.8750	2593.5320	4046.3420
40	0.6958939	6129.1750	2428.7310	3700.4440
41	0.6440547	5624.7180	2247.8970	3376.9100
42	0.5904191	5140.8630	2060.6140	3030.2460
43	0.5253206	4639.2460	1833.4150	2605.6300
44	0.4738237	4145.7300	1653.6860	2402.0430
45	0.4160820	3643.8040	1452.1630	2196.6410
46	0.3564562	3237.8490	1244.0700	1993.7790
47	0.3047902	2896.0970	1063.7440	1632.3530
48	0.2604788	2609.3380	909.0942	1700.2440
49	0.2233531	2373.4510	779.5220	1593.9200
50	0.1902480	2165.4160	663.9819	1501.4340
51	0.1461932	1896.4190	510.2271	1396.1920
52	0.1146278	1702.3100	400.0610	1302.2490
53	0.0857142	1522.8370	299.1501	1223.6870
54	0.0633019	1379.7410	220.9292	1158.8120
55	0.0458511	1265.3500	160.0243	1105.3260

BEREA SAHOSTONE NUMBER 3
NITROGEN ADSCRPTION AT 77.3°K
DATA FROH PRESSURE TRANSDUCER 2

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.1015397	82.5523
0.1583403	123.4642
0.1393070	145.4949
0.2349015	177.8315
0.2658581	199.5420
0.2928142	218.8493
0.3091530	230.8100
0.3236954	241.5901
0.3466207	258.5972

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	73.2186	
THE MONOLAYER AOSORPTICN IS	1375.9040	MICROMOLES
THE NEIGHT OF THE SAIIPLE IS	154.5000	GRAMS
THE TOTAL SURFACE AREA IS	134.5433	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8708	SQUAEE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3047902	239.2632
0.2604788	207.1621
0.2233531	180.4260
0.1902480	156.4809
0.1461932	123.5219
0.1146278	99.4190
0.0857142	76.6125
0.0633019	58.3181

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	58.5616	
THE MONOLAYER ADSORPTICN IS	1315.8010	MICRCMOLES
THE NEIGHT OF THE SAMPLE IS	154.5000	GRAMS
THE TOTAL SURFACE AREA IS	128.3362	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8310	SGUARE METERS/GRAM

BEREA SANDSTONE NUMSER 4
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 1

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0014250	152.4434	13.7512	138.6921
2	0.0036326	339.0276	30.7393	308.2631
3	-0.0023598	548.1606	-20.2229	568.3835
4	0.0066915	781.5894	56.6243	724.9651
5	0.0129051	1027.5620	109.2040	918.3596
6	0.0275309	1303.7070	232.9689	1070.7380
7	0.0653656	1790.6900	553.2991	1237.5910
8	0.1173364	2394.4700	993.3521	1401.1180
9	0.1601185	tSS5.7820	135'1.9380	1533.6440
10	0.1983557	3311.6710	1678.5050	1633.1660
11	0.2366854	3737.5590	2002.8800	1734.6790
12	0.2693813	4105.9500	2279.5300	1826.4300
13	0.3024566	4478.3320	2559.4160	1918.9150
14	0.3269283	4760.8280	2766.4990	1994.3290
15	0.3610553	5154.1500	3055.2640	2078.8750
16	0.3818944	5398.2260	3231.6260	2166.5990
17	0.4037853	5654.9960	3416.8700	2238.1250
18	0.4290218	5956.3860	3630.4240	2325.9620
19	0.4639133	6365.1250	3925.6790	2439.4450
20	0.4871425	6641.9020	4122.2460	2519.6500
21	0.5245195	7068.9100	4435.5310	2650.3780
22	0.5653377	7608.0070	4783.9410	2824.0650
23	0.5971703	7995.6250	5053.3120	2942.3120
24	0.6399004	8529.3320	5414.8980	3114.4330
25	0.6693211	8917.4250	5668.0890	3249.3350
26	0.6829173	9094.0030	5778.9100	3315.0930
27	0.7167572	9558.0000	6065.2650	3492.7340
28	0.7521269	10091.0700	6364.5700	3726.5030
29	0.7725837	10422.1600	6537.6750	5894.4840
30	0.7917981	10754.3500	6700.2650	4054.0330
31	0.8025044	11014.3000	6790.8570	4223.4370
32	0.7768854	10722.1200	6574.0740	4148.0460
33	0.7579579	10438.5100	6413.9100	4024.6010
34	0.7391261	10160.7700	6254.5540	3906.2220
35	0.7207721	9SC0.6640	6099.2420	3791.4210
36	0.7044258	9646.2770	5960.9170	3685.3590
37	0.6865572	9417.6090	5626.6360	3500.9720
38	0.6736448	9191.9600	5700.4450	3491.5150
39	0.6554821	8937.0930	5546.7500	3390.3430
40	0.6375106	8694.1360	5394.6750	3299.4600
41	0.6195390	8454.1950	5242.5970	3211.5970
42	0.6016631	6206.6320	5091.3250	3115.3040
43	0.5783383	7905.7140	4893.0550	3011.7610
44	0.5553059	7617.8160	4699.8120	2918.0030
45	0.5314022	7318.8040	4496.7730	2822.0310
46	0.5010992	6933.6480	4240.3470	2698.3000
47	0.4739506	6581.0390	4010.6150	2570.4230
48	0.4446036	6174.9960	3762.2780	2412.7170
49	0.4147785	5803.6900	3509.8950	2293.9340
50	0.3354315	5449.9330	3261.5580	2188.3750
51	0.3561799	5095.5000	3014.0280	2081.4710
52	0.3314214	4802.5190	2804.5190	1935.0003
53	0.3033168	4476.0350	2566.6960	1909.3380
54	0.2736830	4135.1010	2315.9310	1819.1600
55	0.2434757	3789.0870	2060.3140	1728.7720
56	0.2174744	3490.0750	1840.2890	1649.7860
57	0.1935761	3216.9480	1638.0590	1578.8880
58	0.1687219	2936.0390	1427.7400	1506.2980
59	0.1471177	2689.5890	1244.9240	1444.6640
60	0.1283816	2474.1040	1086.3770	1367.7260
61	0.1120351	2285.9310	948.0515	1337.6500
62	0.0977918	2121.1020	627.5234	1293.5760
63	0.0854601	1974.7570	723.1719	1253.5850

64	0.0747538	1650.1970	632.5735	1217.6240
65	0.0654813	1739.0400	554.1089	1164.9310

BEREA SANDSTONE NUMBER 4
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 1

*** ANALYSIS EASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0653856	56.5291
0.1173984	94.9249
0.1601 185	124.5352
0.1983557	151.5069
0.2366884	178.7540
0.269381 3	201.8707
0.3024566	225.9623
0.3269283	243.5535

THE VALUE OF "C" FACTOR I N 6ET ANALYSIS I S 69.1815
THE MONOLAYER ADSORPTION I S 1383.8850 MICROHOLES
THE WEIGHT OF THE SAtIPLE I S 117.9000 GRAMS
THE TOTAL SURFACE AREA I S 135.0293 SQUARE METERS
SPECIFIC SURFACE AREA I S 1.1453 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.331 4214	248.1033
0.3033168	228.0227
0.2736830	207.1325
0.2434757	166.1635
0.21 74744	168.4541
0.1935761	152.0326
0.1687219	134.5666
0.1471177	119.4012
0.1283816	106.1383
0.1 120351	94.3063
0.0977918	83.7920
0.0854601	74.5430
0.0747538	66.3532
0.065481 3	59.1338

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S 49.3382
THE MONOLAYER ADSCRFTICN IS 1388.3500 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 117.9000 GRAMS
THE TOTAL SURFACE AREA I S 135.4650 SQUARE METERS
SPECIFIC SURFACE AREA I S 1.1490 SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 4
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROHOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0017914	152.1064	15.1593	137.0271
2	0.0036680	339.6563	31.0394	308.6167
3	0.0005119	549.7983	4.3314	545.4663
4	0.0064831	784.0295	54.8503	729.1692
5	0.0127102	1030.7290	107.5548	923.1750
6	0.0275527	1307.8960	233.1538	1074.7420
7	0.0653417	1796.3330	552.9277	1243.4100
8	0.1176321	2400.4070	995.4143	1404.9330
9	0.1608304	2591.8250	1361.3850	1530.4390
10	0.1990105	3317.9190	1684.0460	1633.6720
11	0.2371820	3743.3040	2009.5950	1733.7080
12	0.2701528	4111.8670	2286.0590	1825.8070
13	0.3032500	4483.9720	2566.1310	1917.6410
14	0.3278171	4765.6710	2774.0200	1991.6510
15	0.3620232	5155.0390	3063.4760	2094.5620
16	0.3830077	5401.3350	3241.0490	2160.2860
17	0.4047598	5657.3860	3425.1170	2232.2690
18	0.4300094	5957.9330	3638.7820	2319.1510
19	0.4649834	6365.3200	3934.7350	2430.5810
20	0.4680151	6641.2100	4129.6280	2511.5820
21	0.5252922	7086.2890	4445.0740	2641.2140
22	0.5657254	7603.2100	4787.2220	2815.9880
23	0.5974578	7988.9170	5055.7460	2933.1710
24	0.6403650	8519.3000	5418.8280	3100.4720
25	0.6699649	8905.2920	5669.3080	3235.9840
26	0.6829310	9081.2850	5779.0270	3302.2570
27	0.7166255	9542.0930	6064.1480	3477.9450
28	0.7518552	10071.4600	6362.2690	3709.2140
29	0.7721572	10400.3700	6534.0620	3866.3080
30	0.7911797	10730.1000	6695.0390	4035.0660
31	0.8013308	10989.4100	6780.9330	4208.4800
32	0.7788106	10698.9200	6590.3570	4108.5580
33	0.7596735	10416.7900	6430.1170	3986.6790
34	0.7411924	10140.6200	6272.0390	3868.5820
35	0.7227670	9872.0970	6116.1170	3755.9800
34	0.7065595	9628.9370	5973.9720	3649.9640
37	0.6906080	9401.5070	5843.9880	3557.5190
38	0.6755947	9177.1950	5716.9490	3460.2460
39	0.6573401	8923.8320	5562.4760	3351.3550
40	0.6393412	8681.9490	5410.1670	3271.7810
41	0.6210012	8443.0390	5254.9720	3188.0660
42	0.6027465	8197.3280	5100.5000	3096.8280
43	0.5797149	7897.7690	4905.6010	2992.1670
44	0.5565979	7611.3900	4709.9340	2901.4060
45	0.5325426	7313.6750	4506.4250	2807.2500
46	0.5020043	6934.4840	4248.0070	2686.4760
47	0.4746224	6577.6790	4016.3010	2561.3770
48	0.4453636	6171.7070	3768.7100	2402.9960
49	0.4153373	5600.4190	3514.0240	2285.8240
50	0.3859079	5446.3350	3265.5910	2180.7440
51	0.3563932	5091.6560	3015.8340	2075.8210
52	0.3314650	4798.4760	2805.0580	1993.4160
53	0.3032500	4471.4290	2566.1310	1905.2980
54	0.2733942	4129.6440	2313.4880	1816.1560
55	0.2432824	3782.0520	2058.6790	1723.3730
56	0.2167534	3482.4980	1634.1680	1648.3090
57	0.1926981	3208.7320	1630.6300	1578.1010
58	0.1677045	2927.0310	1419.1320	1507.8990
59	0.1450378	2679.9050	1235.7860	1444.1190
60	0.1271007	2463.8120	1075.5380	1398.2730
61	0.1107225	2275.0660	936.9446	1338.1220
62	0.0953064	2109.7010	814.9546	1294.7470
63	0.0838522	1965.0250	709.5654	1255.4600

64	0.0731804	1838.0620	619.3359	1218.7260
65	0.063891 5	1726.5430	540.6563	1185.8870

BEREA SANDSTONE NUMBER 4
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0653417	56.2241
0.1176321	94.8859
0.1608304	125.2746
0.1990105	152.0655
0.2374820	179.6405
0.2701528	202.7320
0.3032500	226.9339
0.3278171	244.8673

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 72.9590
THE NONOLAYER ADSORPTION IS 1378.5510 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 117.9000 GRAMS
THE TOTAL SURFACE AREA IS 134.5088 SQUAF'E NETERS
SPECIFIC SURFACE AREA IS 1.1409 SQUARE METERS/GRAM

*** ANALYSIS GASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3314850	248.7449
0.3032500	228.4339
0.2733942	207.1749
0.2432824	186.5509
0.2167534	167.8914
0.1926981	151.2538
0.1677045	133.6272
0.1460378	113.4195
0.1271007	104.8839
0.1107225	93.0470
0.0963064	82.3093
0.0838522	72.9030
0.0731594	64.7964
0.0636915	57.5537

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 52.5470
THE MONOLAYER ADSORPTION IS 1381.8680 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 117.9000 GRAMS
THE TOTAL SURFACE AREA IS 134.6324 SQUAFE METERS
SPECIFIC SURFACE AREA IS 1.1436 SQUARE METERS/GRAM

UNCCNSOLIDATED SILICA SANDPACK
NITROGEN ADSORPTION AT 77.3°K
DATA FROM FRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0195725	172.0051	110.7232	61.3718
2	0.0266639	227.2178	162.2569	64.9509
3	0.0372328	279.5376	210.6288	68.9088
4	0.0457818	329.8020	258.9905	70.8115
5	0.0624297	429.2097	353.1689	74.0403
6	0.0769551	526.1862	446.7109	79.4773
7	0.1024747	664.4622	579.7061	84.7561
8	0.1301462	826.6538	736.2461	90.4077
9	0.1460067	919.8953	825.9702	93.9250
10	0.1725534	1075.9200	976.1462	99.7742
11	0.1854693	1152.3440	1049.3250	103.0193
12	0.2096738	1294.1680	1186.1360	106.0303
13	0.2359955	1449.6330	1335.0420	114.5011
14	0.2551181	1562.3080	1443.2200	119.0876
15	0.2676040	1636.8640	1513.6540	123.0098
16	0.2892014	1764.3000	1636.0320	128.2676
17	0.3136109	1913.9710	1774.1170	139.8540
18	0.3393700	2C67.9420	1919.6390	148.1028
19	0.3583803	2182.2980	2027.3810	154.9165
20	0.3751406	2283.5740	2122.1960	161.3782
21	0.3908866	2377.9370	2211.2630	144.6531
22	0.4155229	2526.6750	2350.6410	176.0332
23	0.4362205	2651.3060	2467.7290	183.5791
24	0.4574603	2779.6780	2567.9970	191.6614
25	0.4750282	2834.5600	2667.2660	199.2937
26	0.4962879	3015.6780	2807.5340	208.1433
27	0.5195650	3157.3160	2939.8930	217.4224
28	0.5401574	3262.6370	3055.7070	226.9895
29	0.5577053	3359.5780	3154.9770	234.6013
30	0.5766030	3504.6620	3C61.8620	242.7993
31	0.6006749	3650.8030	3303.0590	252.7449
32	0.6200224	3767.4020	3507.5090	259.8933
33	0.6300327	3686.6160	3515.0520	271.5643
34	0.6620023	4029.7480	3745.5010	284.2463
35	0.6830145	4161.4800	3863.8600	297.6201
36	0.7331834	4477.6400	4147.6670	329.9727
37	0.7725534	4728.5850	4370.3860	358.1992
38	0.8053993	4942.7220	4555.1990	386.5234
39	0.8312711	5114.2530	4702.5540	411.6992
40	0.8047243	4930.7570	4552.3780	378.3789
41	0.7600900	4769.6970	4413.0190	356.6680
42	0.7368952	4493.5110	4148.6440	324.8477
43	0.6960630	4234.7140	3337.6760	277.0333
44	0.6654666	4040.0100	3764.5000	275.4100
45	0.6290213	3812.0440	3558.4160	253.6264
46	0.5833519	3561.8430	3300.0610	261.7822
47	0.5519684	3367.3250	3122.5230	244.8022
48	0.5219347	3180.8420	2952.6200	226.2219
49	0.4934757	3003.8890	2791.6250	212.2632
50	0.4683913	2945.4340	2649.7210	195.7126
51	0.4478064	2716.3710	2533.2700	185.1006
52	0.4222721	2562.1590	2358.6220	173.3374
53	0.3894262	2363.9040	2203.0100	160.8936
54	0.3464566	2104.5470	1959.9290	144.6179
55	0.3008999	1857.1480	1702.2100	154.9377
56	0.2607424	1612.5520	1475.0370	137.5156
57	0.2164229	1347.4030	1224.3180	123.0355
58	0.1725908	1089.5410	978.0554	111.4856
59	0.1352081	664.0603	764.8813	101.1700
60	0.1057367	690.0413	598.1599	91.8813
61	0.0826771	552.7014	467.7102	E4.9912
62	0.0646794	445.4456	305.8958	79.5498
63	0.0491563	363.7691	276.0608	85.7083

UNCCNSOLIDATED SILICA SANDPACK
NITROGEN ADSORPTION AT 77.3°K
DATA FROM FRESSUEE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSUEE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0624297	875.6699
0.0789651	1076.7370
0.1024747	1347.0960
0.1301462	1654.9290
0.1460067	1820.2730
0.1725534	2090.0910
0.1 e54693	2210.5650
0.2096738	2455.7950
0.2359055	2605.6080
0.2551181	2875.9870
0.2676040	2970.3440
0.2892014	3172.0270
0.3136109	3266.9730
0.3393700	3466.5810

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	24.8168	
THE HONOLAYER ADSORPTICN IS	101.3172	MICRCIIIOLES
THE WEIGHT OF THE SAMPLE IS	118.8000	GRAMS
THE TOTAL SURFACE AREA IS	9.8858	SQUAF;E METERS
SPECIFIC SURFACE AREA IS	0.0632	SQUAF;E METERS/GRAM

*** ANALYSIS GASED ON DESORPTION DATA ***

PRESSURE (ATfl.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3464566	3665.6610
0.3008999	2777.9550
0.2607424	2564.8590
0.2164229	2243.9750
0.1728008	1674.9520
0.1352081	1545.2570
0.1057367	1286.8640
0.0826771	1060.4470
0.0646794	869.2925

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	31.4613	
THE KONOLAYER ADSCRPTICN IS	107.2263	MICROMOLES
THE KEIGHT OF THE SAMPLE IS	118.8000	GRAMS
THE TOTAL SUFFACE AREA IS	10.4623	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0881	SQUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
NITROGEN ADSCRPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

NUMBER	PRESSUPE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0198485	150.7476	112.2843	38.4633
2	0.0286794	206.7716	162.2416	44.5300
3	0.0373422	259.4424	211.2476	48.1948
4	0.0456368	310.0173	259.3020	50.7153
5	0.0626576	409.7705	354.4585	55.3120
6	0.0790579	507.0088	447.2363	57.7725
7	0.1031958	645.0425	583.7861	61.2563
8	0.1308662	807.9448	740.3191	67.6257
9	0.1465936	901.5508	829.2005	72.2693
10	0.1732547	1058.1660	980.1143	75.0516
11	0.1861227	1134.5870	1052.9080	81.6765
12	0.2101765	1276.9520	1188.9830	87.9688
13	0.2365010	1432.8660	1337.9020	94.9663
14	0.2555928	1545.8940	1445.9060	99.9880
15	0.2679561	1620.6390	1515.8660	104.7930
16	0.2894867	1748.6140	1637.6460	110.9675
17	0.3142974	1897.$640	1778.0020	119.9617
18	0,3399493	2052.0640	1923.1160	128.9460
19	0.3587887	2166.4670	2029.6930	136.7947
20	0.3756096	2267.7770	2124.8490	142.9280
21	0.3912529	2352.0620	2213.3450	148.7371
22	0.4157273	2511.0130	2351.7980	159.2146
23	0.4363329	2635.4950	2468.3650	167.1299
24	0.4574431	2763.7490	2587.7670	175.9617
25	0.4749347	2870.4880	2686.7500	183.7380
26	0.4961311	2999.3000	2806.6480	192.6521
27	0.5191756	3140.9670	2937.0120	203.9543
28	0.5396129	3266.0080	3052.6260	213.3704
29	0.5569385	3372.6070	3150.6400	221.9666
30	0.5756096	3487.8680	3256.2640	231.6033
31	0.5992430	3632.3280	3389.9600	242.3682
32	0.6185029	3747.3100	3498.9140	248.3960
33	0.6375105	3862.E500	3606.4410	254.4037
34	0.6603868	3999.2070	3735.8540	263.3525
35	0.6805719	4123.6870	3850.0420	273.6445
36	0.7275860	4420.9880	4116.0030	304.9844
37	0.7644238	4657.3750	4324.3980	332.9766
38	0.7952900	4658.5540	4409.0070	359.5469
39	0.6105121	5019.9170	4636.0350	353.8828
40	0.7165433	4847.0930	4449.5270	337.5664
41	0.7632462	4695.2260	4317.7340	377.4922
42	0.7224556	4425.5320	4086.9820	339.5994
43	0.6837676	4169.6320	3868.1210	301.5110
44	0.6541629	3976.1340	3700.6450	275.4880
45	0.6179141	3748.8240	3495.5830	253.24I0
46	0.5764507	3492.0370	3261.0220	231.0146
47	0.5449116	3298.1180	3052.6030	215.5156
48	0.5146340	311Z.1640	2911.3210	200.8430
49	0.4859544	2935.7090	2740.0750	186.6316
50	0.4602184	2777.6970	2603.4880	174.2000
51	0.4393605	2651.1190	2485.4030	165.6257
52	0.4135405	2495.3410	2339.4270	155.9141
53	0.3806559	2297.0920	2153.3960	143.6956
54	0.3374261	2037.5100	1908.8430	128.6675
55	0.2951216	1783.9360	1649.5230	114.4124
55	0.2541629	1539.1630	1437.6170	101.3452
57	0.2093353	1273.5740	1184.2240	89.3499
58	0.1656854	1014.5510	937.2035	77.2578
59	0.1276702	789.8967	722.2393	67.6575
60	0.0977291	613.3025	552.8604	60.4421
61	0.0743481	475.2616	420.5923	54.6763
62	0.0541616	367.4121	317.8230	49.5891
63	0.0419680	282.8872	237.4159	45.4713

UNCONSOLIDATED SILICA SANDPACK
NITROGEN ADSORPTION AT 77.3°K
DATA FRCM PRESSURE TRANSDUCER 2
SAND GSAIN SIZE : 60 TO 65 MESH

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSUFE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0626576	1208.5250
0.0790579	1436.1880
0.1 031958	1818.5080
0.1308662	2226.5200
0.1465936	2377.1660
0.1732547	2684.9140
0.1861 227	2799.8350
0.21 01765	3025.0010
0.2365010	3261.7810
0.2555928	3433.91 80
0.2679561	3492.9660
0.2804867	3671.6420
0.3142974	3820.8720
0.3399493	3994.1290

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	12.8905	
THE KONOLAYER ADSORPTION IS	93.2260	MICROMOLES
THE UEIGHT OF THE SAHPLE IS	118.6000	GRAMS
THE TOTAL SURFACE AREA IS	9.0963	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0766	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSUEE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3374261	3957.9970
0.2051 216	3659.4240
0.2541629	3362.4870
0.2093353	2963.1670
0.1656854	2570.4640
0.1 276702	2163.1300
0.0977291	1792.0350
0.0743481	1469.0030
0.0561616	1200.3900

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	12.6916	
THE MONOLAYER ADSORPTICN IS	04.66 20	MICROMOLES
THE KEIGHT OF THE SAMPLE IS	118.8000	GRAMS
THE TOTAL SURFACE ARE4 IS	9.2364	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0777	SQUARE METERS/GRAM

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
NITROGEN ADSORPTION AT 77.3°K
DATA FFCM FRESSURE TRANSDUCER 1
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0000000	154.0083	0.0000	154.0083
2	0.0019436	704.4963	8.0033	696.4949
3	0.0090379	1139.4010	37.2153	1102.1860
4	0.0366377	1681.1730	150.8621	1530.3110
5	0.0755104	2147.8790	310.9270	1636.9520
6	0.1236153	2628.1450	509.0076	2119.1370
7	0.1760935	3085.4870	725.0955	2350.3920
8	0.2350545	3582.3810	971.9958	2610.3650
9	0.2884354	4006.4680	1187.6820	2618.7250
10	0.3415937	4435.3630	1406.5720	3029.7910
11	0.3318269	4757.9370	1572.2390	3185.6980
12	0.4264334	5123.2610	1755.9130	3367.3470
13	0.4694850	5492.4400	1933.1860	3559.2740
14	0.5194353	5012.5110	2138.8690	3773.6410
15	0.5751215	6432.0030	2368.1620	4063.6410
16	0.6067055	6733.7220	2498.2150	4235.5030
17	0.6503401	7216.4100	2677.8880	4538.5190
18	0.6814382	7576.8900	2805.9400	4770.9490
19	0.7189505	7946.7340	2960.4040	4986.3280
20	0.7470359	8331.1050	3076.0500	5255.0540
21	0.7385811	8253.9370	3041.2360	5212.6990
22	0.7269193	8112.5190	2993.2170	5119.3000
23	0.6959184	7747.0310	2565.5650	4881.4640
24	0.6570457	7320.0350	2705.5000	4614.5310
25	0.5850390	65SS.1870	2408.9790	4176.2070
26	0.5139970	5054.1400	2116.0600	3838.0800
27	0.4568514	5403.3240	1881.1650	3522.1560
28	0.4001944	4930.8040	1647.8700	3282.9340
29	0.3330417	43515.8120	1371.3570	3924.4550
30	0.2765793	3952.6760	1138.8630	2813.8120
31	0.2306123	3585.5750	949.5862	2635.9890
32	0.1929057	3280.9490	794.3230	2486.6260
33	0.1622934	3027.3360	668.2715	2359.0640
34	0.1375121	2814.7270	566.2300	2248.4970
35	0.1173955	2635.6970	483.3965	2152.3010
36	0.1010690	2463.7880	416.1692	2067.6100
37	0.0878524	2353.8330	341.7476	1992.0850
38	0.0771624	2241.6360	317.7297	1923.9060
39	0.0683168	2144.1300	281.3145	1862.8160

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 1
DEPTH FRO3 9552 FT 9 IN TO 9553 FT 3 IN

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0755104	44.4638
0.1236153	66.5607
0.1760935	90.5484
0.2360545	118.3710
0.2884354	143.8044
0.3415937	171.2392

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	62.0081	
THE MONOLAYER ADSORPTION IS	2075.5270	MICROMOLES
THE UEICHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	202.5146	SQUARE MSTERS
SPECIFIC SURFACE AREA IS	1.4044	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3330417	165.1021
0.2765793	135.8731
0.2306123	113.7086
0.1929057	96.1192
0.1622934	82.1238
0.1375121	70.9090
0.1173955	61.7991
0.1010690	54.3777
0.0878524	48.3462
0.0771624	43.4606
0.0633168	39.3643

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	71.8519	
THE MONOLAYER ADSORPTION IS	2099.4600	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	GRAMS,
THE TOTAL SUEFACE APEA IS	204.8498	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.4206	SQUARE METERS/GRAM

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.0000000	152.9253	0.0000	152.9253
2	0.0017337	705.7322	7.0991	698.6331
3	0.0090154	1141.9000	36.9157	1104.9840
4	0.0365511	1655.7790	149.7904	1535.9890
5	0.0756761	2154.0590	309.6750	1844.1840
6	0.1235263	2636.3070	505.8093	2130.4970
7	0.1759709	3094.9390	720.5566	2374.3820
8	0.2353501	3593.4580	963.6997	2629.7580
9	0.2871011	4018.8270	1175.6070	2543.2190
10	0.3399791	4449.3710	1392.1290	3056.2410
11	0.3802009	4769.3390	1556.8270	3212.5120
12	0.4250173	5133.3630	1740.3390	3393.0230
13	0.4679264	5501.7070	1916.0410	3585.6650
14	0.5177704	5920.4490	2120.1400	3800.3090
15	0.5741158	6436.6790	2350.8500	4085.8190
16	0.6051489	6735.7850	2477.9330	4260.8510
17	0.6500518	7217.0000	2661.7990	4555.1990
18	0.6807385	7576.4170	2787.4540	4788.9600
19	0.7181S64	8031.0150	2940.7930	5090.2180
20	0.7462724	8413.3280	3055.7980	5357.5270
21	0.7417648	8336.2890	3037.3410	5298.9450
22	0.7301490	8195.3120	2959.7770	5205.5310
23	0.6993758	7831.1400	2853.7590	4967.3710
24	0.6609743	7404.6170	2706.5240	4698.0890
25	0.51995455	6668.5000	2414.0410	4254.4570
26	0.5185505	6035.4920	2123.3340	3913.1570
27	0.4513383	5184.8350	1889.0640	3595.7700
28	0.4046463	5010.9370	1656.9250	3354.0120
29	0.3372052	4473.8240	1380.7700	3033.0530
30	0.2804264	4025.7260	1148.2760	2880.4510
31	0.2343100	3657.6620	959.4407	2700.2210
32	0.1963418	3353.6670	803.9707	2549.6970
33	0.1655586	3095.7910	677.9619	2420.8300
34	0.1405167	2885.3870	575.3806	2310.0060
35	0.1203190	2705.5340	492.6763	2212.8580
36	0.1037620	2553.0410	424.8796	2128.1610
37	0.0904994	2422.5780	370.5723	2052.0060
33	0.0796638	2310.1160	3C6.2031	1983.9130
39	0.0709085	2212.1970	290.3525	1921.8450

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 2
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0756761	44.3946
0.1255263	66.1515
0.1759709	87.9383
0.2353501	117.0404
0.2871011	141.6434
0.3399791	168.5414

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	57.5624	
THE MONOLAYER ADSORPTION IS	2103.4260	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	205.2367	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.4233	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3372052	164.4955
0.2804264	135.2954
0.2343100	113.3283
0.1963418	95.8192
0.1655686	81.9539
0.1405167	70.7745
0.1203190	61.8095
0.1037620	54.4014
0.0904994	43.4913
0.0796638	43.6306
0.0709085	39.7119

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	77.2354	
THE MONOLAYER ADSORPTION IS	2130.7670	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	207.9045	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.4418	SQUARE METERS/GRAM

FIELD COEE NUMBER 5 (FROM WELL MGS20-13)
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRANSDUCER 1
DEFTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLCW IN (MICROtIOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT OF ADSORPTION (MICROHOLES)
1	0.0020075	151.0140	6.8058	144.2082
2	0.01 07064	403.9746	36.2956	347.6 790
3	0.0317369	676.1497	107.5908	566.5560
4	0.0615521	933.3977	206.7010	724.6965
5	0.11 17485	1271.9480	370.8372	893.1116
6	0.1661409	1533.9030	563.231 9	1025.6710
7	0.2107829	1332.1770	714.5723	1117.6050
8	0.2735875	2163.4240	927.4854	1235.9390
9	0.342 1277	2525.4770	1159.8430	1365.6340
10	0.4161 170	2922.3060	1410.6730	1511.6330
11	0.4890544	3323.2640	1657.9370	1665.3270
12	0.5597933	3732.0020	1697.7480	1834.2540
13	0.61 72449	4095.6430	2092.51 40	2003.1290
14	0.6753288	4533.6670	2299.5940	2209.0730
15	0.7179045	4811.4560	2433.7590	2377.7280
16	0.7570977	5146.6090	2566.6270	2581.9810
17	0.7768854	5345.9880	2633.7090	2712.2760
18	0.7957175	5539.5550	2497.5520	2642.0060
19	0.6112035	5716.2960	2750.0510	2966.2450
20	0.8337434	6012.2890	2826.5310	3185.7580
21	0.8594781	6355.3940	2913.7060	3442.6880
22	0.8729565	6603.1600	2959.3990	3643.7600
23	0.8586175	6399.9020	2910.7880	3489.11 30
24	0.635 1531	6093.1 090	2834.6320	3258.4760
25	0.6109167	5757.1090	2749.0780	3038.0300
26	0.7625455	5314.0580	2585.0790	2728.9580
27	0.7096834	4868.3200	2405.8880	2462.4310
28	0.6472610	4411.7810	2194.2710	2217.5090
29	0.5648598	3876.4830	1914.9240	1961.5530
30	0.4884609	3419.6290	1655.9930	1763.6350
31	0.4122033	2980.0840	1397.7100	1582.3740
32	0.3293163	2533.8700	1116.4170	1417.4520
33	0.2545646	2134.8180	862.9961	1271.8220
34	0.1957748	1617.2270	663.6936	1153.5340
35	0.1523756	1571.7300	516.5664	1055.1630
36	0.1199694	1380.0640	406.7045	973.3579
37	0.0958800	1227.9380	325.0415	902.8970
38	0.0779054	1105.6660	264.1162	541.5498
39	0.0642755	1005.9420	217.7743	788.1685
40	0.0536278	923.8457	181.8031	742.0425

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
NITROGEN ADSORPTION AT 77.3°K
DATA FROM PRESSURE TRPNSDUCER 1
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

*** ANALYSIS PASEU ON ADSORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0615621	90.5215
0.1117485	140.8640
0.1661409	194.2554
0.2107829	238.9738
0.2735875	304.7302
0.3421277	380.8132

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	42.4088	
THE MONOLAYER ADSORPTION IS	947.9895	MICRCIMOLES
TtiE NEIGHT OF THE SAIIPLE IS	156.9000	GRAMS;
THE TOTAL SURFACE AREA IS	92.4978	SQUAFE HETERS
SPECIFIC SURFACE AREA IS	0.5895	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3293183	346.4102
0.2545646	268.5105
0.1957748	211.0320
0.1523756	170.3695
0.1199694	140.0554
0.0958800	117.4523
0.0779084	100.3991
0.0642395	87.0985
0.0536278	76.3559

THE VALUE OF "C" FACTOR JN BET ANALYSIS IS	41.5937	
THE MONOLAYER ADSORPTION IS	1006.6120	MICRCMOLES
THE WEIGHT OF THE SAHPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	93.2178	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.6260	SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FROM NELL MGS20-13)
NITROGEN ADSORPTION AT 77.3°K
DATA FROM FRESSURE TRANSDUCER 2
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

NUMBER	PRESSURE OF SYSTEM (ATM.)	TOTAL AMOUNT FLOW IN (MICROHOLES)	DEAD VOLUME (MICROHOLES)	AMOUNT OF ADSORPTION (MICROMOLES)
1	0.001 7060	154.7370	5.7837	148.9534
2	0.01 04068	403.6062	35.2801	373.5259
3	0.031 6473	681.4380	107.2870	574.1509
4	0.0613325	940.1831	207.9228	732.2603
5	0.1 118315	1279.8390	379.1187	000.7207
6	0.1665956	1597.1060	564.7734	1032.3330
7	0.21 13793	1641.2570	716.5945	1124.6620
8	0.2745442	2172.8360	951.7463	1241.0700
9	0.3431715	2534.5980	1163.3810	1371.2160
10	0.4174698	2330.3670	1415.2590	1515.1090
11	0.4902328	3329.9630	1661.9320	1668.031 0
12	0.5611191	3737.0690	1902.2430	1834.8250
13	0.6181010	4099.2530	2095.4170	2003.8310
14	0.6793482	4510.3240	2303.0500	2207.2730
15	0.7186726	4811.2920	2436.3640	2374.9280
16	0.7577412	5146.1280	2568.8090	2577.31 90
17	0.7771900	5342.6640	2634.7420	2707.9210
18	0.7959567	5534.9490	2698.3640	2836.5550
19	0.81 08846	5710.9370	2748.9700	2961.9650
20	0.8333192	6005.3900	2625.0250	3190.3640
21	0.8598481	6347.171 0	2914.9610	3432.21 00
22	0.8729848	6592.8780	2959.4950	3633.3830
23	0.8567391	6300.8120	2911.2010	3479.6100
24	0.8363048	6085.7300	2835.1470	3250.5830
25	0.8111405	5781.3550	2749.8380	3031.51 70
26	0.7621769	5311.0500	2563.8470	2727.2030
27	0.7094600	4867.3820	2405.1320	2462.2500
28	0.6470166	4412.5230	2103.4500	2219.0720
29	0.5642753	3877.8960	1912.9430	1964.9430
30	0.4880148	3421.1860	1654.41 30	1766.7720
31	0.4120106	2980.9'220	1396.7520	1584.1700
32	0.3284996	2533.9980	1113.6420	1420.3560
33	0.2534335	2133.6940	859.161 9	1274.5320
34	0.1 945748	1814.8680	657.6'257	1155.2420
35	0.1509000	1568.4500	511.5645	1056.8850
35	0.1183143	1375.8790	401.0762	974.7832
37	0.0741739	1222.9840	319.2531	903.7261
33	0.0750191	1100.1290	257.3726	842.7571
39	0.0621856	999.9468	210.8146	789.1321
40	0.0516079	917.3352	174.9555	742.3796

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
NITROGEN ADSORPTION AT 77.3°K
DATA FFOH PRESSURE TRANSDUCER 2
DEPTH FROH 9562 FT 10 IN TO 9563 FT 7 IN

*** ANALYSIS BASED ON ADSORPTION DATA ***

PRESSURE (ATtl.)	THE FACTOR P/(1-P)X(1/MOLE)
0.0613325	89.2306
0.1116315	139.7907
0.1665956	193.6366
0.2113793	238.3263
0.2741442	305.3377
0.3431715	381.0247

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	44.6486	
THE MONOLAYER ADSORPTION IS	948.0117	MICROMOLES
THE WEIGHT OF THE SAtIPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	92.5000	SQUARE METERS
SFECIFIC SURFACE AREA IS	0.5895	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

PRESSURE (ATM.)	THE FACTOR P/(1-P)X(1/MOLE)
0.3284996	344.4221
0.2534335	266.3447
0.1945748	209.1164
0.1509000	168.1521
0.1183143	137.6624
0.0941739	115.0400
0.0759191	97.4851
0.0621356	84.0278
0.0516079	73.2998

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	43.1218	
THE MONOLAYER ADSOEPTION IS	1007.9800	MICROMOLES
THE KEIGHT OF THE SAMPLE IS	156.0000	GRAMS
THE TOTAL SUPFACE AREA IS	98.3513	SGUARE METERS
SPECIFIC SURFACE AREA IS	0.6265	SQUARE METERS/GRAM

Appendix B

Data for Methane and Ethane Adsorption at Room Temperature

This appendix contains all data for methane and ethane adsorption. All the terms in the table have the same meaning as those in Appendix A. The last column listed in the table is the response of the capacitance probe to the quantity of adsorption. The surface area occupied by each molecule was calculated by using Equation 5.9. Since the critical temperature of methane is much lower than room temperature, no surface area calculation was done on methane adsorption data.

Index:

Data for Methane Adsorption

Berea Sandstone Number 1 247
Berea Sandstone Number 2 248
Berea Sandstone Number 3 249
Unconcolidated Silica Sands 250
Field Core Number 5 251

Data for Ethane Adsorption

Berea Sandstone Number 1 252
Berea Sandstone Number 2 254
Berea Sandstone Number 3 256
Unconsolidated Silica Sands 258
Field Core Number 5 260

BEREA SANDSTONE NUMBER 1
METHANE ADSORPTION AT 23.89°C
DATA FROM 1000 PSI HEISE GAUGE

DEAD VOLUME FACTOR= 1.0670

NURSER	PRESSURE OF SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES/GM.)	CAPACITANCE (PICOFARADS)
1	100.2	20695.670	20614.270	0.162	1.275
2	190.4	38933.480	38812.270	0.236	1.277
3	248.0	50484.840	50265.620	0.431	1.279
4	266.1	56551.870	58154.510	0.839	1.279
5	324.1	66179.560	65199.930	1.924	1.281
6	353.2	72026.870	70836.000	2.335	1.261
7	383.7	78118.870	76732.120	2.724	1.282
8	437.3	88950.560	86SS3.000	3.865	1.283
9	490.4	99248.180	97029.000	4.359	1.284
10	540.5	109286.500	106407.800	5.654	1.284
11	598.7	120425.800	117165.900	6.397	1.207
12	644.2	129526.600	125522.900	7.868	1.289
13	694.8	139144.500	134705.300	8.720	1.283
14	746.4	149011.100	143973.600	9.895	1.291
15	767.0	156748.700	151194.900	10.909	1.293
16	805.6	160663.300	154474.000	12.169	1.293
17	773.0	154894.000	148705.200	12.156	1.292
18	i'25.4	146065.400	140206.000	11.509	1.291
19	683.3	138092.800	132622.500	10.745	1.290
20	630.2	128101.800	122960.600	10.098	1.289
21	583.6	119053.600	114397.900	9.145	1.288
22	543.0	111419.800	105874.200	8.929	1.287
23	507.5	104516.500	103226.500	5.427	1.286
24	461.9	95409.680	91640.370	7.522	1.285
25	415.3	86499.250	82781.180	7.303	1.284
26	368.7	77151.060	73837.930	6.508	1.283
27	322.1	67974.120	64S09.920	6.215	1.262
28	274.5	58222.750	55499.150	5.350	1.281
29	226.9	48547.000	460S8.170	4.610	1.230
30	171.3	36924.480	34998.120	3.784	1.279
31	123.7	26906.760	25398.160	2.963	1.273
32	E6.2	19028.570	17753.440	2.535	1.277
33	51.1	11470.370	10555.620	1.777	1.276
34	27.6	6509.289	5710.746	1.569	1.275
35	15.0	3879.538	3118.906	1.494	1.275

BEREA SANDSTONE NUMBER 2
METHANE ADSORPTION AT 24.44°C
DATA FROM 1000 PSI HEISE GAUGE

DEAD VOLUME FACTOR= 1.2334

NUMBER	PRESSURE OF SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES/GM.)	CAPACITANCE (PICOFARADS)
1	63.6	15034.150	15157.450	-0.253	1.694
2	118.2	27859.940	23011.770	-0.312	1.695
3	162.8	38350.440	38402.630	-0.107	1.696
4	200.9	47292.230	47201.650	0.166	1.696
5	244.4	57735.440	57191.300	1.118	1.697
6	290.5	66463.810	67659.560	1.653	1.697
7	342.6	80449.000	79376.160	2.205	1.698
8	390.7	92680.250	91413.430	2.603	1.699
9	442.3	103231.100	101454.100	3.652	1.700
10	490.9	114046.800	112055.500	4.092	1.701
11	543.0	125891.100	123306.700	5.311	1.701
12	591.6	136512.600	133694.600	5.997	1.703
13	622.6	143956.400	140281.200	7.557	1.703
14	641.1	148644.800	144192.400	9.150	1.704
15	651.7	151356.300	146405.500	10.195	1.704
16	614.1	143633.600	138479.300	10.502	1.704
17	573.5	134651.000	129851.100	9.926	1.703
18	527.4	125163.100	119765.500	10.723	1.702
19	474.8	113409.400	108559.600	9.946	1.701
20	434.8	104669.300	99805.430	10.407	1.700
21	302.7	95237.430	90526.370	9.682	1.700
22	340.6	83731.060	78927.610	9.871	1.699
23	285.5	71139.560	66526.370	9.480	1.698
24	241.9	60865.130	56619.530	8.725	1.697
25	196.9	50267.900	46278.620	6.239	1.696
26	153.3	39789.900	36192.230	7.393	1.695
27	112.2	29862.000	26603.560	6.696	1.695
28	78.6	21888.560	18709.530	6.533	1.604
29	51.1	15124.290	12189.110	6.032	1.694
30	29.1	9667.473	6945.523	5.633	1.693

BEREA SANDSTONE NUMBER 3
METHANE ADSORPTION AT 25.56°C
DATA FROM 1000 PSI HEISE GAUGE

DEAD VOLUME FACTOR= 1.1981

NUMBER	PRESSURE OF SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES/GM.)	CAPACITANCE (PICOFARADS)
1	71.6	16512.570	16489.040	0.048	1.445
2	135.6	30066.510	31047.740	-0.163	1.447
3	185.7	42339.500	42291.41 0	0.099	1.445
4	229.7	52336.620	52092.260	0.503	1.449
5	271.2	61622.130	61256.720	0.752	1.450
6	310.3	70571.680	69799.250	1.589	1.451
7	359.8	81316.310	80545.310	1.586	1.452
6	401.4	90651.930	89472.370	2.427	1.453
9	455.4	102433.100	100976.600	2.996	1.454
10	508.5	114012.600	1121.56.800	3.838	1.455
11	552.0	123441.000	121226.000	4.557	1.455
12	601.0	134060.400	131358.300	5.559	1.457
13	642.6	143504.000	139862.100 ,	7.492	1.459
14	667.6	152570.800	149003.200	7.956	1.460
15	718.7	159630.600	155252.500	9.131	1.451
16	734.7	163331.500	158452.800	10.016	1.461
17	743.7	165635.300	160264.000	11.050	1.462
1s	699.6	156272.100	151426.900	9.968	1.461
19	640.6	143576..100	139453.800	8.686	1.459
20	587.5	131984.000	129576.6 00	7.009	1.453
21	530.0	119613.900	116644.200	6.109	1.456
22	460.4	104000.600	102035.500	4.043	1.455
23	401.9	90918.550	63579.430	2.755	1.453
24	339.3	76921.810	76108.060	1.674	1.452
25	293.3	63963.630	63892.360	0.147	1.451
26	220.7	40509.330	50094.640	-1.204	1.449
27	162.1	35533.300	37021.080	-3.050	1.443
28	109.6	23139.960	25155.980	-4.147	1.447
29	70.1	13731.220	16145.560	-4.967	1.446
30	43.0	7272.645	9045.02 3	-5.49s	1.445
31	24.0	2921.922	5561.355	-5.430	1.445

UNCONSOLIDATED SILICA SANDPACK
METHANE ADSCRPTICN AT 24.72°C
DATA FRCM '1000 PSI HEISE GAUGE
SAND GRAIN SIZE : 60 TO 65 MESH

DEAD VOLUME FACTOR= 1.6637

NUMBER	PRESSURE OF SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES/GM.)	CAPACITANCE (PICOFARADS)
1	112.2	34207.100	35841.190	-4.264	1.474
2	136.7	42728.600	44203.100	-3.848	1.475
3	173.8	53851.500	55178.560	-3.463	1.476
4	217.8	67473.160	6SS66.120	-3.635	1.476
5	263.4	81536.750	82892.560	-3.533	1.477
6	301.0	93340.250	94355.930	-2.651	1.476
7	352.5	108978.100	109957.500	-2.556	1.476
8	409.1	126049.100	126887.800	-2.189	1.479
9	476.2	146376.900	147302.900	-2.41 1	1.481
10	520.8	159321.800	159736.300	-1.032	1.461
11	570.9	174036.800	174227.700	-0.458	1.482
12	596.4	162450.000	182135.900	0.646	1.483
13	651.0	197812.600	197112.000	1.829	1.483
14	700.5	212119.400	2110S6.000	2.691	1.484
15	736.1	222861.600	221025.700	4.792	1.485
16	766.2	232146.300	229923.000	5.802	1.466
17	793.7	240076.300	236972.1 00	6.106	1.486
16	617.2	246999.500	243436.500	9.296	1.486
19	773.2	235055.700	231306.000	9.780	1.486
20	730.1	22281 7.100	219351.000	9.051	1.464
21	663.5	209499.000	206303.800	8.336	1.464
22	646.0	198752.300	195692.600	7.984	1.463
23	615.9	190365.200	187145.600	8.402	1.452
24	583.9	161121.800	177971.800	6.220	1.462
25	539.8	166145.600	165260.300	7.530	1.481
26	493.2	154130.000	151703.400	6.332	1.451
27	437.2	137113.100	135206.500	4.075	1.490
28	357.1	121186.000	120318.600	2.263	1.479
29	337.0	106000.500	105279.000	1.653	1.476
30	264.4	89222.750	69322.660	-0.261	1.477
31	232.8	72812.810	73504.560	-1.805	1.476
32	183.8	56885.020	58300.11 0	-3.693	1.476
33	147.2	45144.260	46875.160	-4.51 9	1.475
34	109.2	3C714.770	34891.720	-5.681	1.474
35	75.1	21738.620	24090.690	-6.133	1.474
36	46.1	12933.410	15450.190	-6.594	1.473
37	31.0	7116.582	10001.890	-7.530	1.473

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
METHANE ADSORPTION AT 23.89°C
DATA FROM 1000 PSI HEISE GAUGE

DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

DEAD VOLUME FACTOR= 0.5742

NUMBER	PRESSURE OF SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICRONOLES)	AMOUNT ADSORBED (MICROMOLES/GM.)	CAPACITANCE (PICOFARADS)
1	43.6	5515.816	5522.754	-0.044	0.000
2	107.1	11782.290	11846.730	-0.411	0.000
3	153.9	16831.150	16946.590	-0.717	0.000
4	205.0	22407.270	22460.970	-0.342	0.000
5	257.2	28027.910	28024.840	0.020	0.000
6	310.6	33764.440	33668.140	0.614	0.000
7	355.4	39561.980	39394.350	1.196	0.000
8	414.0	44709.630	44419.390	1.651	0.000
9	469.0	50448.830	50037.970	2.619	0.000
10	523.8	56452.650	55594.310	5.536	0.000
11	559.4	60252.680	59151.020	7.021	0.000
12	574.5	62136.390	60650.410	9.471	0.000
13	496.3	53913.190	52803.600	7.072	0.000
14	436.1	47829.460	46682.520	7.310	0.000
15	369.4	40639.630	39810.640	5.264	0.000
16	306.8	34031.990	33266.850	5.195	0.000
17	247.1	27709.260	26959.450	4.779	0.000
18	167.5	21242.550	20575.210	4.253	0.000
19	129.3	14874.720	14277.120	3.809	0.000
20	80.7	9494.898	8953.262	3.452	0.000
21	34.1	4246.000	3799.380	2.847	0.000
22	14.5	1907.416	1623.536	1.809	0.000

BEREA SANDSTONE NUMBER 1
ETHANE ADSORPTION AT 25.28°C
DATA FROM 1000 PSI HEISE GAUGE

DEAD VOLUME FACTOR= 0.9722

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROHOLES)	DEAD VOLUME (MICROHOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04262	26.171	6594.703	5533.434	1061.270	1.449
2	0.08851	54.356	13177.510	11449.990	1728.523	1.450
3	0.13440	62.540	19855.210	17319.530	2535.633	1.451
4	0.18603	114.248	26942.580	23870.400	3072.188	1.452
5	0.23274	142.936	33590.910	29748.690	3842.227	1.453
6	0.27946	171.624	40015.570	35580.890	4434.676	1.454
7	0.32207	197.795	46012.620	40861.590	5151.027	1.456
8	0.37206	228.496	53028.150	47007.850	6020.305	1.458
9	0.42287	259.700	59921.280	53201.460	6719.820	1.460
10	0.47204	289.698	66491.560	59144.590	7346.969	1.461
11	0.52040	319.593	73045.120	64940.100	8105.023	1.462
12	0.56432	358.850	81260.870	72528.750	8732.125	1.464
13	0.62939	386.531	87480.120	77829.810	9650.313	1.466
14	0.65726	403.643	91432.310	81086.310	10346.000	1.468
15	0.61628	378.478	86108.750	76291.870	9816.875	1.466
16	0.56547	347.274	70453.000	70299.680	9183.313	1.464
17	0.51133	314.056	72240.810	63863.140	8377.668	1.462
18	0.45401	278.625	64157.020	56971.270	7185.750	1.460
19	0.40566	249.131	57740.410	51109.640	6630.770	1.459
20	0.35567	218.430	50913.300	44998.400	5914.902	1.458
21	0.30696	189.742	44417.440	39240.820	5176.621	1.456
22	0.26471	162.564	38263.100	33744.120	4518.993	1.455
23	0.22291	136.896	32352.750	25514.980	3837.777	1.454
24	0.16193	111.732	26367.460	23352.550	3014.930	1.453
25	0.14014	86.064	20413.980	18050.250	2363.734	1.452
26	0.10490	64.422	15161.520	13550.780	1610.734	1.451
27	0.05819	35.734	8018.996	7545.555	473.441	1.450
28	0.02950	16.119	4184.675	3834.990	349.655	1.449

BEREA SANDSTONE NUMBER 1
ETHANE ADSORPTION AT 25.28°C
DATA FROM 1000 PSI HEISE GAUGE

THE SATURATION VAFOR PRESSURE = 41.7895 ATM. (614.13 PSIA)
DEAD VOLUME FACTOR= 0.9722

*** ANALYSIS BASED ON ADSORPTION DATA **+

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.134401	61.2351
0.186031	74.3926
0.232744	78.9504
0.279456	87.4564
0.322071	92.2305

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	4.8554	
THE MONOLAYER ADSORPTION IS	4937.5000	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	8.5645	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0169	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.308959	86.3676
0.204705	79.6635
0.222910	74.7441
0.181934	73.7644
0.140138	68.9490
0.104899	72.7567

THE VALUE OF "C" FACTER IN BET ANALYSIS IS	2.1651	
THE MONOLAYER ADSORPTION IS	7517.0270	MICROIIOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	12.6297	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0248	SQUAFIE METERS/GRAM

1

BEREA SANDSTONE NUMBER 2
ETHANE ADSORPTION AT 24.72°C
DATA FROM 1000 PSI HEISE GAUGE

DEAD VOLUME FACTOR= 1.1239

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03482	21.129	5737.063	5177.477	559.586	1.772
2	0.07212	43.766	11689.540	10692.120	997.418	1.773
3	0.11688	70.932	18779.840	17265.210	1514.633	1.773
4	0.16778	101.819	26815.320	24660.280	2135.039	1.774
5	0.22961	139.348	36234.520	33605.760	2628.754	1.776
6	0.25101	170.537	44049.300	40954.110	3095.191	1.777
7	0.33240	201.727	51944.370	48239.640	3704.734	1.778
8	0.38993	236.640	60439.220	56320.640	4168.578	1.779
9	0.43618	264.710	67498.060	62761.510	4736.543	1.780
10	0.48443	293.988	74732.560	69426.060	5306.500	1.781
11	0.53416	324.172	82488.620	56240.060	6248.563	1.783
12	0.58721	356.368	90218.250	83445.120	6773.125	1.784
13	0.63082	382.829	96781.500	89318.500	7463.000	1.785
14	0.66679	404.662	102351.500	94131.810	8219.688	1.786
15	0.62087	376.792	95579.250	87982.500	7596.750	1.785
16	0.58274	353.651	89947.620	82839.810	7107.813	1.783
17	0.54428	330.309	84389.810	77618.500	6771.313	1.783
18	0.50449	306.162	78760.930	72181.310	6579.625	1.762
19	0.46420	281.714	72770.250	65638.560	6131.688	1.780
20	0.42358	257.064	66703.750	61012.010	5b91.730	1.780
21	0.37633	228.389	59393.370	54418.020	4975.352	1.779
22	0.33190	201.425	52582.410	48169.480	4412.938	1.778
23	0.26764	174.562	45724.840	41897.770	3S27.074	1.777
24	0.24702	149.912	39321.270	36101.610	3219.465	1.776
25	0.20392	123.753	3C617.570	23907.940	2709.625	1.775
26	0.16627	102.121	26619.780	24752.460	2057.316	1.774
27	0.12815	77.773	20226.160	18913.020	1313.160	1.774
28	0.10279	62.379	16278.910	15201.130	1077.777	1.773
29	0.07129	43.263	11181.910	10569.940	611.973	1.773
30	0.03979	24.147	6029.984	5914.723	115.262	1.772

BEREA SANDSTONE NUMBER 2
ETHANE ADSORPTION AT 24.72°C
DATA FRCM 1000 PSI HEISE GAUGE

THE SATL'RATION VAPOR PRESSURE = 41.2958 ATM. (606.88 PSIA)
DEAD VOLUME FACTOR= 1.1239

*** AIIALYSIS EASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.116879	87.3795
0.167775	94.4239
0.229614	113.3907
0.281 007	126.2716
0.332401	134.3970

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	4.9435	
THE MONOLAYER ADSORPTION IS	3437.9570	MICROMOLES
THE WEIGHT OF THE SAtlPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	5.8805	SQUARE METERS
SFECIFIC SURFACE AREA IS	0.0 121	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.331 904	112.5758
0.287639	105.5067
0.247021	101.8985
0.203917 .	94.5334
0.168273	$7.8647
0.128153	111.9358
0.102787	106.2955

THE VALUE OF "C" FACTCR IN BET ANALYSIS IS	1.1169	
THE MONOLAYER ADSORPTION IS	8788.7890	MICROMOLES
THE KEIGHT OF THE SAMPLE IS	486.6001	GRAM!;
THE TOTAL SURFACE AREA IS	18.5696	SQUARE ElETERS
SFECIFIC SURFACE AREA IS	0.0382	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
ETHANE ADSCRPTION AT 23.89°C
DATA FROM 1000 PSI HEISE GAUGE

DEAD VOLUME FACTOR= 1.0918

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROHOLES)	CAPACITANCE (PICOFARADS)
1	0.04017	23.948	6343.637	5714.473	629.164	1.493
2	0.09029	53.832	14154.430	12793.810	1360.617	1.494
3	0.12995	77.478	20440.030	18354.730	2085.297	1.495
4	0.17383	103.640	27253.440	24465.580	2787.852	1.496
5	0.23036	137.348	35057.790	32274.960	3682.824	1.497
6	0.27796	165.723	43226.450	38733.010	4433.438	1.499
7	0.32572	194.1$9	50519.280	45283.080	5236.199	1.500
8	0.36960	220.361	57277.540	51200.800	6076.738	1.501
9	0.41550	247.730	64392.020	57345.840	7046.176	1.502
10	0.46444	276.910	71590.370	63546.110	7744.258	1.504
11	0.51051	304.380	76608.680	69917.250	8591.438	1.505
12	0.55051	328.227	84969.000	75150.120	9818.875	1.506
13	0.58696	349.961	90599.620	79888.930	10710.680	1.507
14	0.62865	374.815	96779.870	85272.620	11507.250	1.509
15	0.65903	392.027	101568.600	89172.310	12396.310	1.511
16	a.68012	405.504	105172.800	91648.620	13304.180	1.511
17	0.63456	378.336	98340.680	86032.430	12308.250	1.510
18	0.58983	351.672	91828.120	80260.620	11567.500	1.508
19	0.54033	327.522	86057.310	74996.060	11061.250	1.506
20	0.50039	298.342	78650.500	68586.870	10063.620	1.504
21	0.45651	272.181	71965.680	62796.210	9189.477	1.503
22	0.41769	249.038	66197.060	57638.280	8548.777	1.502
23	0.37466	223.380	59678.940	51880.840	7798.102	1.500
24	0.33415	199.230	53517.370	46424.430	7092.945	1.499
25	0.28690	171.056	46091.190	40012.370	6078.828	1.493
26	0.24218	144.392	39067.930	33897.670	5170.254	1.497
27	0.19830	118.230	32151.670	27854.640	4297.031	1.496
28	0.15611	93.075	25325.940	22003.000	3322.949	1.495
29	0.11560	68.$26	18749.630	16347.470	2402.164	1.494
30	0.07594	45.280	12096.180	10773.600	1322.582	1.493
31	0.04253	25.357	6555.363	6049.469	505.895	1.492
32	0.02396	14.268	3428.487	3413.923	14.564	1.491

BEREA SANDSTONE NUMBER 3
ETHANE ADSORPTION AT 23.89°C
DATA FROM 1000 PSI HEISE GAUGE

THE SATURATION VAPOR PRESSURE = 40.5706 ATM. (596.22 PSIA)
DEAD VOLUME FACTOR= 1.0918

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.129949	71.6242
0,173828	75.4708
0.230364	81.2734
0.277956	86.8303
0.325716	92.2531

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	2.8519	
THE MONOLAYER ADSORPTION IS	6116.2650	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.1001	GRAMS
THE TOTAL SURFACE AREA IS	10.4444	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0215	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.334155	70.7534
0.286900	66.1852
0.242178	61.8094
0.198299	57.5624
0.156108	55.6689
0.115604	54.4156

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	2.7580	
THE MONOLAYER ADSORPTION IS	8256.9370	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.1001	GRAMS
THE TOTAL SURFACE AREA IS	16.3954	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0337	SQUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
ETHANE ADSORPTION AT 23.1 1°C
DATA FROH 1000 PSI HEISE GAUGE
SAND GRAIN SIZE : 60 TO 65 MESH

DEAD VOLUME FACTOR= 1.5160

NUMBER	PRESSUQE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DE40 VOLUME (MICROMOLES)	AMOUNT ADSORBED (HICROHOLES)	CAPACITAEICE (PICOFARADS)
1	0.03351	19.647	6749.910	6530.676	219.234	1.674
2	0.06874	40.302	,13907.990	13358.910	549,066	1.675
3	0.10826	63.476	21949.640	20974.350	975.297	1.675
4	0.14607	65.642	29562.830	28213.830	1349.000	1.676
5	0.19075	111.838	38474.180	36713.140	1761.039	1.677
6	0.22763	133.501	45995.030	43695.430	2299.602	1.677
7	0.26327	154.357	53160.540	50378.700	2781.836	1.678
8	0.31877	186.901	63850.620	60730.560	3120.055	1.678
9	0.37376	219.142	74727.750	70894.680	3833.063	1.679
10	0.41930	245.842	83726.560	79243.180	4483.375	1.680
11	0.46656	273.550	92924.430	87841.310	5083.125	1.681
12	0.51416	301.459	102378.500	96434.ai0	5943.668	1.683
13	0.56021	328.462	111660.500	104685.400	6975.063	1.684
14	0.60833	356.673	120831.600	113239.000	7592.625	1.685
15	0.64699	379.343	128699.600	120063.400	8636.168	1.686
16	0.68738	403.020	136765.500	127144.500	9621.000	1.687
17	0.65765	3E5.590	131531.200	121936.100	9595.063	1.686
18	0.62122	364.230	124827.500	115518.800	9308.625	1.685
19	0.58083	340.552	117407.000	108359.500	9047.438	1.684
20	0.54045	316.875	109778.500	101152.700	8625.813	1.683
21	0.49405	289.671	100668.300	92813.310	7855.063	1.682
22	0.44250	259.444	90247.310	83472.430	6774.875	1.681
23	0.39095	229.218	80199.580	74052.430	6147.063	1.680
24	0.34283	201.006	70434.930	6518S.620	5246.309	1.679
25	0.28956	169.772	59317.920	55293.780	4024.145	1.678
26	0.23886	140.050	48911.750	45798.150	3113.598	1.678
27	0.19500	114.861	40020.370	37683.000	2330.477	1.677
28	0.14865	87.153	30218.170	28705.830	1512.344	1.676
29	0.10998	64.483	22191.210	21304.380	886.828	1.676
30	0.07733	45.340	15303.160	15018.520	284.641	1.675
31	0.04726	27.708	9346.625	9199.906	146.719	1.675
32	0.02921	17.128	5583.797	5695.348	-105.551	1.674

UNCONSOLIDATED SILICA SPNDPACK
ETHANE ADSORPTION AT 23.11°C
DATA FROM 1000 PSI HEISE GAUGE
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR PRESSURE = 33.8966 ATM. (586.32 PSIA)
DEAD VOLUME FACTOR= 1.5160

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.108262	124.4805
0.146068	126.7999
0.190747	133.8459
0.227694	128.2062
0.263266	128.4552
0.318771	149.9768

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 1.8235
THE MONOLAYER ADSORPTION IS 4871.4800 MICROMOLES
THE KEIGHT OF THE SAIIPLE IS 383.2000 GRAMS
THE TOTAL SURFACE AREA IS 8.5737 SQUARE HETERS
SFECIFIC SURFACE AREA IS 0.0224 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.342830	99.4366
0.289558	101.2822
0.238864	100.7918
0.195903	104.5410
0.148645	115.4490
0.109980	139.3401

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS -0.0264
THE MONOLAYER ADSORPTION IS -266085.6000 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 333.2000 GRAMS
THE TOTAL SURFACE AREA IS -530.4727 SQUARE METERS
SFECIFIC SURFACE AREA IS -1.3843 SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
ETHANE ADSORPTION AT 24.17°C
DATA FRCM 1000 PSI HEISE GAUGE
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

DEAD VOLUME FACTOR= 0.5742

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.10095	60.549	6967.965	6710.906	257.059	0.000
2	0.13845	83.041	9547.613	9175.902	371.711	0.000
3	0.18917	113.467	13008.130	12486.260	521.863	0.000
4	0.23019	138.068	15892.850	15142.890	749.965	0.000
5	0.25111	150.619	17367.700	16491.410	876.297	0.000
6	0.29046	174.216	19960.540	19014.070	946.469	0.000
7	0.32729	196.307	22547.260	21360.820	11E6.438	0.000
8	0.36579	219.402	25311.140	23799.000	1512.148	0.000
9	0.39760	238.480	27520.230	25801.410	1718.824	0.000
10	0.43694	262.077	30178.900	28263.440	1915.461	0.000
11	0.48549	291.197	33458.280	31279.470	2178.605	0.000
12	0.56501	338.893	38575.140	36166.850	2408.293	0.000
13	0.62276	373.536	42253.000	39675.920	2577.078	0.000
14	0.67215	403.157	45563.900	42649.450	2914.449	0.000
15	0.62611	375.544	42533.400	39378.320	2655.078	0.000
16	0.58258	349.437	39737.790	37238.450	2499.344	0.000
17	0.51646	309.773	35356.640	33190.730	2165.906	0.000
18	0.46707	280.152	32021.160	30138.350	1882.813	0.000
19	0.42355	254.044	29109.020	27427.150	1681.871	0.000
20	0.37835	226.933	26163.160	24590.730	1572.434	0.000
21	0.33733	202.332	23372.550	21998.390	1374.160	0.000
22	0.28460	170.702	19792.150	18639.390	1152.762	0.000
23	0.23856	143.088	16645.520	15682.850	962.672	0.000
24	0.19754	118.487	13847.560	13029.890	ai7.672	0.000
25	0.13225	79.326	9363.820	8769.781	534.039	0.000
26	0.07785	46.692	5564.578	5184.773	379.805	0.000
27	0.03064	18.376	2291.157	2048.269	242.889	0.000
28	0.01222	7.330	963.996	818.288	145.708	0.000

FIELD CORE NUMBER 5 (FROM UELL MGS20-13)
ETHANE ADSORPTION AT 24.17°C
DATA FROM 1000 FSI HEISE GAUGE
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 40.8143 ATPI. (599.60 PSIA)
DEAD VOLUME FACTOR= 0.5742

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.100948	436.7974
0.138448	432.3132
0.189173	447.0679
0.230188	398.7100
0.251114	382.6523
0.290656	432.5076
0.327266	410.0637

THE VALUE OF "C" FACTCR IN BET ANALYSIS IS	0.6946	
THE MONOLAYER ADSORPTICN IS	3199.3770	MICRCMOLES
THE WEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	7.1813	SQUARE METERS
SPECIFIC SURFACE AREA IS .	0.0453	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.337330	370.4424
0.284596	345.0947
0.238559	325.4463
0.197543	3h1.0657
0.132254	256.5659

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	3.9079	
THE MONOLAYER ADSCRPTION IS	1354.3950	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	2.5142	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0160	SQUARE METERS/GRAM

Appendix C

Data for Water Adsorption at Elevated Temperature

This appendix contains all the data for water adsorption at elevated temperature. All the data were arranged with the same format as those in Appendix B. The quantity of water in the coreholder listed on the table was corrected by applying the compressibility factor Z, since water vapor is far from ideal gas at the experimental conditions. The surface area occupied by each water molecule was calculated by using the molar volume of liquid water at saturation vapor pressure and Equation 5.9.

Index:

Data for Berea Sandstone Number 1, at

107.10°C	264
119.79°C	268
135.85°C	272
147.61°C	276
171.70°C	280
172.60°C	284
195.61°C	288

Data for Berea Sandstone Number 2, at

109.50°C	292
129.14°C	296
143.90°C	300
166.05°C	304
188.26°C	308

Data for Berea Sandstone Number 3, at

104.73°C	312
131.35°C	316
145.97°C	320
162.13°C	324
189.20°C	328
189.94°C	332

Data for Unconsolidated Silica Sandpack, at

109.61°C	336
125.64°C	340
145.01°C	344
165.92°C	348
187.32°C	352

Data for Field Core Number 3, at

106.65°C	356
124.39°C	360
142.80°C	364

Data for Field Core Number 5, at

105.69°C	368
125.56°C	372
147.35°C	376
166.61°C	380
187.93°C	384

GEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 107.1 0°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAFOR PRESSURE = 1.2816 ATM. (18.83 PSIA)
DEAD VOLUME FACTOR= 0.4687

NUMBER	PRESSURE OF SYSTEM P/F0	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORGED (MICROMOLES)	CAFACITANCE (PICOFARADS.)
1	0.01 146	0.216	933.521	35.183	898.338	0.994
2	0.09356	1.856	4349.733	303.072	4046.667	1.009
3	0.18912	3.562	6770.637	582.482	6188.152	1.023
4	0.26823	5.052	0799.555	827.320	7972.234	1.037
5	0.35653	6.715	10935.660	1101.432	9834.230	1.060
6	0.42878	8.076	12784.510	1326.406	11458.11 0	1.085
7	0.50219	9.459	14646.510	1555.604	13090.900	1.120
8	0.55839	10.517	16164.100	1731.534	14432.570	1.151
9	0.59281	11.165	17420.510	1839.433	15581.070	1.176
10	0.63296	11.922	18503.550	1965.5 15	16543.030	1.198
11	0.67426	12.700	19764.61 0	2095.406	17689.210	1.227
12	0.72131	13.536	20962.030	2243.596	18718.430	1.259
13	0.5'3526	11.211	18182.680	1847.1 15	16335.570	1.212
14	0.51 467	9.694	15762.21 0	1594.658	14187.550	1.169
15	0.431 74	8.132	13197.800	1335.622	11862.180	1.126
16	0.35335	6.655	11028.000	1091.560	9936.441	1.003
17	0.28646	5.395	9240.777	883.831	8356.945	1.070
18	0.23915	4.504	7720.879	737.228	6953.646	1.053
19	0.19182	3.613	6440.328	590.819	5869.508	1.041
20	0.15256	2.673	5458.504	469.555	4988.949	1.032
21	0.12368	2.329	4646.738	360.474	4266.262	1.026

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 107.1 0°C
DATA FROM PRESSURE TRAIISDUCER 1

THE SATURATION VAPOR PRESSURE = 1.2816 ATM. (18.83 PSIA)
DEAD VOLUME FACTOR- 0.4687

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.189123	37.6901
0.268232	45.9788

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	6.8615	
THE MONOLAYER ADSORPTICN IS	8153.3710	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	590.6223	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.1601	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.266459	48.0392
0.239149	45.0077
0.191820	40.4375
0.152555	36.0840
0.123680	33.0817

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	5.2691	
THE MONOLAYER ADSORPTION IS	8655.3120	MICROMOLES
THE KEIFHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	626.9324	SQUARE HETERS
SFECIFIC SURFACE AREA IS	1.2316	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
UATER ADSORPTION AT 107.10°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATICN VAPOR PRESSURE ¤ 1.2616 ATM. (16.63 PSXA)
DEAD VOLUIIE FACTOR= 0.4687

NUMBER	PRESSURE OF P/P0	SYSTEII (FSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROHOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01173	0.221	935.675	36.007	899.868	0.994
2	0.10055	1.694	4361.527	309.205	4052.322	1.009
3	0.18359	3.552	6813.833	580.838	6233.043	1.023
4	0.26912	5.069	8646.675	830.077	6016.797	1.037
5	0.35641	6.713	11006.050	1101.052	9005.012	1.060
6	0.43029	8.104	12S65.500	1331.129	11535.370	1.085
7	0.50337	9.461	14749.850	1559.309	13190.550	1.120
8	0.55967	10.541	16285.630	1735.525	14550.100	1.151
9	0.59497	11.206	17551.210	1846.208	15705.000	1.176
10	0.63532	11.966	16648.600	1972.911	16675.690	1.198
11	0.67651	12.742	19941.450	2102.478	17835.970	1.227
12	0.72276	13.613	21145.660	2248.189	18897.470	1.259
13	0.60115	11.322	18346.210	1865.604	16450.600	1.212
14	0.52095	9.810	15927.320	1613.965	14313.350	1.169
15	0.43712	6.233	13325.380	1352.415	11972.960	1.126
16	0.35643	6.751	11140.660	1107.339	10033.320	1.093
17	0.29070	5.475	9343.563	897.000	6446.563	1.070
18	0.24159	4.550	7826.777	744.775	7092.000	1.053
19	0.19330	3.641	6556.469	595.393	5961.074	1.041
20	0.15347	2.891	5548.613	472.381	5076.230	1.032
21	0.12466	2.348	4730.426	363.484	4346.941	1.026

GEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 107.10°C
DATA FROM PRESSURE TRAIISDUCER 2

THE SATURATION VAPOR PRESSURE = 1.2816 ATM. (18.83 PSIA)
DEAD VOLUME FACTOR= 0.4587

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.100554	27.5880
0.1 PO591	37.2890
0.2691 22	45.9307

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	7.5239	
THE MONOLAYER ADSORPTION I S	7966.9170	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA I S	577.1 157	SQUARE HETERS
SPECIFIC SURFACE AREA I S	1.1336	SQUARE METERS/GRAM

*** AIIALYSIS GASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.290705	48.5227
0.241587	44.9791
0.193300	40.1972
0.153473	35.71 50
0.124656	32.7606

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	5.5834	
THE MONOLAYER ADSORPTION I S	8504.6820	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	509.1001	GRAM;
THE TOTAL SURFACE APEA I S	616.0854	SQUARE HETERS
SPECIFIC SURFACE AREA I S	1.2101	SQUARE METERS/GRAM

PEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 119.79°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 1.9463 ATM. (20.60 PSIA)
DEAD VOLUME FACTOR= 0.4687

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03849	1.101	2851.551	173.766	2677.785	1.021
2	0.09963	2.850	4957.781	450.436	4507.344	1.032
3	0.19098	5.462	7615.828	E65.317	6750.508	1.047
4	0.27254	7.795	0859.910	1237.249	8622.660	1.064
5	0.34882	9.977	12172.700	1586.474	10586.220	1.088
6	0.42286	12.095	14344.260	1926.639	12417.620	1.118
7	0.49783	13.953	16297.430	2226.215	lri071.210	1.151
8	0.54577	15.639	18195.310	2498.808	15697.500	1.187
9	0.59135	16.914	19654.070	2705.557	16948.510	1.215
10	0.62460	17.865	20799.750	2860.062	17929.680	1.237
11	0.65257	18.665	21881.780	2990.189	18891.590	1.259
12	0.68506	19.594	23127.080	3141.669	19955.410	1.286
13	0.71000	20.307	24184.590	3258.094	20926.500	1.310
14	0.73041	20.891	25212.920	3353.465	21859.460	1.330
15	0.76593	21.907	26418.020	3519.728	22898.290	1.348
16	0.65531	18.743	21856.530	3002.994	18853.530	1.269
17	0.58504	16.819	19478.960	2690.183	16788.780	1.242
18	0.52450	15.002	17025.800	2395.724	14630.070	1.193
19	0.43062	12.317	14058.140	1962.397	12095.740	1.140
20	0.33437	9.564	11188.740	1520.199	9668.543	1.096
21	0.26002	7.437	8927.664	1180.054	7747.603	1.069
22	0.20459	5.852	7125.219	927.277	6197.941	1.052
23	0.15824	4.526	5706.629	716.431	4990.195	1.041
24	0.12099	3.461	4546.238	547.310	3998.929	1.033
25	0.09057	2.591	3672.734	409.411	3263.323	1.027
26	0.06927	1.981	3004.998	312.968	2692.030	1.021
27	0.05329	1.524	2491.492	240.660	2250.811	1.017

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 119.79°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAFOR PRESSURE = 1.9463 ATH. (26.60 PSIAI
DEAD VOLUME FACTOR= 0.4687

*** AIIALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.190980	34.9693
0.272538	43.4466
0.348824	50.6019

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	7.1265	
THE MONOLAYER ADSCRPTION IS	8675.5000	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	632.7722	SQUARE NETERS
SPECIFIC SURFACE AREA IS	1.2429	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.334369	51.9554
0.260017	45.3537
0.204589	41.4995
0.158242	37.6719
0.120994	34.4212

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	4.2736	
THE MONOLAYER ADSORPTION IS	9463.6050	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE ADEA IS	690.2549	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.3558	.SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 119.79°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATL'RATION VAFOR PRESSURE = 1.9463 ATM. (28.60 PSIA)
DEAD VOLUIIE FACTOR= 0.4687

NUMBER	FRESSURE OF P/P0	SYSTEM (FSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUHE (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03862	1.105	2870.181	174.364	2695.816	1.021
2	0.10044	2.873	4986.645	454.135	4532.508	1.032
3	0.19214	5.496	7652.832	870.593	6782.238	1.047
4	0.27395	7.836	9910.344	1243.712	8666.629	1.064
5	0.35384	10.035	12232.620	1595.723	10636.900	1.088
6	0.42500	12.156	14416.030	1935.526	12479.510	1.119
7	0.49035	14.025	16331.150	2237.829	14143.320	1.151
8	0.54907	15.704	18303.070	2509.450	15703.620	1.187
9	0.59340	16.972	19780.780	2715.056	17055.720	1.215
10	0.62666	17.924	20934.290	2869.602	18064.680	1.237
11	0.65493	18.732	22039.760	3001.197	19038.570	1.259
12	0.68820	19.684	23303.000	3156.290	20146.710	1.286
13	0.71371	20.413	24373.290	3275.398	21097.890	1.310
14	0.73423	21.000	25422.580	3371.325	22051.250	1.330
15	0.77195	22.079	26652.850	3547.927	23104.920	1.348
16	0.66544	19.033	22017.430	3050.147	18967.280	1.289
17	0.59935	17.143	19602.350	2742.701	16859.650	1.242
18	0.53101	15.188	17177.720	2425.825	14751.890	1.193
19	0.43759	12.516	14183.440	1994.491	12188.940	1.140
20	0.34298	9.810	11280.830	1559.686	9721.145	1.096
21	0.27002	7.723	8993.789	1225.747	7768.039	1.069
22	0.21206	6.065	7206.344	$61.312	6245.031	1.052
23	0.16522	4.726	5787.586	748.157	5039.426	1.041
24	0.12729	3.641	4618.059	575.878	4042.181	1.033
25	0.09660	2.763	3586.304	436.713	3249.500	1.027
26	0.07483	2.140	2964.885	338.129	2626.756	1.021
27	0.05808	1.661	2405.149	262.348	2142.801	1.017

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 119.79°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 1.9463 ATH. (28.60 PSIA)
DEAD VOLUME FACTOR= 0.4687

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.100444	24.6353
0.192139	35.0676
0.273952	43.5371

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	8.8884	
THE MONOLAYER ADSORPTION IS	8139.4450	HICROHOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	593.6736	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.1661	SQUARE METERS/GRAM

*** ANALYSIS EASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.342982	53.7004
0.270021	47.6164
0.212061	43.0954
0.165223	39.2751
0.127290	36.0836

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	4.1505	
THE MONOLAYER ADSORPTION IS	9341.3980	MICROMOLES
THE KEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE PREA IS	681.3413	SQUARE METERS
SFECIFIC SURFACE AREA IS	1.3383	SQUAFE METERS/GRAM

EEREA SANDSTONE NUMBER 1
UATER ADSORPTION AT 135.85°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 3.1661 ATM. (46.53 PSIA)
DEAD VOLUME FACTOR= 0.4687

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03258	3.842	4314.914	583.663	3731.251	0.976
2	0.13382	6.227	6036.086	947.445	5088.641	0.986
3	0.28243	13.141	10386.320	2009.167	5377.160	1.019
4	0.37107	17.265	13099.440	2647.454	10451.980	1.049
5	0.46411	21.595	15954.890	3321.654	12663.230	1.090
6	0.54704	25.453	18656.620	3926.271	14730.350	1.133
7	0.60360	28.065	20952.060	4340.656	16621.410	1.187
8	0.65134	30.306	22735.940	4591.742	16044.200	1.225
9	0.70202	32.664	24491.600	5065.835	19425.770	1.267
10	0.73956	34.411	25319.150	5343.E63	20475.200	1.292
11	0.78405	36.481	27275.660	5674.289	21601.370	1.315
12	0.83923	39.049	29115.580	6085.699	23029.800	1.333
13	0.62066	28.879	21701.440	4466.000	17235.440	1.228
14	0.45285	21.071	15720.060	3239.870	12480.190	1.118
15	0.32236	14.919	11609.020	2206.227	9312.797	1.063
16	0.23683	11.020	8334.602	1682.307	7152.293	1.036
17	0.16697	7.769	6706.461	1183.366	5523.094	1.020
16	0.11513	5.357	5100.117	814.627	4285.488	1.008
19	0.07719	3.502	3971.295	545.516	3425.779	1.001
20	0.05408	2.517	3156.410	381.937	2774.474	0.995

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 135.85°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 3.1661 ATM. (46.53 PSIA)
DEAD VOLUME FACTOR= *0.4687*

*** AIIALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.133825	30.3618
0.282429	46.9838

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 8.2664
THE MONOLAYER ADSORPTION IS 7858.7890 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 509.1001 GRAMS
THE TOTAL SURFACE AREA IS 578.6853 SQUARE METERS
SPECIFIC SURFACE AREA IS 1.1367 SQUARE METERS/GRAM

*** ANALYSIS EASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE1
0.322358	51.0808
0.236835	43.3892
0.166971	36.2908
0.1 15133	30.3614

THE VALUE OF "C" FACTOR IN PET ANALYSIS IS 6.1507
THE MONOLAYER ADSORPTION IS 8408.7890 MICROMOLES
THE WEIGHT OF THE SAHPLE IS 509.1001 GRAMS
THE TOTAL SURFACE AREA IS 619.1848 SQUARE METERS
SPECIFIC SURFACE AREA IS 1.2162 SQUARE METERWGRAM

GEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 135.85°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 3.1661 ATM. (46.53 PSIA)
DEAD VOLUHE FACTOR= 0.4667

NUMBER	FRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW It4 (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.08494	3.952	4262.964	600.448	3662.537	0.976
2	0.13909	6.425	5950.51 2	977.781	4972.730	0.986
3	0.28402	13.215	10284.640	2020.592	6264.250	1.019
4	0.371 61	17.300	13013.590	2652.836	10360.750	1.049
5	0.46456	21.616	15911.560	3324.936	12555.650	1.090
6	0.54745	25.473	18630.240	3929.294	14700.940	1.138
7	0.60534	26.166	20952.640	4353.414	16609.230	1.187
8	0.65326	30.396	22775.500	4705.918	18069.580	1.225
9	0.70559	32.831	24565.630	5092.230	19473.400	1.267
10	0.74419	34.627	25713.690	53713.203	20535.480	1.292
11	0.79060	36.766	27378.170	5723.035	21655.140	1.315
12	0.64713	39.417	29231.590	6144.793	23066.800	1.333
13	0.61472	26.603	21822.720	4422.371	17400.350	1.228
14	0.44636	20.862	15883.440	3207.205	12681.240	1.116
15	0.31667	14.734	11850.640	2255.263	9595.353	1.063
16	0.23046	10.723	9155.703	1636.675	7519.027	1.036
17	0.15998	7.444	7137.004	1133.563	6003.436	1.020
16	0.10993	5.117	5629.31 3	776.063	4851.246	1.008
19	0.07531	3.504	454.508	532.195	4016.31 3	1.001
20	0.05321	2.476	3772.071	375.718	3396.353	0.995

GEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 135.85°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = **3.1661** ATM. (**46.53** PSIA)
DEAD VOLUME FACTOR= **0.4587**

*** ANALYSIS BASED ON ADSCRPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.138091	32.2186
0.284021	45.0005

THE VALUE OF "C" FACTOR It4 SET ANALYSIS IS	7.2569	
THE MONOLAYER ADSORPTICN IS	7972.4450	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	587.0544	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.1531	SQUARE METERS/GRAM

*** AIIALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.316666	48.2955
0.230458	39.8289
0.159979	31.7230
0.109983	25.4727

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	a.9797	
THE MONOLAYER ADSCSPTION IS	8061.8200	MICROMOLES
THE KEIEHT OF THE SAMPLE IS	503.1001	GRAMS
TtiE TOTAL SURFACE AREA IS	553.6357	SQUARE HETERS
SFECIFIC SURFACE AREA IS	1.1660	SQUARE METERS/GRAM

EEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 147.61°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 4.4028 ATN. (64.70 PSIA)
DEAD VOLUHE FACTOR= 0.4687

NUMBER	FRESSURE P/PO	OF SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUIIE (MICROMOLES)	AMCUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02564	1.659	2522.531	244.602	2277.929	1.001
2	0.05379	3.480	3951.721	513.630	3335.091	1.008
3	0.16435	10.634	7833.199	1576.221	6C56.977	1.028
4	0.27581	17.846	11350.690	2656.918	E693.773	1.051
5	0.38040	24.613	14855.770	3660.177	11175.590	1.085
6	0.44281	28.651	17070.890	4295.094	12775.790	1.113
7	0.49684	32.147	19029.780	4S30.090	14199.690	1.142
8	0.53569	34.660	20543.720	5216.410	15327.510	1.169
9	0.56908	36.821	21857.440	5549.547	16307.900	1.193
10	0.63020	42.005	25016.440	6352.879	18663.570	1.262
11	0.71640	46.353	27851.690	7031.305	20830.390	1.323
12	0.75170	45.637	29547.330	7389.395	22157.940	1.349
13	0.78123	50.548	31112.130	7669.898	23422.230	1.367
14	0.79096	51.177	31740.290	7769.039	23951.250	1.378
15	0.67988	43.990	27514.550	6662.113	20852.430	1.335
16	0.58939	38.135	23477.550	5752.570	17724.980	1.256
17	0.50412	32.618	20127.550	4902.398	15225.160	1.184
18	0.43343	28.044	17551.820	4202.461	13349.350	1.139
19	0.36395	23.549	15116.910	3516.632	11599.280	1.106
20	0.25384	16.424	11104.390	2443.171	8661.223	1.064
21	0.16667	10.764	8119.387	150s.537	6520.848	1.040
22	0.10494	6.790	5905.078	1004.027	4991.051	1.027

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 147.61°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATLRATICN VAFOR PRESSLIRE = 4.4028 ATM. (64.70 PSIA)
DEAD VOLUME FACTOR= 0.4687

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.164354	31.4336
0.275809	43.8073

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	9.4189	
THE MONOLAYER ADSORPTION IS	8051.0110	MICROMOLES
THE UEIGHT OF THE SAKPLE IS	509.1001	GRAMS
THE TOTAL SURFACE APEA IS	597.3416	SQUARE METERS
SPECIFIC SURFACE AREA I S	1.1733	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSLIRE (P/P0)	THE FACTOR P/(1-P)X (I/MOLE)
0.253845	39.2790
0.166666	30.6707
0.104935	23.4895

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	9.3380	
THE MONOLAYER ADSORPTION IS	8459.4410	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	627.6446	SQUARE METERS
SFECIFIC SURFACE AEEA IS	1.2329	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
HATER ADSORPTION AT 147.61°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATIOII VAPOR PRESSURE = 4.4028 ATM. (64.70 PSIA)
DEAD VOLUME FACTOR= 0.4687

WISER	PRESSURE OF P/P0	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROHOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02650	1.714	2473.984	252.759	2221.225	1.001
2	0.05409	3.500	3777.367	516.507	3260.861	1.008
3	0.16305	10.550	7776.277	1543.664	6212.613	1.028
4	0.27455	17.765	11335.810	2644.746	8691.070	1.051
5	0.33070	24.632	14869.560	3683.085	11186.470	1.085
6	0.44414	28.737	17090.400	4308.176	12782.230	1.113
7	0.47920	32.300	19028.010	4853.570	14174.440	1.142
8	0.53801	34.611	20529.360	5239.512	15289.850	1.149
9	0.57140	34.971	21824.930	5572.641	16252.290	1.193
10	0.65070	42.102	24935.930	6357.973	18567.960	1.262
11	0.71702	46.393	27752.460	7037.559	20714.900	1.323
12	0.75150	48.624	29413.000	7387.371	22025.630	1.349
13	0.78101	50.533	30958.630	7687.594	23271.040	1.357
14	0.79078	51.165	31512.680	7787.188	23765.490	1.378
15	0.67117	43.427	27404.960	6574.207	20830.760	1.335
16	0.58270	37.702	23372.170	5685.672	17686.500	1.256
17	0.47653	32.260	19985.610	4847.496	15141.110	1.184
18	0.42776	27.677	17360.030	4146.484	13213.540	1.139
19	0.35719	23.111	14894.500	3452.320	11442.180	1.106
20	0.24561	15.692	11022.230	2353.114	8659.121	1.064
21	0.15876	10.272	8203.742	1522.212	6681.527	1.040
22	0.07842	6.368	6220.988	941.469	5279.520	1.027

EEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 147.61°C
DATA FROM FRESSURE TRAIJSDUCER 2

THE SATURATICN VAFOR PRESSURE = 4.4028 ATM. (64.70 PSIA)
DEAD VOLUME FACTOR= 0.4687

*** ANALYSIS **BASED ON** ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(I-P)X (1/MOLE)
0.163053	31.3586
0.274560	43.5473

THE VALUE OF "C" FACTOR It1 BET ANALYSIS I S	0.0757	
THE MCNOLAYER ADSCRFTION I S	8140.3860	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TCTAL SURFACE AQEA IS	603.9727	SQUARE METERS
SPECIFIC SURFACE AREA IS	**1.1864**	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.245609	37.5987
0.153759	28.2447

THE VALUE OF "C" FACTOR IN BET AIIALYSIS IS	10.6529	
THE MONOL4YER ADSORFTICN IS	8414.0110	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL. SUFFACE AREA IS	624.2742	SQUARE METERS
SPECIFIC SLRFACE AREA I S	1.2262	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
WATER ADSORPTIOII AT 171.70°C
DATA FROM FRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 8.1390 ATM. (119.61 PSIA)
DEAD VOLUME FACTOR= 0.4687

NUMBER	PRESSURE OF P/P0	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01017	1.217	692.377	169.564	522.813	1.030
2	0.03769	4.508	2502.670	629.359	1873.311	1.035
3	0.10159	12.151	4700.414	1702.270	2998.144	1.047
4	0.16381	19.594	7195.277	2754.835	4440.441	1.058
5	0.23536	28.510	9985.855	4025.919	3959.934	1.072
6	0.31601	37.798	13004.750	5342.277	7642.480	1.091
7	0.39832	47.643	16289.880	6792.977	9496.906	1.118
8	0.47754	57.119	19579.920	8184.578	11495.340	1.154
9	0.59691	71.397	25303.330	10309.850	14993.480	1.239
10	0.68573	82.020	29727.550	11914.430	17813.120	1.330
11	0.74698	89.347	33201.770	13033.320	20168.450	1.405
12	0.79578	95.184	36037.270	13932.150	22105.110	1.444
13	0.83569	100.316	38637.590	14728.050	23509.530	1.472
14	0.65033	102.965	40443.890	15140.620	25303.070	1.495
15	0.87730	104.934	42099.150	15448.680	26650.460	1.535
16	0.72625	65.868	33867.790	1C653.560	21214.210	1.473
17	0.61528	73.594	28104.170	10640.060	17464.110	1.363
18	0.42601	50.956	19735.600	7277.863	12457.740	1.189
19	0.50676	36.692	14485.080	5f02.367	$282.719	1.134
20	0.22472	26.679	10981.490	3792.560	7188.934	1.108
21	0.13917	16.646	749: .477	2337.069	5155.406	1.087
22	0.07760	9.282	4793.129	1298.563	3494.566	1.073
23	0.04602	5.504	3153.082	768.690	2384.393	1.064
24	0.02602	3.352	2155.306	467.658	1687.648	1.059
25	0.0 1784	2.134	1520.537	237.516	1223.021	1.056

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 171.70°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 8.1390 ATM. (119.61 PSIA)
DEAD VOLUME FACTOR= 0.4687

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.101585	37.7133
0.163814	44.1187
0.236360	52.5099
0.316012	60.4534

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	4.9790	
THE MONOLAYER ADSORPTION IS	7437.3000	MICROtIOLES
THE WEIGHT OF THE SAtIPLE IS	509.1001	GRAMS
THE TOTAL SLRFACE AREA IS	565.1250	SQUARE METERS
SFECIFIC SURFACE AREA IS	1.1100	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-PIX (1/MOLE)
0.306759	47.6693
0.224723	40.3206
0.139169	31.3590

THE VALUE OF "C" FACTCR IN BET ANALYSIS IS	6.4053	
THE MONOLAYER ADSORPTION IS	8666.2260	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAM5
THE TOTAL SURFACE AREA IS	654.1079	SQUAPE METERS
SPECIFIC SURFACE AREA IS	1.2348	SQUAFE METERS/GRAM

BEREA SANDSTONE NUMBER 1
RATER ADSORPTION AT 171.70°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAFOR PRESSURE = 8.1390 ATM. (119.61 PSIA)
DEAD VOLUME FACTOR= 0.4687

NUMBER	FRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.00990	1.164	677.234	164.963	512.271	1.030
2	0.03683	4.405	2423.45 5	614.908	1808.547	1.035
3	0.09845	11.776	5212.761	1649.484	3563.297	1.047
4	0.1591 3	19.034	7647.793	2675.327	4972.465	1.058
5	0.23330	27.905	10401.160	3939.285	6461.875	1.072
6	0.31007	37.088	13414.890	5259.637	6155.254	1.091
7	0.33273	46.975	16735.210	6695.367	10039.850	1.118
8	0.47337	56.619	20109.050	8110.930	12078.120	1.154
9	0.59460	71.121	25932.170	10268.430	15663.740	1.239
10	0.66601	82.054	30376.010	11919.550	16456.450	1.330
11	0.74669	89.312	33884.000	13027.910	20856.080	1.405
12	0.79577	95.182	36745.850	13331.91 0	22813.930	1.444
13	0.83923	100.380	39'247.710	14737.970	24609.740	I.472
14	0.661 24	103.014	41178.560	15148.490	26030.070	1.495
15	0.87787	105.002	42828.640	15459.400	27369.230	1.535
16	0.73859	68.343	34584.720	12839.360	21705.350	1.473
17	0.62766	75.074	28774.260	10863.030	17911.230	1.363
18	0.43722	52.296	20326.000	7474.51 6	12651.460	1.189
19	0.31787	38.021	15005.070	5394.484	9610.586	1.134
20	0.23562	28.183	11450.290	3979.01 3	7471.281	1.108
21	0.151 55	18.128	7881.379	2546.866	5334.51 2	1.087
22	0.08854	10.590	5217.133	1482.559	3734.574	1.073
23	0.05657	6.767	3551.156	945.613	2605.543	1.064
24	0.03858	4.614	2495.154	644.127	1851.027	1.059
25	0.02817	3.369	1805.676	470.110	1335.566	1.056

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 171.70°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAFOR PRESSURE = 8.1390 ATM. (119.61 PSIA)
DEAD VOLUME FACTCR- 0.4667

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.159129	38.0583
0.233300	47.0902
0.310074	55.1094

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	6.5588	
THE MONOLAYER ADSCRFTION IS	7506.1350	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	566.5469	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.1128	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.317675	46.4888
0.235620	41.2580
0.151555	33.4850

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	5,5395	
THE MONOLAYER ADSORPTION IS	0063.2160	MICROMOLES
THE HEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AFEA IS	665.5815	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.3467	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 172.60°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 8.3161 ATM. (122.21 PSIA)
DEAD VOLUME FACTOR= 0.4687

NUMBER	PRESSURE OF P/P0	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04364	5.334	3303.756	743.351	2560.405	0.972
2	0.12295	15.026	6533.2227	2103.606	4629.617	0.989
3	0.21476	26.246	10225.150	3694.156	6531.000	1.007
4	0.29661	36.250	13314.690	5127.391	6187.508	1.032
5	0.37139	45.399	15652.640	6449.645	9203.000	1.051
6	0.42369	51.761	17871.240	7382.160	10489.080	1.073
7	0.56772	69.382	23900.700	$984.297	13916.410	1.160
8	0.63563	77.662	27049.560	11229.610	15819.970	1.224
9	0.73618	89.971	31990.580	13096.440	18894.140	1.332
10	0.76372	93.336	33636.070	13512.620	20023.440	1.351
11	0.76376	05.785	34867.640	13989.680	20877.960	1.380
12	0.60141	97.943	35958.210	14322.870	21635.330	1.393
13	0.81550	99.665	36886.000	14589.420	22296.570	1.407
14	0.64162	102.881	38608.690	15068.830	23519.650	1.430
15	0.86051	105.164	39982.460	15444.720	24537.740	1.447
16	0.72464	88.560	33336.760	12880.740	20458.020	1.335
17	0.60177	73.543	27404.980	10607.080	16797.890	1.275
18	0.49459	60.445	22633.770	6656.652	14177.120	1.169
19	0.40353	4Q.322	19023.490	7022.695	12000.600	1.120
20	0.28269	34.549	13871.230	4892.645	6956.566	1.074
21	0.15208	18.586	E613.281	2606.346	6006.934	1.041
22	0.08615	10.528	5747.816	1470.827	4276.986	1.028
23	0.05119	6.256	4106.504	872.266	3234.233	1.019
24	0.03269	3.996	3078.345	556.512	2521.833	1.014

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 172.60°C
DATA FRCM FRESSURE TRANSDUCER 1

THE SATURATION VAPCR PRESSURE = 8.3161 ATM. (122.21 PSIA)
DEAD VOLUME FACTOR= 0.4687

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTO7 P/(1-P)X (1/MOLE)
0.122951	30.2804
0.214757	41.8758
0.296614	51.5045

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	8.9512	
THE MONOLAYER ADSORPTION IS	7264.3510	HICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SUFFACE AREA IS	548.6738	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.0777	SQUARE METERS/GRAM

*** AHALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.282694	43.8451
0.152077	29.6576

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	8.8903	
THE MONOLAYER ADSORPTION IS	8287.7500	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	625.9707	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.2296	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 172.60°C
DATA FEOM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSL'RE = 8.3161 ATM. (122.21 FSIA)
DEAD VOLUtlE FACTOR= 0.4687

NUMBER	PRESSURE OF P/PO	SYSTEM (FSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04613	5.638	3168.375	785.818	2382.555	0.972
2	0.12241	14.960	6429.781	2094.230	4335.551	0.989
3	0.20975	25.634	9504.188	3607.020	6137.168	1.007
4	0.28878	35.202	12833.350	4989.570	7849.789	1.032
5	0.36213	44.257	15177.760	6285.156	8892.605	1.051
6	0.41428	50.630	17416.570	7213.789	10202.750	1.073
7	0.56042	68.490	23637.350	9851.105	13786.250	1.160
8	0.63027	77.026	26871.180	11130.790	15740.380	1.224
9	0.73401	89.705	31971.330	13055.650	16915.480	1.332
10	0.76326	93.279	33667.420	13603.960	20063.450	1.361
11	0.76359	95.764	34962.230	13986.460	20375.770	1.390
12	0.80184	97.995	36093.160	14330.920	21762.240	1.393
13	0.61622	99.753	37059.330	14603.060	22456.260	1.407
14	0.E4355	103.092	38826.760	15121.720	23705.030	1.430
15	0.86276	105.441	40231.310	15487.830	24743.480	1.447
16	0.72664	88.828	33511.790	12921.740	20590.050	1.385
17	0.60235	73.615	27439.370	10617.800	16821.570	1.275
18	0.49307	60.260	2271'5.290	8629.211	14166.030	1.169
19	0.40045	48.940	16968.020	6966.957	12001.070	1.120
20	0.27942	34.149	13942.430	4825.156	9117.281	1.074
21	0.15158	18.525	6926.636	2597.687	6229.148	1.041
22	0.08678	10.606	6005.616	1481.734	4525.082	1.028
23	0.05211	6.368	4344.641	687.932	3456.709	1.019
24	0.03332	4.072	3276.839	567.101	2509.798	1.014

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 172.60°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 8.3161 ATM. (122.21 PSIA)
DEAD VOLUME FACTOR- 0.4687

*** ANALYSIS BASED ON ADSCRPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.122407	32.1712
0.209753	42.8305
0.288779	51.7252

THE VALUE OF "C" FACTOR IN GET ANALYSIS IS	7.5708	
THE HCNOLAYER ADSORPTION IS	7379.5420	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	557.3743	SQUARE METERS
SFECIFIC SURFACE AREA IS	1.0948	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.279421	42.5317
0.151577	25.6508

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.8360	
THE MONOLAYER ADSORPTION IS	8291.8040	MICRCIMOLES
THE WEICHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	626.2771	SQUARE METERS
SFECIFIC SURFACE AREA IS	1.2302	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 195.61°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 13.9759 ATM. (205.39 PSIA)
DEAD VOLUME FACTOR= 0.4687

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03269	6.715	2821.830	689.935	1931.895	1.020
2	0.15213	33.299	9285.461	4453.000	4827.461	1.046
3	0.29868	61.345	15851.170	6305.570	7545.605	1.076
4	0.42937	83.187	22615.750	12076.200	10539.540	1.123
5	0.57501	118.717	31333.190	16481.430	14851.760	1.210
6	0.66775	137.143	37436.180	19206.810	18229.370	1.313
7	0.75005	154.052	43045.530	21754.020	22111.510	1.430
8	0.78803	161.853	4'3554.300	22945.570	26608.720	1.548
9	0.59292	119.726	38186.110	16629.280	21558.830	1.247
10	0.50533	103.783	34166.110	14311.010	19855.090	1.198
11	0.42190	86.654	29843.520	11858.360	179S5.150	1.154
12	0.35384	73.701	26540.710	10029.960	16510.750	1.126
13	0.30278	62.188	23693.200	8422.531	15270.670	1.105
14	0.24340	49.952	20705.540	6737.188	13968.350	1.086
15	0.17365	36.692	17454.210	4918.676	12535.530	1.068
16	0.09957	20.450	13468.240	2724.249	10743.990	1.050
17	0.05047	10.366	10674.520	1375.651	9298.871	1.037
18	0.02555	5.308	9174.313	703.147	8471.164	1.028

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 195.61°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 13.9759 ATM. (205.39 PSIA)
DEAD VOLUME FACTOR= 0.4687

*** ANALYSIS BASED ON ADSCRPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.162129	40.0834
0.298680	56.4411

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	6.7979	
THE MONOLAYER ADSORPTION IS	7119.7460	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SURFACE AREA IS	547.9319	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.0763	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.302781	28.4381
0.243402	23.0311
0.176645	17.3507

THE VALUE OF "C" FACTOR IN PET ANALYSIS IS	66.3525	
THE MONOLAYER ADSORPTION IS	11030.4200	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	509.1001	GRAMS
THE TOTAL SUSFACE AREA IS	848.8960	SQUARE METERS
SPECIFIC SURFACE AREA IS	1.6674	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 1
WATER ADSORPTION AT 195.61°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAFOR PRESSURE = 13.9759 ATM. (205.39 PSIA)
DEAD VOLUME FACTOR= 0.4687

NUMBER	FRESSURE OF P/P0	SYSTEH (PSIA)	TOTAL AMOUNT FLOW IN (MICROHOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOECED (MICROMOLES)	CRFACITANCE (PICOFARADS)
1	0.03268	6.713	2828.908	889.629	1939.279	1.020
2	0.16232	33.333	9288.117	4463.219	4824.898	1.046
3	0.29963	61.335	15333.180	8304.168	7529.016	1.076
4	0.42870	88.051	22581.950	12055.760	10525.190	1.123
5	0.57669	118.445	31300.650	16441.650	14859.000	1.210
6	0.66625	155.840	37333.230	19160.890	18222.340	1.313
7	0.74850	153.733	43773.180	21705.530	22067.650	1.430
8	0.78612	161.460	49422.720	22835.320	26537.390	1.548
9	0.58173	119.481	37377.170	16593.300	20783.850	1.247
10	0.50434	103.586	33365.850	14281.820	19084.030	1.198
11	0.42142	86.556	29060.250	11844.370	17215.880	1.154
12	0.35888	73.709	25756.010	10031.070	15724.940	1.126
13	0.30319	62.272	22908.760	8434.316	14474.440	1.105
14	0.3404	50.122	19918.380	6755.063	13163.320	1.086
15	0.17943	36.e52	16568.100	4940.457	11727.640	1.068
16	0.10055	20.652	12670.650	2751.353	9919.297	1.050
17	0.05141	10.558	9861.238	1401.277	8459.961	1.037
18	0.02674	5.491	8303.254	727.414	7581.640	1.028

BEREA SANDSTONE NUMBER 1
WATER ADSCRPTION AT 195.61°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATL'RATION VAFOR PRESSURE = 13.9759 ATM. (205.39 PSIA)
DEAD VOLUME FACTOR= 0.4687

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSLIRE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.162316	40.1600
0.293631	56.5522

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 6.8258
THE MONOLAYER ADSCRFTICN IS 7097.5620 MICROMOLES
THE WEIGHT OF THE SAMFLE IS 509.1001 GRAMS
THE TOTAL SURFACE AREA IS 546.2244 SQUARE METERS
SPECIFIC SURFACE AREA IS 1.0729 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.303194	39.0612
0.244035	24.5236
0.179425	18.6447
0.100551	11.2701

THE VALUE OF "C" FACTOR IN PET ANALYSIS IS 47.7332
THE MONOLAYER ADSORPTION IS 10576.0400 MICROMOLES
THE KEIGHT OF THE SAMPLE IS 509.1001 GRAMS
THE TOTAL SURFACE AREA IS 813.9270 SQUARE METERS
SPECIFIC SURFACE AREA IS 1.5988 SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 109.50°C
DATA FROM FRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 1.3904 ATfl. (20.43 PSIA)
DEAD VOLUME FACTOR= 0.5418

NUMBER	PRESSURE P/P0	OF SYSTEM (FSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORGED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01268	0.259	1025.203	48.500	976.704	1.101
2	0.05282	1.079	2398. C04	202.244	2195.960	1.110
3	0.10353	2.115	3562.020	396.801	3166.0 19	1.120
4	0.16384	3.755	5124.992	705.666	4419.324	1.129
5	0.23246	4.750	6091.238	893.098	5198.137	1.137
6	0.29376	6.002	7302.934	1129. $58	6172.973	1.146
7	0.32124	6.564	7909.406	1236.327	6672.078	1.156
8	0.36036	7.363	9039.637	1337.905	7651.730	1.177
9	0.39736	8.119	9791.586	1531.519	8260.066	1.191
10	0.43542	8.897	10620.980	1679.464	8941.520	1.207
11	0.47454	9.696	11543.430	1831.761	9711.672	1.228
12	0.50838	10.388	12314.160	1953.673	10350.490	1.248
13	0.53799	10.993	13055.210	2079.255	10975.960	1.268
14	0.56548	11.554	13774.140	2186.706	11587.430	1.288
15	0.59615	12.181	14563.070	2306.698	12256.370	1.310
16	0.62682	12.808	15383.780	2426.849	12956.930	1.333
17	0.66066	13.499	16282.690	2559.6 10	13723.070	1.357
18	0.6881 6	14.061	17074.710	2667.618	14407.080	1.376
19	0.71143	14.536	17798.090	2759.105	15038.970	1.393
20	0.74210	15.163	18622.850	2879.841	15743.0 10	1.415
21	0.75797	15.487	19285.860	2952.360	16343.500	1.430
22	0.71 302	14.569	17974.410	2765.352	15209.050	1.406
23	0.65957	13.681	16771.740	2594.605	14177.140	1.383
24	0.62512	12.793	15494.480	2424.096	13070.380	1.357
25	0.551E8	11.277	13551.550	2133.553	11417.990	1.313
26	0.52218	10.670	12582.750	2017.528	10565.220	1.293
27	0.46487	9.499	11114.690	1794.075	9320.6 13	1.250
28	0.42240	8.631	10133.700	1628.815	8504.891	1.227
29	0.39204	7.806	9282.813	1472.018	7810.793	1.209
30	0.31934	6.525	7972.211	1228.954	6743.254	1.189
31	0.25767	5.265	6475.496	990.462	5485.031	1.169
32	0.20129	4.113	5176.918	772.909	4404.008	1.157
33	0.15559	3.200	4188.535	600.766	3587.769	t.149
34	0.12040	2.460	3396.826	461.574	2935.251	1.143
35	0.08951	1.829	2763.811	342.967	2420.844	1.139
35	0.06821	1.394	2251.658	261.230	2020.423	1.135
37	0.05329	1.089	1705.056	204.043	1701.012	1.132
38	0.04050	0.828	1618.889	155.045	1453.844	1.129
39	0.03091	0.632	1400.529	113.308	1282.221	1.127
40	0.02452	0.501	1227.361	93.822	1133.539	1.126

BEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 109.50°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 1.3904 ATM. (20.43 FSIA)
DEAD VOLUIIE FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.103534	36.4782
0.183842	50.9701
0.232457	50.2628
0.293761	67.3826
0.321244	70.9350

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 8.5107
THE MONOLAYER AOSCRPTION IS 5594.4760 MICROMOLES
THE WEIGHT OF THE SAIIPLE IS 486.2000 GRAMS
THE TOTAL SURFACE AREA IS 405.7664 SQUARE METERS
SPECIFIC SURFACE AREA IS 0.8346 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.319340	69.5750
0.257674	63.2845
0.201294	57.2263
0.156595	51.7507
0.120396	46.6315

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 4.4056
THE MONOLAYER ADSORPTION IS 6762.1600 MICRCMOLES
THE WEIGHT OF THE SAMPLE IS 485.2000 GRAMS
THE TOTAL SUPFACE AREA IS 490.4583 SQUARE HETERS
SPECIFIC SURFACE AREA IS 1.0088 SQUAF'E METERS/GRAM

BEREA SANDSTONE NUMBER 2
UATER ADSORPTION AT 109.50°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAPOR FRESSURE = 1.3904 ATM. (20.43 PSIA)
DEAD VOLUtlE FACTOR= 0.5418

NUMBER	PRESSURE OF P/P0	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01236	0.252	1023.287	47.271	976.016	1.101
2	0.05252	1.073	2334.253	201 ,082	2163.171	1.110
3	0.10273	2.099	3533.003	393.733	3139.270	1.120
4	0.16312	3.742	5085.023	702.878	4382.145	1.129
5	0.23163	4.737	6051.918	690.688	5161.227	1.137
6	0.29371	6.001	7260.672	1129.774	6130.895	1.146
7	0.32157	6.571	7864.660	1237.578	6627.082	1.156
8	0.35181	7.393	8987.844	1393.537	7594.305	1.177
9	0.39974	8.168	9733.898	1540.757	E198.141	1.191
10	0.43645	6.959	10559.500	1691.243	6878.253	1.207
11	0.47717	9.750	11476.780	1841.994	9654.793	1.228
12	0.51125	10.446	12274.080	1974.875	10299.200	1.248
13	0.54146	11.064	13013.160	2092.827	10920.330	1.268
14	0.56858	11.618	13730.670	2190.522	11531.850	1.288
15	0.59957	12.251	14516.750	2320.117	1C196.640	1.310
16	0.63058	12.884	15337.770	2441.586	12896.180	1.333
17	0.66391	13.565	16239.140	2572.357	13566.780	1.357
18	0.69182	14.136	17328.550	2631.995	14346.550	1.376
19	0.71585	14.627	17750.950	2776.519	14974.430	1.393
20	0.74532	15.229	16593.330	2892.528	15700.800	1.415
21	0.76238	15.578	19260.620	2959.753	16300.850	1.433
22	0.70629	14.472	17942.800	2746.772	15196.030	1.406
23	0.66549	13.593	16733.460	2538.551	14154.910	1.383
24	0.62111	12.691	15453.140	2404.480	13048.660	1.357
25	0.54712	11.179	13506.780	2114.935	11391.830	1.313
26	0.51751	10.574	12532.390	1999.329	10533.050	1.293
27	0.45062	9.412	11064.010	1i77.554	9286.457	1.250
28	0.41931	8.568	10081.610	1616.802	E464.809	1.227
29	0.37954	7.755	9226.445	1462.322	7766.121	1.209
30	0.31669	6.512	7910.805	1226.445	6684.359	1.169
31	0.25626	5.236	6418.754	985.001	5433.730	1.169
32	0.20033	4.103	5122.516	771.113	4351.395	1.157
33	0.15709	3.210	4137.152	602.686	3534.467	1.149
34	0.12194	2.492	3340.542	467.504	2873.038	1.143
35	0.09225	1.885	2683.153	353.464	2334.6E9	1.139
36	0.07114	1.454	2185.201	272.499	1912.702	1.155
37	0.05529	1.150	1787.351	215.555	1571.795	1.132
38	0.04535	0.727	1466.914	173.613	1293.301	1.129
39	0.03597	0.735	1212.809	137.674	1075.136	1.127
40	0.02893	0.591	1008.443	110.726	897.718	1.126

BEEEA SANDSTONE NUMBER 2
WATER ADSORPTION AT 109.50°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAFOR PRESSURE = 1.3904 ATM. (20.43 PSIA)
DEAD VOLUHE FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.102735	36.4327
0.183118	51.1548
0.231832	58.4743
0.293713	67.8295
0.321567	71.5225

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 8.6158
THE MONOLAYER ADSORPTION IS 5541.3860 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 486.2000 GRAMS
THE TOTAL SURFACE AREA IS 401.9158 SQUARE METERS
SPECIFIC SURFACE AREA IS 0.8266 SQUARE METERS/GRAM

*** ANALYSIS GASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.318692	69.9791
0.256260	63.4104
0.200829	57.7509
0.157094	52.7297
0.121939	48.3366

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 4.0793
THE MONOLAYER ADSORPTION IS 6919.5930 MICROMOLES
THE HEIGHT OF THE SAMPLE IS 456.2000 GRAMS,
THE TOTAL SURFACE AREA IS 501.8770 SQUARE METERS
SPECIFIC SURFACE AREA IS 1.0322 SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 129.14°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 2.5976 ATM. (38.17 PSIA)
DEAD VOLUME FACTOR= 0.5418

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01527	0.583	1181.968	103.318	1078.150	1.136
2	0.03902	1.489	2165.506	255.502	1900.005	1.140
3	0.06729	2.569	3021.957	458.285	2563.672	1.145
4	0.10689	4.080	3995.203	728.734	3266.469	1.150
5	0.13348	5.095	4618.273	910.687	3707.587	1.154
6	0.17647	6.737	5633.875	1205.527	4433.348	1.160
7	0.21495	8.206	6495.648	1469.987	5025.859	1.166
8	0.24891	9.502	7332.914	1703.851	5629.063	1.172
9	0.28287	10.798	8113.766	1938.204	6175.559	1.179
10	0.34966	13.348	9736.039	2400.521	7335.516	1.196
11	0.37287	14.234	10331.940	2561.607	7770.336	1.204
12	0.42263	14.136	11624.400	2908.136	8716.270	1.223
13	0.45383	17.325	12450.210	3125.254	9324.957	1.238
14	0.40573	18.924	13550.020	3418.055	10131.960	1.260
15	0.54217	20.697	14822.720	3743.409	11079.310	1.289
16	0.57841	22.080	15876.570	3998.003	11878.570	1.314
17	0.69614	23.139	16702.960	4193.320	12509.640	1.334
18	0.65543	25.020	18163.350	4540.953	13622.400	1.368
19	0.68431	26.123	19127.670	4745.250	14362.420	1.389
20	0.72395	27.636	20415.240	5026.251	15388.960	1.417
21	0.75283	28.738	21458.520	5231.473	16227.050	1.440
22	0.77152	29.452	22211.550	5364.449	16847.100	1.455
23	0.79247	30.252	23085.320	5513.727	17571.590	1.474
24	0.67364	25.715	19823.680	4669.734	15153.950	1.421
25	0.62223	23.753	18105.670	4306.582	13889.090	1.300
26	0.57418	21.918	16724.670	3968.222	12756.450	1.361
27	0.48421	18.484	13874.880	3337.411	10537.470	1.299
23	0.42756	16.322	12377.600	2942.053	9435.555	1.263
29	0.34818	13.291	10358.580	2390.272	7968.313	1.226
30	0.28745	10.973	8783.902	1969.873	6814.027	1.208
31	0.19523	7.557	6433.367	1354.993	5073.371	1.185
32	0.13354	5.113	4803.961	913.845	3S90.116	1.175
33	0.07179	3.504	3685.147	625.568	3059.579	1.170
34	0.06330	2.417	2903.866	431.056	2472.810	1.165
35	0.04506	1.720	2337.825	306.681	2031.144	1.161

BEREA SANDSTONE NUMBER 2
NATER ADSCRPTION AT 129.14°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 2.5976 ATtl. (38.17 PSIA)
DEAD VOLUtlE FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.106888	35.6389
0.133476	41.5461
0.176475	43.3353
0.21 4953	54.4799
0.246908	58.8721
0.282867	63.6712
0.349661	73.2 953

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	7.9714	
THE MONOLAYER ADSCRPTION I S	5838.9880	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	486.2000	GRAMS
THE TOTAL SURFACE AREA IS	428.2014	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8807	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	ME FACTOR P/(1-P)X (1/MOLE)
0.348183	67.0370
0.267450	59.2030
a.198232	48.6856
0.133937	39.7547

THE VALUE OF "C" FACTCR I N BET ANALYSIS I S	6.4312	
THE MONOLAYER ADSORPTION I S	6704.2960	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	484.2000	GRXIIS
THE TOTAL SURFACE AREA IS	491.6587	SGUARE METERS
SFECIFIC SURFACE AREA IS	I.0112	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 129.14°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAFOR PRESSURE = 2.5976 ATH. (38.17 PSIA)
DEPD VOLUME FACTOR= 0.5418

NUMBER	PRESSURE OF P/P0	SYSTEII (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (IIICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01447	0.552	1176.624	98.379	1078.445	1.136
2	0.03721	1.420	2156.774	253.172	1903.602	1.140
3	0.06533	2.494	3012.961	444.856	2568.095	1.145
4	0.10422	3.979	3992.191	710.512	3261.679	1.150
5	0.13030	4.974	4621.078	683.936	3732.143	1.154
6	0.1741 9	6.650	5626.102	1189.857	4435.242	1.160
7	0.21148	8.073	6480.359	1446.069	5034.239	1.166
8	0.24504	9.354	7320.695	1677.220	5643.473	1.172
9	0.27945	10.666	8093.996	1914.635	6179.359	1.179
10	0.34582	13.201	9709.624	2373.678	7335.945	1.196
11	0.35864	14.072	10301.060	2532.230	7766.836	1.204
12	0.41 804	15.958	11591.510	2875.695	6715.820	1.223
13	0.44918	17.147	12411.490	3092.760	9318.730	1.238
14	0.49030	16.716	13514.080	3380.002	10134.060	1.260
15	0.53663	20.493	14782.640	3705.942	11076.700	1.289
16	0.57298	21.673	15831.670	3959.852	11872.020	1.314
17	0.60042	22.920	16655.020	4152.898	12502.120	1.334
18	0.64907	24.777	18113.630	4496.01 2	13617.660	1.368
19	0.67775	25.873	19072.250	4696.902	14373.350	1.369
20	0.71 666	27.365	20367.680	4975.96 1	15391.720	1.417
21	0.74556	28.461	21413.070	5179.801	16233.260	1.440
22	0.76367	29.160	22174.230	5310.004	16864.230	1.455
23	0.76467	29.954	23062.940	5458.156	17604.760	1.474
24	0.66730	25.473	19810.580	4624.91 8	151G5.660	1.421
25	0.61622	23.523	16183.490	4264.230	13919.260	1.390
26	0.56502	21.683	16715.810	3924.950	12790.850	1.361
27	0.47778	10.239	13370.460	3292.507	10577.950	1.299
28	0.42076	16.062	12370.750	2694.637	9476.063	1.263
29	0.34579	13.200	10298.780	2373.677	7025.109	1.226
30	0.26493	10.877	8745.070	1952.438	6792.629	1.203
31	0.10605	7.484	6434.645	1340.01 6	5094.6 25	1.185
32	0.13215	5.045	4838.805	901.617	3937.188	1.175
33	0.09077	3.455	3739.070	618.600	3120.470	1.170
34	0.0631 8	2.412	2966.053	430.202	2535.65 1	1.165
35	0.04477	1.709	2403.619	304.726	2093.893	1.161

BEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 129.14°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 2.5976 ATM. (38.17 PSIA)
DEAD VOLUME FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.104223	35.4541
0.130300	40.1435
0.174192	47.5492
0.211476	53.2731
0.245045	57.5145
0.279454	62.7633
0.345818	72.0599

THE VALUE OF "C" FACTOR IN PET ANALYSIS IS	8.2842	
THE NONOLAYER ADSORPTION IS	5845.5190	MICROMOLES
THE NEIGHT OF THE SAMPLE IS	456.2000	GRAMS
THE TOTAL SUPFACE AREA IS	428.6804	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8817	SQUAFE METERS/GRAM

*** ANALYSIS BASED ON DESOFPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.345759	66.6943
0.284927	58.6604
0.196053	47.8667
0.132151	33.6760

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	6.9317	
THE MONOLAYER ADSORPTICN IS	6595.6000	HICROHOLES
THE UEICHT OF THE SAMPLE IS	486.2000	GRAMS
THE TOTAL SURFACE AREA IS	483.7021	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.9949	SQUARE METERS/GRAM

GEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 143.90°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATUPATICN VAPOR FRESSURE = 3.9768 ATM. (58.44 PSIA)
DEAD VOLUME FACTOR= 0.5418

NUMBER	FRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.00849	0.496	854.956	65.297	799.659	1.176
2	0.04063	2.375	2239.532	400.461	1681.072	1.160
3	0.06095	3.562	2955.006	613.185	2371.822	1.183
4	0.06427	3.756	3101.952	646.717	2455.236	1.163
5	0.076 10	4.447	3439.506	766.01 2	2673.4 94	1.184
6	0.09753	5.700	4047.107	932.520	3064.537	1.137
7	0.13597	7.946	5073.008	1371.663	3701.345	1.192
8	0.18920	11.057	6436.375	1912.444	4525.930	1.200
9	0.20029	11.706	6730.543	2025.396	4705.145	1.201
10	0.24392	14.256	7863.449	2470.638	5392.809	1.207
11	0.29274	17.108	9148.633	2070.554	6178.078	1.217
12	0.34045	19.897	10467.040	3461.007	7006.035	1.227
13	0.38409	22.448	11712.060	3911.287	7800.773	1.242
14	0.42737	24.977	13018.420	4353.309	8159.117	1.253
15	0.46840	28.544	14753.790	4993.820	9759.977	1.286
16	0.52391	30.619	15640.940	5364.449	10476.500	1.306
17	0.55757	32.566	16945.450	5716.766	11228.660	1.328
18	0.57939	33.661	17677.750	5945.699	11732.050	1.343
19	0.60047	35.093	18382.540	6167.262	12215.280	1.356
20	0.63153	36.909	19399.800	6494.492	12905.310	1.379
21	0.64707	37.617	20020.530	6658.422	13352.100	1.392
22	0.66555	38.697	20692.890	6653.844	13339.040	1.407
23	0.67738	39.588	21141.340	6979.046	14162.290	1.416
24	0.71324	41.664	22340.330	7359.410	14980.920	1.440
25	0.7431 9	43.434	23440.070	7677.895	15762.170	1.462
26	0.76684	44.817	24344.570	7930.094	16414.470	1.478
27	0.7890 1	46.112	25280.020	8166.966	17113.030	1.496
28	0.80823	47.235	26136.320	6372.648	17763.670	1.513
29	0.7541 8	44.076	24372.960	7704.992	16577.960	1.463
39	0.70939	41.459	22722.570	7318.469	15404.100	1.457
31	0.66347	36.775	21098.690	6831.832	14267.060	1.428
32	0.60208	35.167	18850.440	6184.156	12666.290	1.334
33	0.50673	29.615	15890.680	5185.004	10705.670	1.321
34	0.40200	23.494	12943.170	4096.434	6366.746	1.267
35	0.29482	17.230	9781.863	2991.912	6789.949	1.226
36	0.18627	10.886	6735.414	1882.657	4352.754	1.204
37	0.11796	6.85'4	4851.270	1189.258	3662.01 2	1.192
38	0.07484	4.374	3619.743	753.31 1	2866.432	1.185
39	0.04954	2.895	2796.950	498.170	2298.790	1.160

BEREA SANDSTONE NUMBER 2
HATER ADSORPTION AT 143.90°C
DATA FROM FRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 3.9768 ATM. (58.44 PSIA)
DEAD VOLUME FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.135067	42.5151
0.189199	51.5579
0.200290	53.2297
0.243921	59.6228
0.292736	66.994
0.340447	73.6761

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	7.7019	
THE MONOLAYER ADSORPTION IS	5748.9750	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	486.2000	GRAMS
THE TOTAL SURFACE AREA IS	425.5027	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.6752	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.294817	61.5721
0.186272	47.1715
0.117964	36.5211

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	7.9370	
THE MONOLAYER ADSORPTION IS	6206.2610	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.2000	GRAMS
THE TOTAL SURFACE AREA IS	459.3496	SQUARE PIETERS
SPECIFIC SURFACE AREA IS	0.9448	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 143.90°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATICN VAPOR PRESSURE = 3.9768 ATM. (58.44 PSIA)
DEAD VOLUME FACTOR= 0.5418

NUMBER	FRESSURE OF P/PO	SYSTEM (FSIA)	TOTAL AMOUNT FLOW IN (MICROtlOLES)	DEAD VOLUME (MICROtlOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (FICOFARADS)
1	0.00891	0.521	877.947	89.467	768.479	1.176
2	0.04132	2.41 5	2278.558	415.419	1663.139	1.160
3	0.061 86	3.615	2968.830	622.358	2345.522	1.163
4	0.05510	3.805	3034.647	655.066	2429.579	1.183
5	0.07700	4.500	3432.51 6	775.068	2657.429	1.184
6	0.09863	5.764	4034.020	793.641	3040.380	1.167
7	0.13578	7.494	5064.746	1379.890	3684.656	1.192
8	0.1901 2	11.111	6433.188	1921.792	451 1.395	1.200
9	0.20122	11.760	6728.875	2034.905	4693.069	1.201
10	0.2451 2	14.326	7862.301	2482.943	5379.355	1.207
11	0.29393	17.173	9150.543	2982.856	6167.664	1.217
12	0.341 69	19.969	10470.270	3473.782	6996.492	1.227
13	0.36539	22.524	11717.010	3924.717	7792.30 I	1.242
14	0.42657	25.047	13026.100	4371.777	6654.328	1.256
15	0.48943	28.604	14779.260	5004.539	9774.730	1.286
16	0.52531	30.701	15857.610	5379.023	10468.560	1.306
17	0.55901	32.671	16975.040	5731.902	11243.140	1.328
18	0.58104	33.953	17703.870	5962.969	11745.91 0	1.343
19	0.60224	35.197	16412.290	6185.914	12226.390	1.353
20	0.63352	37.025	19431.300	6515.383	12915.910	1.379
21	0.64902	37.931	20052.530	6679.020	13373.51 0	1.372
22	0.66724	38.995	20733.370	6871.645	13861.730	1.407
23	0.67920	39.695	21185.720	6998.328	14187.390	1.416
24	0.71510	41.793	22394.330	7379.145	15015.180	1.440
25	0.74502	43.541	23504.000	7697.4 14	15806.590	1.452
26	0.76895	44.940	24411.450	7952.645	16458.51 0	1.473
27	0. 79071	46.212	25352.980	6165.137	17167.840	1.496
28	0.81002	47.340	26209.720	8391.840	17817.880	1.513
29	0.75565	44.162	24441.340	7810.668	16630.670	1.453
30	0.71 055	41.527	22789.280	7330.820	15453.460	1.457
31	0.66662	38. E43	21 158.430	6843.984	14314.450	1.428
32	0.60324	35.256	18898.080	6196.443	12701.630	1.384
33	0.50742	29.655	15933.070	5192.188	10740.890	1.321
34	0.40304	23.555	12992.600	4107.281	8885.328	1.267
35	0.29604	17.301	9500.391	3004.459	6705.930	1.226
35	0.1 E747	10.956	6759.258	1894.650	4864.406	1.204
37	0.11906	6.953	4673.21 5	1200.333	3672.881	1.192
33	0.07595	4.439	3644.622	764.460	2880.142	1.135
39	0.05055	2.954	2822.797	506.400	2314.397	1.180

BEREA SANDSTONE NUMBER 2
WATER ADSORPTIOII AT 143.90°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 3.9768 ATM. (58.44 PSIA)
DEAD VOLUME FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSL'RE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.136778	43.0006
0.1901 17	52.0340
0.201224	53.6677
0.2451 25	60.3645
0.293934	67.4968
0.341687	74.1851

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	7.5304	
THE HONOLAYER ADSORPTION I S	5741.2100	MICRCIMOLES
THE WEIGHT OF THE SAIIPLE I S	486.2000	GRAMS
THE TOTAL SURFACE AREA IS	424.9280	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8740	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.296040	61.8803
0.187470	47.4310
0.1 19058	36.7962

THE VALUE OF "C" FACTOR I N BET ANALYSIS IS	7.9112	
THE MONOLAYER ADSORPTION I S	6198.2300	MICROIIOLES
THE WEIGHT OF THE SAMPLE I S	436.2000	GRAMS
THE TOTAL SURFACE ARE4 IS	458.7537	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.9435	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 2
WATER ADSCRPTION AT 166.05°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 7.0946 ATM. (104.26 PSIA)
DEAD VOLUME FACTOR= 0.5418

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	CEAD VOLUME (MICROMOLES)	AMOUNT ADSORPED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01304	1.360	1232.613	221.948	1010.665	1.135
2	0.06047	6.305	3162.752	1031.500	2131.251	1.141
3	0.09300	9.696	4281.301	1589.048	2602.252	1.145
4	0.14336	14.947	5890.625	2456.055	3434.570	1.150
5	0.18710	19.508	7254.357	3212.881	4041.486	1.156
6	0.22442	23.399	8456.438	3E61.462	4594.973	1.162
7	0.25515	26.706	9481.496	4414.879	5066.617	1.167
8	0.29367	30.619	10713.080	5072.109	5640.977	1.174
9	0.31669	33.018	11461.410	5476.512	5984.906	1.179
10	0.34944	36.433	12490.330	6053.941	6436.398	1.186
11	0.39183	41.166	14042.E50	6857.758	7185.094	1.199
12	0.44020	45.895	15630.560	7665.621	7964.965	1.215
13	0.47334	49.351	16818.080	8258.402	8559.688	1.228
14	0.50108	52.244	17864.370	8756.523	9107.852	1.241
15	0.52483	54.725	18761.330	9185.227	9576.113	1.252
16	0.55798	58.176	19904.640	9783.543	10211.090	1.270
17	0.60367	62.940	21778.830	10613.570	11165.260	1.300
18	0.63652	66.365	23134.670	11213.320	11921.550	1.325
19	0.66625	69.464	24411.050	11758.340	12652.700	1.352
20	0.70751	73.766	26137.930	12516.320	13619.610	1.399
21	0.76047	79.288	26451.290	13499.920	14051.370	1.459
22	0.79525	82.915	30116.440	14148.530	15947.910	1.497
23	0.84048	87.630	32306.610	14996.600	17310.010	1.547
24	0.88544	92.318	34558.260	15845.030	18713.230	1.593
25	0.92256	96.187	36478.540	16549.450	10029.000	1.630
26	0.85138	88.766	33184.650	15C01.700	17982.940	1.595
27	0.77218	80.509	29279.070	13717.000	15561.070	1.527
28	0.65927	71.865	25254.720	12181.870	13072.E40	1.448
29	0.61695	64.325	22345.540	10855.800	11492.740	1.374
30	0.51050	53.225	18434.550	8925.953	0508.605	1.260
31	0.43344	45.191	15756.640	7544.957	8211.664	1.246
32	0.35775	37.508	13096.050	6236.117	6859.941	1.218
33	0.30221	31.509	11600.140	5222.035	57i8.113	1.201
34	0.22016	22.954	8249.102	3787.264	4461.836	1.192
35	0.15135	15.781	5938.582	2594.141	3344.441	1.171
36	0.08673	9.043	3696.165	1481.512	2214.653	1.161
37	0.04562	5.069	2271.215	628.887	1442.327	1.155
38	0.03006	3.13%	1470.473	512.012	958.461	1.151
39	0.01900	1.981	E93.123	323.467	569.657	1.149
40	0.01211	1.263	512.674	206.127	306.547	1.148

BEREA SANDSTCNE NUMBER 2
WATER ADSORPTION AT 166.05°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAFCR FRESSURE = 7.0946 ATH. (104.26 PSIA)
DEAD VOLUtlE FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.143361	48.7259
0.187102	56.9511
0.224423	62.9735
0.256146	67.0643
0.293674	73.7046
0.316687	77.4378
0.349441	63.4534

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	7.4359	
THE MONOLAYER ADSCRPTICN IS	5250.4210	MICROMOLES
THE WEIGHT OF THE SAHPLE IS	466.2000	GRAMS
THE TOTAL SURFACE AREA IS	394.6179	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8116	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.332213	74.9556
0.220161	63.2734
0.151357	53.3278

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	5.5269	
THE MONOLAIER ADSCRPTICN IS	5714.3660	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.2000	GRAMS
THE TOTAL SURFACE APEA IS	429.4890	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8834	SQUAFE METERS/GRAM

BEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 166.05°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 7.0946 ATM. (104.26 PSIA)
DEAD VOLUME FACTOR= 0.5418

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01287	1.341	1221.274	218.927	1002.347	1.135
2	0.05968	6.223	3139.570	1018.039	2121.531	1.141
3	0.09184	9.576	4243.367	1569.223	2674.144	1.145
4	0.14166	14.769	5836.270	2426.651	3409.618	1.150
5	0.18484	19.271	7188.324	3173.593	4014.731	1.156
6	0.22166	23.111	8389.418	3813.359	4576.059	1.162
7	0.25318	26.397	9407.875	4362.977	5044.898	1.167
8	0.29019	30.256	10624.240	5010.965	5613.281	1.174
9	0.31274	32.607	11372.290	5407.056	5765.207	1.179
10	0.34490	35.950	12392.330	5975.727	6418.605	1.186
11	0.38972	40.633	13934.580	6766.977	7167.613	1.199
12	0.43469	45.322	15505.260	7567.203	7935.066	1.215
13	0.46731	48.723	16686.940	S150.353	8536.563	1.228
14	0.49459	51.557	17730.230	8639.895	C090.336	1.241
15	0.51806	54.014	18618.670	9062.266	0556.414	1.252
16	0.55067	57.414	19842.280	9651.109	10191.170	1.270
17	0.59574	62.113	21616.900	10469.140	11147.760	1.300
18	0.62844	65.525	225'59.400	11065.950	11873.440	1.325
19	0.65781	68.585	24228.650	11603.500	12625.170	1.352
20	0.67954	72.832	25945.260	12352.820	13592.440	1.399
21	0.75091	78.292	28241.810	13322.320	14919.490	1.459
22	0.78533	81.880	29335.500	13963.170	15932.320	1.497
23	0.82984	86.521	32073.710	14796.620	17'277.090	1.547
24	0.87443	91.170	34309.620	15636.760	18672.860	1.593
25	0.91111	94.994	36216.670	16331.730	19886.940	1.630
26	0.84325	87.919	32923.660	15045%.750	17874.910	1.505
27	0.76415	79.672	29053.810	13568.410	15455.400	1.527
28	0.68226	71.134	25064.510	12052.800	13011.710	1.448
29	0.61129	63.735	22165.410	10752.480	11412.920	1.374
30	0.50626	52.784	18269.870	88'19.777	0420.102	1.280
31	0.42993	44.825	15611.320	7482.246	8129.074	1.246
32	0.35694	37.215	12960.600	6186.461	6774.145	1.218
33	0.29961	31.238	10870.530	5176.344	5674.163	1.201
34	0.21816	22.746	8123.832	3752.525	4371.305	1.182
35	0.14979	15.617	5821.219	2567.010	3254.209	1.171
36	0.08615	6.982	3567.374	1471.442	2095.932	1.161
37	0.04762	4.965	2203.796	811.768	1392.028	1.155
38	0.02849	2.970	1414.120	485.188	928.932	1.151
39	0.01854	1.033	650.985	315.531	535.454	1.149
40	0.01241	1.294	461.209	211.181	250.028	1.148

GEREA SANDSTONE NUMBER 2
WATER LDSCRPTION AT 166.05°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 7.0946 ATM. (104.26 PSIA)
DEAD VOLUtlE FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.141657	48.4030
0.164837	56.4790
0.221650	62.2337
0.2531 76	67.1971
0.290190	72.8320
0.312741	76.2848
0.344898	82.0241

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 7.2244
THE MONOLAYER ADSORFTION IS 5319.4580 MICROtIOLES
THE WEIGHT OF THE SAIIPLE IS 486.2000 CRAMS
THE TOTAL SURFACE AREA IS 399.8088 SQUARE METERS
SPECIFIC SURFACE AREA IS 0.8223 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.299612	75.1255
0.218165	63.8349
0.149787	54.1 376

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS 5.2173
THE MONOLAYER ADSORPTION IS 5772.3120 MICROMOLES
THE WEIFHT OF THE SAMPLE IS 485.2000 GRAMS
THE TOTAL SURFACE AREA IS 433.8428 SQUARE METERS
SFECIFIC SURFACE AREA IS 0.8923 SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 2
NATER ADSORPTION AT 188.26°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 11.9141 ATM. (175.09 PSIA)
DEAD VOLUNE FACTOR= 0.5418

NUMBER	PRESSURE P/PO	OF SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROHOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02663	4.663	2124.871	725.326	1399.545	1.145
2	0.03848	6.737	2735.237	1048.671	1686.566	1.147
3	0.08450	14.776	4855.402	2310.657	2555.746	1.154
4	0.13722	24.026	7173.281	3766.247	3407.035	1.161
5	0.15661	27.420	7937.777	4304.324	3693.453	1.164
6	0.17661	30.922	8850.145	4861.152	3988.992	1.167
7	0.23240	40.690	11240.270	6423.309	4816.969	1.176
8	0.26916	47.127	12807.830	7460.020	5347.820	1.162
9	0.30455	53.323	14337.570	8463.496	5874.078	1.139
10	0.35303	61.819	16433.360	$849.012	6554.352	1.200
11	0.37879	66.322	17604.660	10587.640	7017.020	1.207
12	0.40817	71.465	18951.580	11435.390	7516.199	1.217
13	0.43235	75.701	20117.940	12136.610	7981.324	1.226
14	0.47968	83.987	22341.490	13516.950	8824.531	1.244
15	0.52165	91.334	24382.740	14750.540	9632.195	1.265
16	0.57436	100.564	27009.620	15313.420	10606.190	1.296
17	0.60248	105.487	28396.480	17153.250	11243.230	1.315
16	0.63601	111.357	30113.640	18160.510	11953.330	1.341
19	0.67018	117.340	31699.500	19193.790	12705.700	1.371
20	0.71331	124.893	34220.930	20507.920	13713.000	1.422
21	0.75714	132.566	35550.400	21654.660	14795.710	1.488
22	0.78714	137.819	38405.230	22763.600	15621.620	1.525
23	0.81180	142.137	39992.210	23551.440	16440.760	1.565
24	0.78609	137.635	38654.230	22750.880	15903.350	1.546
25	0.74041	129.636	36152.190	21339.100	14613.090	1.505
26	0.64730	113.334	31405.120	18501.270	12703.840	1.416
27	0.58486	102.401	28345.600	16626.360	11719.240	1.331
28	0.49419	86.526	24107.660	13942.270	10165.390	1.278
29	0.40094	70.199	19801.240	11226.340	8574.902	1.233
30	0.33479	58.617	16701.270	9325.531	7375.746	1.215
31	0.24721	43.583	12604.000	6840.102	5963.902	1.194
32	0.19765	34.607	10634.150	5446.891	5135.266	1.185
33	0.13505	23.645	7924.008	3705.971	4218.035	1.174
34	0.07703	13.486	5312.953	2105.051	3207.903	1.164
35	0.04148	7.563	3569.040	1130.885	2435.155	1.157
36	0.02386	4.178	2550.837	649.743	1901.094	1.154
37	0.01417	2.462	1638.996	355.676	1453.321	1.152

BEREA SANCSTONE NUMBER 2
WATER ADSORPTION AT 188.26°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATICN VAFOR PRESSURE = 11.9141 ATM. (175.09 PSIA)
DEAD VOLUME FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.1 37221	46.6813
0.156605	50.2738
0.176607	53.7696
0.232400	62.8532
0.269165	68.8686
0.304549	74.5505

THE VALUE OF "C" FACTOR I N 8ET ANALYSIS IS	7.8237	
THE MCNOLAYER ADSORPTION IS	5266.91 00	MICROMOLES
THE KEIGHT OF THE SAMPLE I S	486.2000	GRAMS
THE TOTAL SURFACE AREA I S	402.8110	SQUARE HETERS
SFECIFIC SURFACE AREA I S	0.8285	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.334787	68.2341
0.247206	55.0620
0.197654	47.5 086
0.135046	37.0149

THE VALUE OF "C" FACTOR I N BET ANALYSIS IS	10.5258	
THE MONOLAYER ADSORPTICN I S	5811.8160	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.2000	GRAMS
THE TOTAL SUSFACE AREA IS	444.4854	SQUARE METERS
SPECIFIC SURFACE AREA I S	0.91 42	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 2
HATER ADSORPTION AT 188.26°C
DATA FRCM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 11.9141 ATM. (175.09 PSIA)
DEAD VOLUME FACTOR= 0.5418

NUMEER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMCUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02642	4.626	2117.074	719.562	1397.51 2	1.145
2	0.03816	6.681	2728.106	1040.006	1688.099	1.147
3	0.08408	14.722	4863.199	2299.054	2564.146	1.154
4	0.13662	23.920	7172.172	3749.544	3422.628	1.161
5	0.15584	27.286	8006.141	4283.066	3723.074	1.164
6	0.17593	30.61 2	8856.961	4843.648	4013.31 3	1.167
7	0.23152	40.537	11249.090	6398.695	4850.398	1.176
8	0.26820	46.959	12816.000	7432.754	5383.250	1.182
9	0.30351	53.140	14352.750	8433.879	5918.871	1.189
10	0.35185	61.605	16458.680	9613.945	6644.738	1.200
11	0.37759	66.111	17639.320	10553.080	7086.238	1.207
12	0.40683	71.232	18398.650	11396.800	76P2.059	1.217
13	0.43116	75.491	20163.330	12101.910	8061.418	1.226
14	0.47829	83.743	22390.860	13476.250	8914.605	1.244
15	0.52026	91.091	24432.1P0	14709.660	9722.523	1.265
16	0.57278	100.286	27068.410	16266.220	10802.190	1.296
17	0.60079	105.190	26453.030	17102.580	11350.440	1.315
18	0.63425	111.050	30179.900	18107.700	12072.190	1.341
19	0.66541	117.031	31072.010	19140.260	12831.750	1.371
20	0.71 156	124.586	34291.400	20454.400	13837.000	1.422
21	0.75521	132.228	36724.430	21795.130	14929.300	1.488
22	0.78505	137.454	33438.460	22718.760	15769.690	1.525
23	0.60972	141.772	40074.260	23486.440	16587.8 20	1.565
24	0.78467	137.336	38744.260	25706.760	16037.500	1.546
25	0.73894	129.379	36247.070	21293.890	14953.1 YO	1.505
26	0.64600	113.107	31504.980	18462.100	13042.870	1.416
27	0.58375	102.208	28440.660	16593.440	11847.220	1.331
28	0.49301	66.320	24217.060	13907.780	10309.280	1.278
29	0.40009	70.051	19913.260	11201.820	8711.449	1.238
30	0.33420	58.514	16806.830	9308.648	7496.184	1.215
31	0.24682	43.216	12909.140	6829.293	6079.848	1.194
32	0.19730	34.544	10736.980	5438.879	5298.105	1.185
33	0.13490	23.619	8024.859	3701.813	4323.043	1.174
34	0.07703	13.486	5409.059	2105.051	3304.008	1.164
35	0.041 47	7.261	3661.370	1130.515	2530.855	1.157
36	0.02389	4.183	2643.856	650.530	1993.326	1.154
37	0.01423	2.492	1929.210	387.195	1542.01 5	1.152

EEREA SANDSTONE NUMBER 2
WATER ADSORPTION AT 188.26°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAFOQ PRESSURE = 11.9141 ATM. (175.09 PSIA)
DEAD VOLUME FACTOR= 0.5418

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FEESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.136618	46.2322
0.155840	49.5554
0.175979	53.2131
0.231525	62.1141
0. E68200	68.0804
0.303507	73.6231

THE VALUE OF "C" FACTOR I N BET ANALYSIS IS 7.7876
THE MONOLAYER ADSORPTION I S 5324.7500 MICROMOLES
THE WEIGHT OF THE SAMPLE I S 486.2000 GRAMS
THE TOTAL SUPFACE AREA I S 407.2349 SQUARE METERS
SPECIFIC SURFACE AREA I S 0.8376 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSUEE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.3341 96	66,9419
0.246823	53.9007
0.197296	46.3918
0.1348%	36.0694

THE VALUE OF "C" FACTOR I N BET ANALYSIS IS 10.9077
THE MONOLAYER ADSORFTION I S 5883.8160 MICROMOLES
THE KEIGHT OF THE SAMPLE I S 486.2000 GRAMS
THE TOTAL SUFFACE AREA I S 449.9919 SQUARE IIETERS
SFECIFIC SURFACE AREA IS 0.9255 SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 104.73°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 1.1612 ATM. (17.36 PSIA)
DEAD VOLUME FACTOR- 0.5265

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORGED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.00249	0.043	151.118	7.953	143.166	1.225
2	0.01368	0.237	670.429	43.747	826.681	1.228
3	0.04849	0.842	2047.113	155.201	1891.911	1.235
4	0.13057	2.267	3594.492	418.470	3176.022	1.253
5	0.18405	3.195	4659.355	590.414	4079.442	1.266
6	0.25869	4.491	6293.813	830.896	5462.914	1.288
7	0.31840	5.527	7582.254	1023.757	6558.496	1.312
8	0.36444	6.326	8464.648	1172.707	7291.941	1.532
9	0.40425	7.017	9317.531	1301.736	8015.793	1.356
10	0.42914	7.449	9993.761	1382.472	8611.488	1.376
11	0.46149	8.011	10636.620	1487.545	9199.082	1.401
12	0.48887	8.486	11418.610	1576.552	9842.059	1.429
13	0.51998	9.026	12120.530	1677.805	10442.720	1.459
14	0.54437	9.459	12815.370	1758.892	11056.470	1.490
15	0.57101	9.912	13479.910	1844.116	11635.800	1.521
16	0.59539	10.388	14276.970	1933.486	12343.480	1.560
17	0.63822	11.079	15166.490	2063.647	13104.640	1.607
18	0.66560	11.554	15998.680	2153.247	13845.430	1.653
19	0.69672	12.035	16775.360	2255.174	14520.180	1.698
20	0.72411	12.570	17482.720	2344.969	15137.750	1.739
21	0.74776	12.980	18104.990	242: .594	15632.390	1.776
22	0.77017	13.369	18688.790	2406.203	16192.580	1.811
23	0.69204	12.013	16224.840	2239.846	13994.990	1.712
24	0.60839	10.561	13981.390	1066.147	12015.240	1.606
25	0.51093	8.859	11407.650	1648.347	9759.305	1.491
26	0.41091	7.133	9031.441	1323.323	7705.117	1.392
27	0.31707	5.504	7116.047	1019.439	6098.605	1.327
28	0.24321	4.309	5626.973	797.087	4829.883	1.288
29	0.19434	3.374	4442.664	623.538	3819.126	1.265
30	0.15049	2.612	3526.309	482.461	3043.847	1.250
31	0.11414	1.951	2831.735	365.693	2466.043	1.239
32	0.08404	1.459	2320.546	269.141	2051.405	1.230
33	0.06147	1.067	1946.600	196.777	1750.023	1.225

BEREA SANDSTONE NUMBER 3
WATER ADSCRFTION AT 104.73°C
DATA FROM FRESSURE TRANSDUCER 1

THE SATURATION VAFOR PRESSURE = 1.1612 ATM. (17.36 PSIA)
DEAD VOLUME FACTOR- 0.5265

*** ANALYSIS GASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.130571	47.2855
0.164052	55.2940
0.258667	63.8775
0.316401	71.2265

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	5.0004	
THE MONOLAYER ADSORPTION I S	6366.02 10	MICROMOLES
THE UEIGHT OF THE SAMPLE I S	456.6001	GRAMS
THE TOTAL SURFACE AREA IS	460.6'526	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.9467	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.31 7066	76.1272
0.248206	68.3559
0.194344	63.1622
0.150486	56.1973
0.1 14135	52.2459

THE VALUE OF "C" FACTOR IN BET ANALYSIS I S	3.8355	
THE MONOLAYER ADSORPTION IS	6478.6750	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	456.6001	GRAMS
THE TOTAL SUCFACE AREA IS	468.7383	SQUARE HETERS
SFECIFIC SURFACE AREA IS	0.9633	SQUAEE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 104.73°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATICN VAPOR PRESSURE = 1.1812 ATM. (17.36 PSIA)
DEAD VOLUtIE FACTOR= 0.5265

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROtIOLES)	DEAD VOLUNE (MICROMOLES)	AMOUNT ADSOEEED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.00182	0.032	154.659	5.813	148.846	1.225
2	0.01272	0.221	879.908	40.701	839.207	1.228
3	0.04636	0.605	2068.050	140.356	1919.684	1.235
4	0.12820	2.225	3624.019	410.858	3213.161	1.253
5	0.18187	3.157	4700.992	583.402	4117.590	1.266
6	0.25741	4.468	6321.457	8C6.764	5494.691	1.288
7	0.31203	5.417	7652.008	1003.148	6643.859	1.312
8	0.36575	6.349	8539.684	1176.969	7362.711	1.332
9	0.40765	7.076	9339.367	1312.755	8076.609	1.356
10	0.43589	7.567	10045.070	1404.392	8643.676	1.376
11	0.46960	8.152	10741.570	1513.906	9227.672	1.401
12	0.50058	8.690	11464.250	1614.668	9849.586	1.429
13	0.53340	9.259	12159.570	1721.500	10438.070	1.459
14	0.56074	9.734	12833.650	1810.632	11028.020	1.490
15	0.58900	10.225	13495.800	1902.846	11592.960	1.521
16	0.62000	10.763	14273.220	2004.101	12269.120	1.560
17	0.65195	11.491	15160.300	2141.300	13019.000	1.607
18	0.69205	12.013	15334.270	2239.873	13734.390	1.653
19	0.72489	12.584	16749.350	2347.541	14401.800	1.698
20	0.75500	13.106	17451.030	2446.369	15004.660	1.739
21	0.78054	13.550	18079.070	2530.320	15548.750	1.776
22	0.80245	13.930	16667.600	2602.344	16065.250	1.811
23	0.63342	11.864	16190.210	2211.577	13978.630	1.712
24	0.60089	10.431	13927.030	1941.656	11985.370	1.608
25	0.50548	8.775	11339.330	1630.591	9703.738	1.491
26	0.40542	7.035	8954.754	1305.531	7649.223	1.392
27	0.31266	5.427	7015.563	1005.188	6040.371	1.327
28	0.24374	4.231	5558.977	782.686	4776.269	1.288
29	0.18950	3.290	4404.250	607.952	3796.288	1.265
30	0.14629	2.539	3513.523	468.968	3044.555	1.250
31	0.11042	1.917	2841.613	353.760	2487.853	1.239
32	0.08006	1.390	2354.685	256.368	2098.317	1.230
33	0.05798	1.006	2002.189	185.589	1816.600	1.225

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 104.73°C
DATA FRCM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 1.1812 ATM. (17.36 PSIA)
DEAD VOLUME FACTOR= 0.5265

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.128201	45.7659
0.181873	53.9889
0.257406	63.0846
0.312026	68.2138

TtiE VALUE OF "C" FACTOR IN BET ANALYSIS IS	4.9332	
THE MONOLAYER ADSORPTION IS	6544.2070	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	473.4795	SQUARE METERS
SFECIFIC SURFACE AREA IS	0.9730	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.312658	75.3065
0.243740	67.4784
0.189505	61.5900
0.146288	56.2824
0.110418	49.8918

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	4.2552	
TtiE MONOLAYER ADSORPTION IS	6253.4840	MICROMOLES
THE EIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SCRFACE AREA IS	452.4453	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.9298	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
HATER ADSORPTION AT 131.35°C
DATA FFOM PRESSURE TRANSDUCER 1

THE SATURATICN VAFOR PRESSURE = 2.7748 ATM. (40.78 PSIA)
DEAD VOLUME FACTOR= 0.5265

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03705	1.511	2224.936	260.311	1954.625	1.203
2	0.10059	4.102	3957.208	707.972	3249.236	1.221
3	0.17844	7.277	5705.281	1258.810	4446.469	1.240
4	0.23830	9.718	7034.422	1684.097	5350.324	1.256
5	0.28970	11.814	81Q4.473	2050.469	6144.000	1.276
6	0.35541	14.493	9722.582	2520.577	7202.004	1.306
7	0.40523	16.5'25	11036.980	2878.281	8158.703	1.340
8	0.52131	21.259	13990.000	3716.155	10273.840	1.444
9	0.59235	24.155	15992.900	4231.973	11760.930	1.536
10	0.64377	26.252	17483.610	4606.875	12876.740	1.609
11	0.67611	27.571	18525.280	4643.301	13681.980	1.661
12	0.71004	28.955	19550.980	5091.898	14559.080	1.717
13	0.75457	30.770	21137.660	5419.039	15718.820	1.801
14	0.78319	31.938	22050.260	5629.852	16430.410	1.856
15	0.80492	32.824	22924.300	5790.188	17134.110	1.901
16	0.81870	33.386	23572.600	5891.984	17680.620	1.939
17	0.69243	28.237	19755.410	4962.840	14792.570	1.781
18	0.56978	23.235	15673.230	4067.821	11605.400	1.604
19	0.43354	20.126	13217.340	3515.139	9702.203	1.497
20	0.33072	13.486	9186.180	2343.708	6042.469	1.360
21	0.23293	9.499	6623.121	1645.833	4077.265	1.303
22	0.15415	6.286	4703.730	1055.662	3622.063	1.276
23	0.10513	4.287	3402.910	740.003	2662.907	1.260
24	0.07046	2.873	2461.793	495.498	1966.296	1.247
25	0.04912	2.003	1506.138	345.202	1460.936	1.239
26	0.03471	1.415	1343.034	243.824	1099.210	1.232

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 131.35°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATLRATICN VAPOR PRESSURE = 2.7748 ATM. (40.78 PSIA)
DEAD VOLUME FACTOR- 0.5265

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.100589	34.4200
0.178443	48.8478
0.238304	58.4750
0.289699	66.3826

THE VALUE OF "C" FACTOR IN PET ANALYSIS IS	10.4167	
THE MONOLAYER ADSCRPTION IS	5350.4140	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	392.6936	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.6074	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.330719	72.2168
0.232927	61.0086
0.154150	50.3147
0.105126	44.1155

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	5.0249	
THE MONOLAYER CDSCRFTION IS	6392.0420	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	469.3831	SQUAF'E METERS
SPECIFIC SURFACE AREA IS	0.9646	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 131.35°C
DATA FROM FRESSUQE TRANSDUCER 2

THE SATURATION VAFOR PRESSURE = 2.7748 ATH. (40.78 PSIA)
DEAD VOLUtlE FACTOR- 0.5265

NUMBER	FRESSURE OF P/PO	SYSTEN (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03522	1.436	2246.922	247.394	1993.527	1.203
2	0.09834	4.010	3959.626	692.094	3297.533	1.221
3	0.17508	7.140	5752.460	1234.975	4517.484	1.240
4	0.23443	9.560	7099.840	1656.557	5443.281	1.256
5	0.28489	11.618	8282.520	2016.160	6266.359	1.276
6	0.34975	14.263	9827.539	2450.024	7347.512	1.306
7	0.39794	16.227	11174.750	2825.842	8348.91 0	1.340
8	0.51 381	20.953	14151.120	3661.838	10489.280	1.444
9	0.55502	23.857	16167.550	4178.680	11988.900	1.536
10	0.63563	25.920	17679.390	4547.434	13131.960	1.609
11	0.66717	27.206	18748.050	4777.883	13970.170	1.661
12	0.70027	28.556	17895.640	5020.266	14875.370	1.717
13	0.74467	30.367	21402.920	5346.273	16056.650	1.801
14	0.77233	31.495	22359.190	5549.828	16309.360	1.856
15	0.79415	32.385	23234.660	5710.676	17523.980	1.901
16	0.60701	32.909	23907.960	5805.570	18102.390	1.939
17	0.69460	28.325	20046.910	4978.746	15068.160	1.781
18	0.571 80	23.317	15970.100	4062,492	11857.610	1.604
19	0.49320	20.112	13527.190	3512.692	10014.490	1.497
20	0.331 11	13.502	9472.816	2346.500	7126.31 6	1.360
21	0.23314	9.507	6903.230	1647.381	5255.848	1.303
22	0.15460	6.305	4979.488	1069.863	3889.626	1.276
23	0.10493	4.279	3670.602	538.632	2931.969	1.260
24	0.07089	2.891	2723.625	498.478	2225.347	1.247
25	0.04935	2.013	2065.051	346.844	1718.207	1.239
26	0.03526	1.438	1594.643	247.670	1346.973	1.232

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 131.35°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 2.7748 ATM. (40.78 PSIA)
DEAD VOLUIIE FACTOR= 0.5265

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-PIX (1/MOLE)
0.175084	46.9829
0.234434	56.2571
0.284893	63.5764
0.349752	73.2050

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	8.1525	
THE MONOLAYER ADCORPTICN IS	5860.9170	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	430.3013	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8845	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-PIX (1/MOLE)
0.331109	69.4626
0.233145	57.8455
0.154602	47.0161
0.104932	39.9844

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	5.6616	
THE KONOLAYER ADSORPTION IS	6363.8000	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	467.3093	SQUAF'E METERS
SPECIFIC SURFACE AREA IS	0.9604	SQUAF'E METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 145.97°C
DATA FROM FRESSURE TRANSDUCER 1

THE SATURATION VAFOR PRESSL'RE = 4.2102 ATM. (61.87 PSIA)
DEAD VOLUME FACTOR- 0.5265

NUMBER	FRESSURE OF SYSTEM P/FO	(PSIA)	TOTAL AMOUNT FLON IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02337	1.446	1546.745	240.414	1306.330	1.248
2	0.05722	3.540	2891.324	559.295	2302.030	1.257
3	0.08445	5.225	3715.481	870.542	2844.939	1.266
4	0.13646	8.443	5117.332	1409.550	3707.782	1.277
5	0.17278	10.690	6044.551	1757.138	4257.410	1.285
6	0.22237	13.758	7358.750	2304.524	5054.223	1.297
7	0.25625	15.655	8320.320	2659.166	5641.152	1.308
8	0.29048	17.973	9235.621	3018.483	6217.137	1.321
9	0.321 58	19.897	10090.120	3345.684	6744.441	1.334
10	0.35447	23.788	11917.420	4010.026	7907.395	1.370
11	0.43338	26.814	13361.400	4529.160	8832.242	1.407
12	0.49278	30.489	15276.860	5162.395	10114.470	1.465
13	0.5381 9	33.299	16783.820	5648.770	11135.050	1.522
14	0.60561	37.471	18992.140	63i4.313	12617.830	1.616
15	0.66848	41.360	21219.650	7054.727	14164.920	1.720
16	0.71072	43.974	22907.000	7514.168	15394.830	1.797
17	0.75785	46.890	24597.900	8028.746	16569.160	1.879
18	0.79309	49.071	26t23.460	8415.098	17708.370	1.949
19	0.75673	46.821	24916.640	8016.535	16900.110	1.895
20	0.66707	42.510	22542.120	7256.680	15265.440	1.791
21	0.60205	37.250	19504.890	6335.867	13169.020	1.660
22	0.43908	30.261	16007.830	5122.938	10884.900	1.513
23	0.36297	22.453	12395.370	3782.597	6615.793	1.397
24	0.26589	16.451	9540.039	2760.279	6779.758	1.334
25	0.15541	11.472	7258.484	1918.726	5339.758	1.299
26	0.1 1634	7.193	5280.250	1200.782	4079.463	1.273

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 145.97°C
DATA FROH FRESSUFE TRANSDUCER 1

THE SATURATION VAPOR PRESSURE = 4.2102 ATfl. (61.87 PSIAI
DEAD VOLUME FACTOR= 0.5265

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.136461	42.6198
0.172775	49.0583
0.222368	56.5775
0.256249	60.8598
0.290464	65.852 1
0.321577	70.2810

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	7.3534	
THE MONOLAYER ADSORPTION IS	5866.7570	MICROIIOLES
THE WEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	434.8093	SQUARE EIETERS
SFECIFIC SURFACE AREA IS	0.8936	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.265893	53.4235
0.185407	42.6248
0.116339	32.2727

THE VALUE CF "C" FACTO? IN 6ET ANALYSIS IS	9.7994	
THE MONOLAYER ADSORPTION IS	63%. OS90	MICROMOLES
THE EIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	471.2239	SQUARE METERS
SFECIFIC SURFACE AREA IS	0.9684	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 145.97°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAFOR FRESSURE = 4.2102 ATM. (61.87 PSIA)
DEAD VOLUME FACTOR= 0.5265

NUMBER	PRESSURE OF SYSTEM P/PO	(FSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOPPED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02321	1.436	1552.183	238.728	1313.460	1.248
2	0.05741	3.552	2807.761	591.226	2306.535	1.257
3	0.08499	5.25s	3722.287	876.165	2645.122	1.266
4	0.13661	8.452	5138.871	1411.109	3727.762	1.277
5	0.17267	10.684	6076.934	1766.063	4290.867	1.285
6	0.22232	13.756	7402.629	2304.034	5008.504	1.297
7	0.25715	15.910	8358.375	2663.589	5669.785	1.308
8	0.29174	18.050	9265.632	3031.637	6234.191	1.321
9	0.32249	19.953	10129.510	3355.331	6774.1E4	1.334
10	0.38532	23.641	11974.460	4019.093	7955.367	1.370
11	0.43458	26.689	13420.400	4541.953	8878.449	1.407
12	0.49414	30.573	15341.690	5176.930	10164.760	1.465
13	0.54061	33.449	16843.880	5674.734	11169.140	1.522
14	0.60842	37.644	19051.100	6404.609	12646.490	1.616
15	0.67136	41.539	21287.000	7086.012	14200.990	1.720
16	0.71400	44.177	22954.440	7549.910	15434.530	1.797
17	0.76127	47.102	24699.910	8066.223	16633.690	1.879
18	0.79697	49.311	26237.450	8457.715	17779.740	1.949
19	0.76066	47.064	25016.510	S059.562	16956.920	1.895
20	0.69081	42.742	22634.630	7297.414	15337.410	1.791
21	0.60583	37.484	195'18.530	6376.613	13211.910	1.660
22	0.49260	30.478	16077.790	5160.504	10917.280	1.513
23	0.36635	22.667	12462.870	3818.311	8644.559	1.397
24	0.26936	16.666	9588.746	2796.650	6792.094	1.334
25	0.18917	11.704	7289.055	1957.958	5331.094	1.299
26	0.12070	7.468	5295.625	1246.024	4049.601	1.273

GEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 145.97°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAFOR PRESSLTE = 4.2102 ATM. (61.87 PSIA)
DEAD VOLUME FACTOR= 0.5265

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.135611	42.4454
0.172672	48.6406
0.222321	56.0699
0.257145	60.8335
0.291736	66.0714
0.322492	70.2664

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	7.5668	
THE MONOLAYER ADSORPTION IS	5838.8160	MICROIIOLES
THE UEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AEEA IS	432.7355	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8893	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.269359	54.2781
0.169170	43.7629
0.120702	33.6974

THE VALUE OF "C" FACTOR IN EET ANALYSIS IS	8.8059	
THE MONOLAYER ADSCRFTICN IS	6473.7530	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SUPFACE AEEA IS	479.7364	SQUAF'E METERS
SPECIFIC SURFACE AREA IS	0.9860	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 162.13°C
DATA FROH FRESSURE TRANSDUCER 1

THE SATURATION VAFOR PRESSURE = 6.4347 ATM. (94.56 PSIAI
DEAD VOLUME FACTOR= 0.5265

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03059	2.893	2000.414	463.295	1537.119	1.253
2	0.07215	6.823	3577.434	1094.988	2632.446	1.264
3	0.10596	10.020	4657.035	1610.743	3076.292	1.272
4	0.12401	11.727	5233.004	1886.806	3352.198	1.275
5	0.16149	15.271	6388.664	2461.596	3927.068	1.262
6	0.16046	17.065	6964.051	2753.370	4210.660	1.287
7	0.22732	21.496	6438.945	3476.537	4962.406	1.301
8	0.25132	23.766	9227.930	3848.339	5379.590	1.309
9	0.30024	28.392	10768.650	4603.016	6159.641	1.327
10	0.3491 6	33.018	12392.600	5373.637	7018.973	1.350
11	0.37408	35.374	13294.400	5764.605	7523.883	1.366
12	0.40630	38.422	14453.620	6271.887	8181.742	1.337
13	0.47644	45.054	16925.940	7382.355	9543.566	1.448
14	0.58829	55.631	20902.120	9171.840	11730.280	1.556
15	0.68813	65.073	24977.650	10789.370	14188.280	1.761
16	0.74299	70.261	27441.660	116E6.680	15755.170	1.661
17	0.79007	74.712	30091.000	12461.560	17629.430	1.962
16	0.73308	69.324	27940.920	11524.180	16416.740	1.873
19	0.44659	42.232	17232.780	6908.695	10324.000	1.475
20	0.32683	30.907	13265.330	503.098	8261.238	1.381
21	0.19043	18.008	6584.992	2907.01 1	5677.980	1.309
22	0.10595	10.019	5876.809	1610.543	4266.262	1.280
23	0.061 19	5.786	4292.648	928.130	3364.519	1.262
24	0.03798	3.591	5305.724	575.357	2730.347	1.251
25	0.02348	2.221	2630.438	355.538	2274.900	1.245

EEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 162.13°C
DATA FROM FRESSURE TRANSDUCER 1

THE SATURATION VAPOR FRESSURE = 6.4347 ATM. (94.56 PSIA)
DEAD VOLUME FACTOR= 0.5265

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.105962	36.5272
0.124013	42.2317
0.161491	49.0423
0.180461	52.2950
0.227320	59.2651
0.251323	62.4007
0.30035	69.6585
0.349163	76.4333

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 7.5529
THE MONOLAYER ADSORPTION IS 5632.8860 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 496.6001 GRAMS
THE TOTAL SURFACE AREA IS 422.1558 SQUARE METERS
SPECIFIC SURFACE AREA IS 0.6676 SQUARE METERS/GRAM

*** ANALYSIS EASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.326833	58.7702
0.190435	41.4286
0.105949	27.7772

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 11.0988
THE MONOLAYER ADSORPTION IS 6543.1320 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 496.6001 GRAMS
THE TOTAL SURFACE APEA IS 490.3740 SQUARE METERS
SPECIFIC SURFACE AREA IS 1.0078 SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 162.13°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 6.4347 ATM. (94.56 PSIA)
DEAD VOLUME FACTOR= 0.5265

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03055	2.889	1995.704	462.648	1533.056	1.253
2	0.07182	6.792	3552.61 7	1089.958	2492.659	1.264
3	0.10561	9.987	4697.488	1605.406	3092.062	1.272
4	0.12403	11.728	5248.207	1887.016	3361.191	1.275
5	0.16171	15.292	6400.273	Z465.029	3935.244	1.282
6	0.11099	17.115	6974.51 6	2761.493	4213.020	1.287
7	0.22761	21.524	8448.035	3481.043	4966.988	1.301
8	0.25161	23.793	$240.367	3952.746	5387.617	1.309
9	0.30030	28.397	10796.640	4609.832	6186.809	1.327
10	0.3491 8	33.020	12427.190	5373.91 0	7053.289	1.350
11	0.37422	35.388	13336.640	5766.820	7569.824	1.366
12	0.40682	38.471	14492.100	6280.109	8212.000	1.337
13	0.47691	45.099	16969.770	7389.895	9579.879	1.448
14	0.56349	55.651	20964.230	91T5.1 17	11789.110	1.586
15	0.68555	65.112	25069.780	10796.160	14273.620	1.761
16	0.74371	70.329	27551.120	11698.460	15852.650	1.861
17	0.79094	74.795	30224.660	12476.030	17748.620	1.962
18	0.73330	69.344	28961.200	11527.670	16533.520	1.673
19	0.44632	42.206	17331.950	69C4.359	10427.590	1.475
20	0.32682	30.906	13362.820	5023.936	8338.895	1.381
21	0.19002	17.969	8660.113	2900.539	5759.574	1.309
22	0.10559	9.985	5946.563	1605.067	4341.432	1.280
23	0.06077	5.745	4365.863	921.691	3444.173	1.262
24	0.03783	3.577	3379.335	573.075	2806.260	1.251
25	0.02331	2.204	2709.072	352.694	2356.178	1.245

PEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 162.13°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAFOR PRESSURE = 6.4347 ATM. (94.56 PSIA)
DEAD VOLUME FACTOR= 0.5265

*** ANALYSIS BASED ON ADSCRPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.105613	38.1892
0.124026	4Z.1240
0.161714	49.0211
0.180988	52.4526
0.227611	59.3286
0.251608	62.4019
0.300297	69.3699
0.349181	76.0674

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	7.5185	
THE MONOLAYER ADSORPTION IS	5654.9840	MICRCIIIOLES
THE WEIGHT OF THE SAtIPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	423.8118	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.8710	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(I-P)X (1/MOLE)
0.326822	58.2202
0.190015	40.7306
0.105591	27.1926

THE VALUE CF "C" FACTOR IN PET ANALYSIS IS	11.5378	
THE MONOLAYER ADSORPTION IS	6567.8620	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	496.6001	GRAMS
THE TOTAL SURFACE APEA IS	492.2288	SQUARE METERS
SPECIFIC SUDFACE AREA IS	1.0116	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 189.20°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAPCR PRESSURE = 12.1636 ATM. (178.75 PSIA)
DEAD VOLUME FACTOR= 0.5265

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOU IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE [PICOFARADS]
1	0.03527	6.305	2579.843	951.588	1628.255	1.428
2	0.09716	17.368	5174.935	2632.954	2841.984	1.448
3	0.13102	23.420	6907.863	3559.240	3348.624	1.457
4	0.15218	27.204	7800.020	4140.582	3659.438	1.463
5	0.22002	39.329	10721.820	6016.457	41305.363	1.484
6	0.26811	47.926	12893.550	7358.469	5535.086	1.501
7	0.31194	55.761	14850.930	8590.375	6260.559	1.519
8	0.36090	64.513	17128.730	9977.000	7151.738	1.545
9	0.41303	73.831	19732.000	11465.890	8266.109	1.580
10	0.45400	81.155	22203.210	12645.640	9557.574	1.616
11	0.50472	90.221	24343.710	14117.730	10825.950	1.670
12	0.55315	96.878	27331.570	15535.990	11795.580	1.724
13	0.64564	115.411	32479.390	18260.600	14195.760	1.376
14	0.68946	123.245	35219.950	19598.280	15621.670	1.958
15	0.74867	133.828	39003.290	21396.870	17606.420	2.080
16	0.79480	142.074	42053.200	22813.530	19239.660	2.180
17	0.71072	127.044	37540.090	20241.570	17298.520	2.033
18	0.56056	100.203	30052.580	15754.170	14298.410	1.601
19	0.40956	73.210	23062.110	11366.270	11695.840	1.641
20	0.25605	45.770	15942.940	7020.969	8921.977	1.538
21	0.16351	29.227	11877.090	4452.348	7424.746	1.502
22	0.07787	13.919	7955.676	2107.262	5048.410	1.469
23	0.04051	7.242	6003.531	1003.399	4910.129	1.452
24	0.02301	4.113	4881.531	620.249	4261.281	1.442
25	0.01352	2.417	4202.301	354.172	3838.128	1.438
26	0.00865	1.546	3759.932	232.907	3527.025	1.435
27	0.00585	1.045	3460.890	157.446	3303.445	1.433

BEREA SANDSTONE NUMBER 3
WATER ADSCRPTION AT 189.20°C
DATA FROM FRESSURE TRANSDUCER 1

THE SATL'RATION VAFOR FRESSURE = 12.1636 ATN. (178.75 PSIA)
DEAD VOLUME FACTOR= 0.5265

*** ANALYSIS BASED ON DSCRPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.131 020	45.0256
0.152164	49.0515
0.220018	59.9487
0.268113	66.1835
0.31 1941	72.41 58

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	6.7920	
THE MONOLAYER ADSCRPTION I S	5675.4760	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	485.6001	GRAMS
THE TOTAL SUSFACE AEEA I S	434.3994	SQUARE NETERS
SPECIFIC SURFACE AREA I S	0.8927	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.256052	38.5766
0.163506	26.3263

THE VALUE OF "C" FACTOR IN BET ANALYSIS I S	29.2701	
THE MONOLAYER ADSORPTION I S	7296.3670	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	456.6001	GRAMS
THE TOTAL SUQFACE AREA I S	558.461 9	SQUARE NETERS
SPECIFIC SUDFACE AREA I S	1.1477	SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 189.20°C
DATA FFOM PRESSURE TRANSDUCER 2

THE SATURATION VAPCR PRESSURE = 12.1636 ATM. (178.75 PSIA)
DEAD VOLUME FACTOR= 0.5265

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03490	6.238	2537.483	941.569	1655.914	1.428
2	0.09672	17.289	5512.395	2620.992	2891.402	1.443
3	0.13044	23.317	6067.969	3543.392	3424.577	1.457
4	0.15158	27.095	7674.375	4123.922	3750.453	1.463
5	0.21948	39.234	10802.200	6001.629	4800.578	1.484
6	0.26759	47.833	12984.510	7343.797	5640.719	1.501
7	0.31141	55.666	14960.530	8575.484	6385.055	1.519
8	0.35026	64.398	17243.050	9958.801	7304.258	1.545
9	0.41222	73.687	19391.580	11442.780	8448.809	1.580
10	0.45346	81.053	22357.320	12629.980	9737.336	1.618
11	0.50439	90.162	25117.370	14103.120	11009.250	1.670
12	0.55278	98.811	27516.780	15525.010	11991.770	1.724
13	0.64530	115.351	32691.170	18270.550	14420.610	1.876
14	0.68926	123.208	35445.320	19592.110	15853.200	1.958
15	0.74867	133.829	39230.400	21397.020	17633.370	2.060
16	0.79474	142.063	42283.210	22811.580	19471.620	2.160
17	0.71029	126.967	37757.430	20228.410	17529.010	2.033
18	0.56004	100.109	30260.740	15738.760	14521.980	1.801
19	0.40901	73.112	23252.470	11350.640	11901.830	1.641
20	0.25570	45.708	16107.110	7011.230	9095.883	1.538
21	0.16484	29.465	11936.480	4489.023	7447.465	1.502
22	0.07758	13.668	7994.621	2099.450	5395.168	1.469
23	0.04017	7.181	6026.633	1064.263	4942.367	1.452
24	0.02287	4.088	4892.426	616.405	4276.020	1.442
25	0.01340	2.396	4211.254	351.043	3850.211	1.438
26	0.00858	1.534	3772.460	231.025	3541.435	1.435
27	0.00599	1.070	3466.248	161.221	3305.027	1.433

BEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 189.20°C
DATA FROM FRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 12.1636 ATM. (178.75 PSIA)
DEAD VOLUtlE FACTO%= 0.5265

*** ANALYSIS GASED ON ADSCRPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.130442	43.8037
0.151578	47.6366
0.219434	59.5771
0.26755'0	64.7709
0.311413	70.8293

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS 6.9551
THE HCNOLAYER ADSORPTICN IS 5756.0390 MICROMOLES
THE UEIGHT OF THE SAMPLE IS 486.6001 GRAMS
THE TOTAL SURFACE AREA IS 440.5657 SQUARE HETERS
SFECIFIC SURFACE AREA IS 0.9054 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.255704	37.7699
0.164637	26.5017

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 21.4617
THE MONOLAYER ADSORPTICN IS 7698.1870 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 486.6001 GRAMS
THE TOTAL SUCFACE AREA IS 588.4517 SQUARE METERS
SFECIFIC SURFACE AREA IS 1.2093 SQUARE METERS/GRAM

BEREA SANDSTONE NUMBER 3
WATER ADSCRPTION AT 189.94°C
DATA FROM PRESSURE TRANSDUCER 1

THE SATURATION VAFOR PRESSUFE = 12.3628 ATfl. (181.68 PSIA)
DEAD VOLUME FACTOR= 0.5265

NUMSER	PRESSURE OF P/P0	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROHOLES)	AMOUNT ADSOPPED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04005	7.277	2884.145	1096.936	1737.209	1.383
2	0.07323	13.305	4415.148	2010.403	2404.745	1.393
3	0.11 166	20.265	6301.879	3073.870	3228.009	1.406
4	0.15485	28.133	8169.125	4276.523	3892.602	1.420
5	0.21100	33.335	10585.640	5851.938	4033.71 1	1.433
6	0.26264	47.754	13123.910	7318.645	5605.273	1.461
7	0.31404	57.055	155FS.910	8779.141	6619.777	1.485
8	0.35461	64.426	18362.020	9955.402	8416.625	1.512
9	0.32840	59.665	17746.270	9191.188	8555.086	1.504
10	0.19539	35.682	12302.420	5440.859	6361.570	1.456
11	0.12373	22.480	9092.000	3409.299	5582.699	1.432
12	0.09864	17.922	8028.543	2713.068	5315.453	1.423
13	0.04965	9.021	5693.832	1360.858	4337.973	1.408
14	0.02623	4.765	4410.457	717.621	3632.836	1.402
15	0.0 1474	2.673	3732.263	402.912	3329.351	1.398
16	0.00995	1.807	3340.325	271.847	3068.478	1.396
17	0.00755	1.372	3072.630	206.327	2866.502	1.396
18	0.00563	1.024	2898.658	153.918	2744.740	1.394
19	0.00479	0.871	2763.031	130.991	2637.040	1.394
20	0.00444	0.805	2668.506	121.166	2547.340	1.394
21	0.00408	0.740	2593.864	111.340	2422.523	1.393
22	0.00444	0.806	2500.559	121.166	2379.393	1.332
23	0.00276	0.501	2488.11 9	75.316	2412.803	1.392

BEREA SANDSTONE NUMBER 3
WATER ADSCRPTION AT 189.94°C
DATA FROM PRESSURE TRCNSDUCER 1

THE SATURATION VAPOR PRESSURE = 12.3628 ATM. (181.68 PSIA)
DEAD VOLUME FACTOR= 0.5265

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.11 1655	38.9370
0.154847	47.0682
0.2I1001	55.3256
0.262840	61.4197
0.314036	67.1265

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 6.5147
THE MONOLAYER ADSORPTION IS 6151.0150 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 466.6001 GRAMS
THE TOTAL SURFACE AREA IS 471.0896 SQUARE METERS
SPECIFIC SURFACE AREA IS 0.9681 SGUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.328402	57.1573
0.196395	35.6175
0.123730	24.8475

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 33.0631
THE MONOLAYER ADSORPTION IS 6118.1550 MICROMOLES
THE UEIGHT OF THE SAMPLE IS 486.6001 GRAMS
THE TOTAL SURFACE AREA IS 468.5730 SQUARE METERS
SFECIFIC SURFACE AREA IS 0.9630 SQUARE METERS/GRAM

GEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 189.94°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATICN VAFOR FRESSURE = 12.3626 ATM. (161.66 PSIA)
DEAD VOLUME FACTOR= 0.5265

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICRONOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03973	7.219	2834.774	1068.164	1776.590	1.383
2	0.07266	13.201	4419.676	1994.689	2424.987	1.393
3	0.11192	20.334	6271.145	3081.241	3189.904	1.406
4	0.15454	28.096	8169.102	4270.773	3898.328	1.420
5	0.21175	33.471	10636.420	5872.992	4763.438	1.439
6	0.26258	47.706	13089.830	7311.156	5776.676	1.461
7	0.31330	56.921	15599.630	8756.066	6641.570	1.485
8	0.35244	64.033	18445.410	9832.988	S562.430	1.512
9	0.32639	59.300	17641.620	9133.543	6708.078	1.504
10	0.19463	35.393	12356.730	5396.949	6969.769	1.456
11	0.12144	22.064	9190.281	3345.735	5944.543	1.432
12	0.09776	17.762	8046.137	2666.735	5357.398	1.423
13	0.04638	8.791	5737.609	1325.044	4411.664	1.406
14	0.02434	4.423	4472.754	665.945	3806.809	1.402
15	0.01266	2.300	3815.511	346.038	3469.473	1.398
16	0.00774	1.406	3423.063	211.428	3211.635	1.396
17	0.00528	0.959	3158.413	144.142	3014.271	1.396
18	0.00334	0.607	2955.035	91.283	2893.752	1.394
19	0.00246	0.447	2857.288	67.259	2790.028	1.394
20	0.00202	0.367	2766.040	55.248	2710.792	1.394
21	0.00167	0.304	2693.042	45.639	2647.404	1.393
22	0.00237	0.431	2563.543	64.857	2518.686	1.392
23	0.00167	0.304	2515.106	45.639	2469.469	1.392

GEREA SANDSTONE NUMBER 3
WATER ADSORPTION AT 189.94°C
DATA FROM PRESSURE TRANSDUCER 2

THE SATURATION VAPOR PRESSURE = 12.3628 ATM. (181.68 PSIA)
DEAD VOLUHE FACTOR= 0.5265

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.111921	39.5077
0.154641	46.9252
0.211748	56.3939
0.262577	61.6184
0.313300	66.6864

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	6.2441	
THE KONOLAYER ADSCRPTION IS	6218.8040	MICROMOLES
THE WEIGHT OF THE SAtIPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	476.2813	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.9768	SGUARE METERWGRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.325394	55.6434
0.194833	34.7181
0.121443	23.6512

THE VALUE OF "C" FACTOR IN BET AIIALYSIS IS	35.8472	
THE MONOLAYER ADSCRPTION IS	6213.6210	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	486.6001	GRAMS
THE TOTAL SURFACE AREA IS	475.8943	SQUARE METERS
SFECIFIC SURFACE AREA IS	0.9780	SQUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 109.61°C
DATA FFCM PRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAFOR PRESSURE = 1.3955 ATH. (20.51 PSIA)
DEAD VOLUME FACTOR= 0.7309

NUMBER	PFESSURE OF SYSTEM P/PO	(FSIA)	TOTAL AMOUNT FLOW It4 (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04210	0.863	463.637	218.156	245.481	1.185
^	0.12736	2.612	1086.735	661.055	425.679	1.188
3	0.23160	4.750	1780.474	1204.456	576.019	1.198
4	0.36650	7.558	2660.602	1921.536	739.066	1.212
5	0.50228	10.301	3530.360	2625.989	904.371	1.238
6	0.59721	12.289	4211.777	3136.770	1073.008	1.274
7	0.67086	13.759	4502.953	3519.125	1283.829	1.324
8	0.73936	15.163	5457.570	3883.776	1573.614	1.410
9	0.78467	16.093	5812.234	41c5.593	1686.637	1.501
10	0.81207	16.655	6136.337	4272.047	1664.340	1.532
11	0.69455	14.244	5085.957	3645.098	1440.859	1.407
12	0.41131	6.435	2661.274	2146.546	514.727	1.255
13	0.21963	4.534	1317.173	1141.957	175.216	1.230
14	0.12544	2.634	645.977	666.644	-20.657	1.225
15	0.07008	1.437	254.248	363.323	-109.075	1.222
16	0.03611	0.740	-1.706	187.077	-189.784	1.222

UNCONSOLIDATED SILICA SANOPACK
WATER ADSORPTION AT 109.61°C
DATA FROM FRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR FRESSURE = 1.3955 ATM. (20.51 PSIA)
DEAD VOLUtlE FACTOR= 0.7309

*** ANALYSIS BASED ON ADSORPTIOII DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.127364	342.8696
0.231 597	523.2485

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	15.1311	
THE NONOLAYER ADSCRPTION I S	539.6682	MICRCMOLES
THE WEIGHT OF THE SAMPLE IS	3S3.2000	GRAMS
THE TOTAL SUEFACE AREA I S	39.1443	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.1022	SQUARE METERWGRAM

*** ANALYSIS GASED ON DESOEPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTO!? P/(1-P)X (1/MOLE)
0.219630	1606.2670
0.128438	-7130.3590

THE VALUE OF "C" FACTCR I N BET ANALYSIS I S	-3.9294	
THE MONOLAYER ADSORPTION I S	13.0943	MICRCMOLES
THE WEIGHT OF THE SAMPLE I S	383.2000	GRAMS
THE TOTAL SURFACE AREA I S	0.9498	SQUARE HETERS
SPECIFIC SURFACE AREA I S	0.0025	SQUARE METERS/GRAM

UHCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 109.61°C
DATA FROM FRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAFOR PRESSL'RE = 1.3955 ATM. (20.51 PSIA)
DEAD VOLUME FACTOR= 0.7309

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOPBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04001	0.821	470.229	207.321	262.903	1.165
2	0.12391	2.541	105'6.209	643.101	453.109	1.188
3	0.22712	4.658	1796.975	1181.085	615.690	1.198
4	0.35556	7.456	2685.81 8	1895.549	790.270	1.212
5	0.49778	10.209	3552.101	2602.225	949.876	1.238
6	0.59504	12.203	4233.969	3116.666	1114.303	1.274
7	0.65609	13.661	4827.473	3493.741	1333.732	1.324
8	0.73484	15.071	5488.105	3859.690	1628.415	1.410
9	0.77811	15.958	5861.172	4090.557	1770.61 5	1.501
10	0.60825	16.576	6161.109	4251.602	1909.508	1.582
11	0.70257	14.409	5107.781	3687.812	1419.970	1.407
12	0.41620	8.536	2682.789	2172.274	510.515	1.255
13	0.22342	4.582	1336.265	1161.769	174.497	1.230
14	0.13005	2.667	677.780	675.035	2.744	1.225
15	0.07088	1.454	25'0.910	367.501	-76.592	1.222
16	0.0366 1	0.751	31.354	189.710	-158.356	1.222

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 109.61°C
DATA FROM FEESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 HESH

THE SATURATION VAPOR PRESSURE = 1.3055 ATPI. (20.51 PSIA)
DEAD VOLUME FACTOR= 0.7309

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.123912	312.1516
0.2271 23	477.141 6

THE VALUE OF "C" FACTOR IN BET AIIALYSIS IS 15.0144
THE HONOLAYER ADSORPTIOH IS 553.6948 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 383.2000 GRAMS
THE TOTAL SURFACE AREA IS 42.3522 SQUARE METERS
SPECIFIC SURFACE AREA IS 0.1105 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.223424	1648.7680
0.130050	54476.7000

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS -3.4162
THE MONOLAYER ADSORPTION IS -2.2846 MICROMOLES
THE WEIGHT OF THE SAMPLE IS 383.2000 GRAMS
THE TOTAL SURFACE AREA IS -0.1657 SQUARE METERS
SPECIFIC SURFACE AREA IS -0.0004 SQUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 125.64°C
DATA FROM PRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR FRESSVRE = 2.3357 ATH. (34.33 PSIA)
DEAD VOLUME FACTOR= 0.7309

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORGED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04213	1.446	581.835	350.642	230.993	1.290
2	0.11195	3.843	1310.464	933.922	376.542	1.292
3	0.16116	6.218	1963.929	1514.025	469.904	1.296
4	0.26737	9.178	2806.573	2239.718	566.655	1.303
5	0.33094	11.360	3412.702	2777.021	635.661	1.311
6	0.36194	13.110	3903.291	3209.350	693.941	1.319
7	0.42978	14.753	4373.191	3616.158	757.033	1.329
8	0.47197	16.201	4792.676	3975.724	616.952	1.340
9	0.55257	18.967	5569.773	4665.141	904.633	1.370
10	0.61302	21.042	6146.624	5164.352	964.473	1.409
11	0.66530	22.837	6692.402	5634.758	1057.645	1.464
12	0.68734	23.593	6990.461	5825.105	1165.355	1.501
13	0.71379	24.501	7341.285	6053.863	1267.422	1.556
14	0.74067	25.431	7632.813	6288.438	1344.375	1.614
15	0.76039	26.101	7849.601	6457.769	1392.012	1.660
16	0.60070	27.415	8232.508	6606.035	1424.473	1.760
17	0.85108	29.214	8767.125	7247.059	1520.066	1.895
18	0.75858	26.039	7686.636	6442.023	1446.813	1.705
19	0.67816	23.276	6954.660	5745.777	1208.902	1.540
20	0.60658	20.752	6171.223	5111.699	1059.523	1.447
21	0.53403	16.333	5412.336	4506.711	905.625	1.391
22	0.43011	14.764	4334.750	3618.919	715.831	1.343
23	0.31399	10.778	3169.504	2633.551	555.953	1.315
24	0.24006	8.240	2466.936	2009.444	459.492	1.305
25	0.16731	5.343	1750.367	1397.783	352.604	1.295
26	0.07674	2.634	875.335	639.575	235.760	1.287

UNCONSOLIOATED SILICA SANDPACK
WATER ADSCRPTICN AT 125.64°C
DATA FROM FRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 NESH

THE SATURATION VAFOR PRESSURE = 2.3357 ATM. (34.33 PSIA)
DEAD VOLUME FACTOR= 0.7309

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.1 11951	334.7937
0.181 157	470.8086
0.267371	643.8123
0.330944	778.1323

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	20.0048	
THE MONOLAYER ADSORPTION IS	469.941 4	NICRCMOLES
THE EIGHT OF THE SAMPLE IS	383.2000	GRAMS
THE TOTAL SURFACE AREA IS	34.391 9	SQUARE METERS
SFECIFIC SURFACE AREA IS	0.0697	SGUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.313991	823.2839
0.240058	687.4756
0.16731 0	569.8359

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	7.2165	
THE MONOLAYER ADSORFTION IS	493.4675	HICRCMOLES
THE WEIGHT OF THE SAHPLE IS	3E3.2000	GRAMS
THE TOTAL SURFACE AREA IS	36.4795	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0952	SGUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 125.64°C
DATA FROM FRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR FRESSURE = 2.3357 ATM. (34.33 PSIA)
DEAD VOLUEIE FACTOR= 0.7309

NUMBER	FRESSURE OF P/PO	SYSTEM (FSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOPBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04230	1.452	577.881	352.214	225.667	1.290
2	0.11130	3.821	1306.356	925.516	377.640	1.292
3	0.17990	6.175	1979.591	1503.492	476.099	1.296
4	0.26560	9.117	2800.778	2224.787	575.091	1.333
5	0.32877	11.285	3410.769	2755.600	652.169	1.311
6	0.37997	13.043	3904.508	3192.686	711.622	1.319
7	0.42797	14.690	4372.813	3500.700	772.113	1.329
8	0.47044	16.148	47E5.363	3962.683	825.660	1.340
9	0.55080	18.907	5564.855	4650.012	914.844	1.370
10	0.61068	20.959	6153.266	5165.863	987.402	1.409
11	0.66357	22.777	6694.410	5619.E57	1054.543	1.464
12	0.69576	23.539	6995.285	5811.488	1163.797	1.501
13	0.71258	24.460	7346.063	6043.406	1302.656	1.556
14	0.73648	25.349	7642.473	6267.707	1374.766	1.614
15	0.75537	26.031	7962.270	6440.199	1422.070	1.660
16	0.79861	27.413	8259.133	6789.863	1469.270	1.760
17	0.84997	29.176	6779.188	7237.320	1541.867	1.895
18	0.75643	25.965	7925.734	6423.336	1502.308	1.705
19	0.67652	23.222	6935.617	5731.699	1256.918	1.540
20	0.60257	20.684	6233.738	5094.465	1139.273	1.447
21	0.53273	18.286	5459.723	4495.160	964.563	1.391
22	0.42857	14.711	4372.250	3605.616	766.434	1.343
23	0.31316	10.749	3226.161	2626.514	599.647	1.315
24	0.23939	8.217	2515.553	2003.789	511.764	1.305
25	0.16555	5.683	1807.134	1383.028	424.106	1.295
26	0.07770	2.667	921.072	647.622	273.450	1.267

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 125.64°C
DATA FROM PRESSUQE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR PRESSURE = 2.3357 ATM. (34.33 PSIA)
DEAD VOLUME FACTOR= 0.7309

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.11 1305	331.4758
0.179903	460.7605
0.265602	627.6896
0.326768	751.0298

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	17.7877	
THE MONOLAYER ADSCRPTION I S	483.5261	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	383.2000	GRAMS
THE TOTAL SURFACE AREA I S	35.7520	SQUARE METERS
SPECIFIC SURFACE AREA I S	0.0933	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.31 3159	760.3501
0.239387	614.9866
0.165551	467.7979

THE VALUE OF "C" FACTCR I N 6ET ANALYSIS I S	15.15'38	
THE MONOLAYER ADSCRPTION I S	471.2725	MICROMOLES
THE KEIGHT OF THE SAMPLE I S	383.2000	GRAMS
THE TOTAL SUEFACE AREA IS	34.4593	SQUARE METERS
SPECIFIC SURFACE AREA I S	0.0900	SQUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTIOII AT 145.0 1°C
DATA FROM PRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR PRESSURE = 4.1006 ATM. (60.26 PSIA)
DEAD VOLUME FACTOR= 0.7309

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.12720	7.666	2154.042	1779.855	374.188	1.294
2	0.23333	14.061	3793.986	3277.982	516.003	1.300
3	0.33806	20.372	5398.629	4768.594	630.035	1.311
4	0.45680	27.528	7218.824	6473.852	744.973	1.335
5	0.52352	31.549	8253.809	7439.441	814.367	1.355
6	0.59346	35.763	9424.410	8457.512	966.898	1.395
7	0.66160	39.869	10529.310	9455.234	1074.078	1.468
8	0.70354	42.397	11275.210	10072.450	1202.758	1.540
9	0.72828	43.888	11739.380	10437.490	1301.891	1.574
10	0.74799	45.076	12080.740	10729.000	1351.736	1.646
11	0.76463	46.193	12400.810	11005.060	1395.754	1.700
12	0.78454	47.279	12714.070	11270.920	1443.148	1.759
13	0.83138	48.293	12998.550	11521.200	1477.352	1.813
14	0.61500	49.114	13239.550	11723.820	1515.727	1.858
15	0.76557	46.135	12547.800	10989.320	1558.480	1.744
16	0.69530	42.051	11137.300	9995.191	1142.109	1.577
17	0.69206	41.759	11115.760	9916.504	1199.262	1.604
18	0.53251	32.090	8403.496	7569.061	833.535	1.406
19	0.38878	23.429	6091.723	5495.055	596.668	1.348
20	0.23673	14.266	3667.707	3326.160	341.547	1.319
21	0.10828	6.525	1596.332	1513.968	82.364	1.306
22	0.05201	3.134	637.823	725.745	-87.922	1.304

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 145.01°C
DATA FROM PRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR PRESSURE = 4.1006 ATM. (60.26 PSIA)
DEAD VOLUtIE FACTOR= 0.7309

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.127202	369.4846
0.233329	589.6044
0.338060	610.6052

THE VALUE OF "C" FACTOR IN 5ET ANALYSIS IS	16.1723	
THE MONOLAYER ADSORPTION IS	469.6032	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	383.2000	GRAM5
THE TOTAL SURFACE AREA IS	34.7971	SQUARE METERS
SFECIFIC SURFACE AREA IS	0.0908	SQUARE METERS/GRAM

*** AIIALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.236728	908.0718
0.108276	1474.2380

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	-1.2586	
THE HCNOLAYER ADSORPTION IS	-407.1394	MICRCNOLES
THE WEIGHT OF THE SAIIPLE IS	383.2000	GRAMS
THE TOTAL SURFACE AREA IS	-30.1557	SGUARE METERS
SFECIFIC SURFACE AREA IS	-0.0787	SGUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSCOPTION AT 145.01°C
DATA FROM FRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAFOR PRESSURE = 4.1006 ATM. (60.26 PSIA)
DEAD VOLUME FACTOR= 0.7309

NUMBER	PRESSURE OF SYSTEH P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.12635	7.614	2161.543	1767.876	333.667	1.294
2	0.23247	14.009	3804.220	3265.751	538.469	1.300
3	0.33716	20.318	5416.039	4755.773	660.266	1.311
4	0.45594	27.476	7244.578	6461.539	783.039	1.335
5	0.52263	31.495	6273.691	7426.512	867.379	1.355
6	0.59461	35.833	9471.797	6474.297	937.500	1.395
7	0.66318	39.965	10577.050	9478.531	1093.527	1.468
8	0.70486	42.476	11333.830	10091.810	1242.027	1.540
9	0.72938	43.955	11603.570	10453.850	1349.715	1.594
10	0.74917	45.147	12145.690	10746.420	1399.262	1.646
11	0.76763	46.259	12472.300	11019.940	1452.352	1.700
12	0.76530	47.324	12788.690	11262.170	1506.527	1.757
13	0.80192	48.326	13073.300	11529.110	1544.188	1.813
14	0.81484	49.104	13320.580	11721.440	1599.141	1.658
15	0.77314	46.5511	12631.130	11101.620	1529.508	1.7.14
16	0.69353	42.095	11356.340	9998.586	1357.758	1.577
17	0.69351	41.793	11383.230	9924.668	1463.570	1.604
18	0.53333	32.140	8577.465	7581.934	1095.531	1.406
19	0.38956	23.476	6360.848	5506.191	854.656	1.348
20	0.23699	14.282	3938.221	3329.867	608.354	1.319
21	0.10832	6.528	1865.983	1514.596	351.385	1.306
22	0.05088	3.066	919.945	709.924	210.021	1.304

UNCONSOLIDATED SILICA SANDPACK
UATER ADSORPTION AT 145.01°C
DATA FROM FRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR FRESSL'RE = 4.1006 ATM. (60.26 PSIA)
DEAD VOLUME FACTOR- 0.7309

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTO!? P/(1-P)X (1/MOLE)
0.126350	357.3738
0.232467	562.4736
0.337162	770.3945

THE VALUE OF "C" FACTO? IN BET AIIALYSIS IS	16.5070	
THE MONOLAYER ADSORPTION IS	491.4358	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	383.2000	GRAMS
THE TOTAL SURFACE AREA IS	36.3994	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.0950	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.236989	510.5547
0.103321	345.71 73

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	7.1906	
THE MONOLAYER ADSCRPTION IS	672.01 33	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	383.2000	GRAMS
THE TOTAL SUFFACE AREA IS	49.7743	SCUAPE METERS
SFECIFIC SURFACE AREA IS	0.1299	SQUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 165.92°C
DATA FROM PRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAFOR PRESSURE = 7.0719 ATM. (103.93 PSIA)
DEAD VOLUNE FACTOR= 0.7309

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03760	3.903	1118.431	841.675	256.756	1.291
2	0.08310	9.156	2414.692	2024.313	390.379	1.292
3	0.12823	13.326	3432.083	2952.471	479.612	1.294
4	0.15567	16.179	4107.613	3559.664	517.929	1.296
5	0.20601	21.410	5354.285	4763.020	591.266	1.298
6	0.26383	27.420	6824.254	6119.066	705.188	1.303
7	0.30231	31.419	7800.852	7026.305	774.547	1.307
8	0.33081	34.380	6516.707	7700.660	616.047	1.311
9	0.37136	35.534	0534.789	8664.160	670.629	1.317
10	0.40171	41.749	10317.600	9388.395	929.211	1.323
11	0.43081	44.773	11061.910	10055.140	976.766	1.330
12	0.45824	47.624	11753.600	10744.100	1009.492	1.333
13	0.49168	51.100	12606.170	11550.550	1055.621	1.350
14	0.52553	54.617	13475.730	12370.050	1105.676	1.364
15	0.50379	61.712	15237.410	14033.420	1203.992	1.416
16	0.64768	67.312	16672.550	15356.760	1315.789	1.479
17	0.71475	74.282	18571.030	17016.820	1554.203	1.620
18	0.79203	82.314	20642.600	18948.310	1694.488	1.044
19	0.80512	83.987	21119.440	19353.210	1766.230	1.903
20	0.83576	85.659	21904.710	20050.510	1854.203	1.993
21	0.78493	81.576	20421.170	18770.070	1651.105	1.838
22	0.69350	72.697	18060.140	16638.080	1422.059	1.625
23	0.64710	67.252	16649.980	15342.490	1307.498	1.520
24	0.60907	63.299	15630.700	14407.580	1223.125	1.464
25	0.57657	59.922	14752.170	13612.330	1139.832	1.426
26	0.54487	56.628	13917.600	12639.990	1077.613	1.334
27	0.49648	51.598	12685.370	11666.450	101?.922	1.365
28	0.44907	48.750	11980.270	11004.880	975.387	1.353
29	0.43174	44.870	11033.540	10107.400	926.141	1.341
30	0.34209	35.553	8776.668	7965.265	608.333	1.320
31	0.28972	30.110	7454.773	6729.004	725.770	1.311
32	0.15991	19.737	4972.680	4367.125	5E5.555	1.299
33	0.13039	13.551	3494.266	3002.674	491.612	1.293
34	0.08242	8.566	2276.546	1893.216	353.330	1.290
35	0.04250	4.417	1264.974	974.337	25'0.636	1.253
35	0.02304	2.395	739.820	527.685	212.135	1.287
37	0.01362	1.415	477.316	311.735	165.582	1.286

UNCONSOLIDATED SILICA SANDPACK
WATER ADSCPPTION AT 165.92°C
DATA FROM PRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR PRESSL'RE = 7.0719 ATM. (103.93 PSIA)
DEAD VOLUME FACTOR= 0.7309

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.128226	306.6760
0.155675	355.9897
0.206007	438.8159
0.263633	503.2146
0.302313	559.4326
0.330807	605.7690

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	11.9774	
THE MONOLAYER ADSORPTION IS	638.5926	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	3S3.2000	GRAMS
THE TOTAL SLRFACE AREA IS	47.9916	SQUARE IIETERS
SPECIFIC SURFACE AREA IS	0.1252	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.342069	643.2119
0.289721	562.0217
0.189912	400.3623
0.130391	305.0015

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	17.6201	
THE MONOLAYER ADSORPTION IS	588.8657	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	383.2000	GRAMS
THE TOTAL SURFACE AREA IS	44.2545	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.1155	SQUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 165.92°C
DATA FROM FRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR PRESSURE = 7.0719 ATM. (103.93 PSIA)
DEAD VOLUME FACTOR= 0.7309

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03752	3.900	1124.922	859.914	265.008	1.291
2	0.08803	9.149	2431.414	2022.648	408.766	1.292
3	0.12839	13.344	3448.591	2956.367	492.223	1.294
4	0.15584	16.196	4133.512	3593.422	540.090	1.296
5	0.20619	21.429	5386.523	4767.242	619.281	1.298
6	0.26433	27.476	6856.367	6131.895	724.473	1.303
7	0.30289	31.479	7835.71 9	7039.969	796.750	1.307
8	0.331 17	34.418	8561.734	7709.367	852.367	1.31 1
9	0.371 85	38.646	9585.323	6675.91 0	909.418	1.317
10	0.40259	41.841	10356.750	9409.422	957.332	1.323
11	0.43165	44.861	11115.620	10105.270	1010.352	1.330
12	0.45867	47.600	11616.410	10759.320	1057.004	1.333
13	0.49251	51.186	12677.070	11570.590	1106.477	1.350
14	0.52645	54.713	13556.360	12392.440	1163.922	1.364
15	0.50460	61.796	15331.050	14053.160	1277.663	1.416
16	0.64910	67.453	16769.650	15331.690	1378.168	1.479
17	0.71 633	74.447	18577.650	17056.180	1621.469	1.620
18	0.79333	82.512	20758.780	18996.160	1762.621	1.644
19	0.61019	84.201	21240.670	19405.210	1635.465	1.903
20	0.63797	87.069	22023.800	20106.370	1917.434	1.993
21	0.76215	81.287	20541.010	18700.300	1840.719	1.838
22	0.60654	72.390	18162.090	16564.730	1597.367	1.625
23	0.64395	66.925	16739.030	15264.930	1474.105	1.520
24	0.60584	62.964	15705.960	14328.580	1377.375	1.464
25	0.57301	59.552	14822.730	13525.480	1297.250	1.426
26	0.54137	55.264	13SS2.640	12754.740	1227.902	1.394
27	0.4931 9	51.256	12752.070	11586.940	1165.129	1.365
28	0.46590	48.420	12038.130	10928.480	1109.646	1.353
29	0.42842	44.525	11088.370	10027.850	1060.520	1.341
30	0.33877	35.208	6823.613	7889.605	934.207	1.320
31	0.28626	29.750	74'4.070	6647.293	646.777	1.31 1
32	0.18534	19.366	5010.082	4303.820	706.262	1.299
33	0.12685	13.184	3517.71 4	2920.776	596.936	1.233
34	0.07861	8.169	2275.612	1805.256	490.356	1.290
35	0.03872	4.024	1278.887	867.341	391.546	1.288
36	0.01921	1.997	758.873	439.869	319.004	1.287
37	0.00968	1.006	494.144	221.626	272.51 8	1.286

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 165.92°C
DATA FROM FRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR PRESSURE = 7.0719 ATM. (103.93 PSIA)
DEAD VOLUME FACTOR= 0.7309

*** ANALYSIS GASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.128394	299.2686
0.155835	341.8005
0.206188	419.4270
0.264378	496.0764
0.302891	545.3357
0.331 174	580.9199

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	11.9579	
THE MONOLAYER ADSCRPTICN IS	661.4194	MICRCMOLES
THE WEIGHT OF THE SAMPLE IS	383.2000	GRAMS
THE TOTAL SURFACE AREA IS	49.7071	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.1297	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.338773	548.4231
0.286258	473.6175
0.186342	324.2661
0.126858	243.3920

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	26.2046	
THE MONOLAYER ADSORPTION IS	663.6826	MICRCMOLES
THE WEIGHT OF THE SAMPLE IS	353.2000	GRAMS
THE TOTAL SURFACE AREA IS	49.8772	SQUARE HETERS
SPECIFIC SURFACE AREA IS	0.1302	SQUARE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 187.32°C
DATA FROM PRESSURE TRAIISDUCER 1
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATICN VAFOR PRESSURE = 11.6686 ATH. (171.48 PSIAI
DEAD VOLUtIE FACTOR= 0.7309

NUMBER	PRESSURE OF P/PO	SYSTEH (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02820	4.836	1309.862	1016.887	292.975	1.322
2	0.09359	16.049	3E84.653	3390.031	434.822	1.325
3	0.17793	30.511	7159.082	6483.520	675.563	1.329
4	0.25430	43.607	10143.920	9318.375	825.547	1.335
5	0.29536	50.819	11804.430	10873.830	910.605	1.333
6	0.35145	60.268	13949.050	12973.570	975.477	1.347
7	0.40847	70.045	16222.030	15145.490	1076.539	1.359
8	0.45976	80.554	18692.720	17502.960	1189.762	1.377
9	0.51227	87.845	20420.530	19153.010	1267.523	1.394
10	0.54871	94.093	21914.510	20577.140	1337.357	1.416
11	0.56196	99.796	23286.610	21884.990	1401.617	1.442
12	0.62769	107.636	25194.950	23696.290	1498.660	1.499
t3	0.66053	113.263	26614.000	25006.820	1607.1 S4	1.556
14	0.68353	117.213	27614.410	25929.690	1664.715	1.605
15	0.70440	120.792	21548.910	26770.500	1778.402	1.659
16	0.53201	125.526	29774.220	27883.070	1566.152	1.738
17	0.74875	128.395	30507.780	26558.300	1939.477	1.791
18	0.77123	132.250	31490.940	29485.790	2005.145	1.855
19	0.79097	135.635	32366.030	30294.920	2071.109	1.934
20	0.60346	137.777	32924.750	30803.520	2116.227	1.980
21	0.76760	131.629	31246.070	29337.670	1908.402	1.863
22	0.72975	125.139	29623.210	27796.430	1826.761	1.753
23	0.69121	118.528	27993.530	26236.390	1755.141	1.656
24	0.67089	115.044	27225.730	25421.800	1806.930	1.603
25	0.59280	101.654	23929.660	22312.950	1616.703	1.498
26	0.55161	94.591	22218.310	20690.980	1527.332	1.445
27	0.51678	86.617	20794.730	19326.550	1466.168	1.420
28	0.47746	81.875	19196.E40	17800.930	1395.926	1.393
29	0.40337	70.023	16429.890	15141.670	1288.215	1.373
30	0.37723	64.688	15198.680	13952.950	1245.727	1.354
31	0.34046	58.382	13748.280	12557.030	1191.242	1.356
32	0.30926	53.033	12521.620	11379.390	1142.230	1.350
33	0.24928	42.746	10177.430	9131.090	1046.348	1.340
34	0.21309	36.541	8773.5%	7784.832	988.762	1.335
35	0.16102	27.612	6745.645	5860.336	885.309	1.329
36	0.12001	20.580	5164.750	4355.063	809.688	1.325
37	0.06690	11.472	3120.040	2418.578	701.461	1.323
38	0.03210	5.504	1767.636	1157.635	610.000	1.320
39	0.01473	2.525	1065.598	530.502	555.036	1.319

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 187.32°C
DATA FROM FRESSURE TRANSDUCER 1
SAND GRAIN SIZE : 60 TO 65 HESH

THE SATURATION VAFOR FRESSURE = 11.6686 ATM. (171.48 PSIAI
DEAD VOLUME FACTOR= 0.7309

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTO? P/(1-PIX (1/MOLE)
0.177926	320.3789
0.254297	413.0784
0.2 96356	462.51 93

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	12.2559	
THE HONOLAYER ADSOAPTIOEI I S	764.1553	MICROMOLES
THE E I G H T OF THE SAHPLE I S	383.2000	GRAMS
THE TOTAL SURFACE AREA I S	58.3967	SQUAFE METERS
SPECIFIC SURFACE AREA I S	0.1524	SQUAFE METERS/GRAM

*** ANALYSIS GASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE I
0.340453	433.3320
0.309263	391.9783
0.249278	317.3'135
0.21 3093	273.3755
0.161021	216.7851
0.12001 2	166.4337

THE VALUE OF "C" FACTOR I N PET ANALYSIS I S	53.6444	
THE MONOLAYER ADSCRFTICN I S	820.8677	MICRCMOLES
THE WEIGHT OF THE SAMPLE I S	383.2000	GRAMS
THE TOTAL SURFACE APEA I S	62.7306	SQUARE METERS
SPECIFIC SURFACE AREA I S	0.1637	SQUAFE METERS/GRAM

UNCONSOLIDATED SILICA SANDPACK
WATER ADSORPTION AT 187.32°C
DATA FROM PRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR PRESSURE = 11.6686 ATM. (171.48 PSIA)
DEAD VOLUME FACTOR= 0.7309

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02845	4.879	1301.433	1025.955	275.473	1.322
2	0.09389	16.101	3881.203	3400.938	480.265	1.325
3	0.17838	30.599	7163.641	6500.398	663.242	1.329
4	0.25503	43.732	10150.510	9345.621	804.895	1.335
5	0.29710	50.948	11812.720	10921.960	890.758	1.339
6	0.35213	60.383	13960.790	12993.050	961.738	1.347
7	0.40920	70.170	16231.670	15173.280	1058.574	1.357
8	0.47048	60.679	18711.070	17531.080	1179.996	1.377
9	0.51320	88.003	20444.320	19189.070	1255.250	1.394
10	0.54974	94.270	21942.550	20617.720	1324.824	1.416
11	0.58300	09.972	23317.290	21925.630	1391.605	1.442
12	0.62875	107.818	25230.760	23738.370	1492.387	1.499
13	0.66151	113.435	26655.890	25045.960	1609.926	1.554
14	0.68456	117.389	27664.270	25970.970	1693.305	1.605
15	0.70548	120.976	28609.420	26813.900	1795.520	1.659
16	0.73294	125.685	29842.850	27925.610	1317.234	1.738
17	0.74979	128.574	30570.630	28610.780	1559.848	1.791
18	0.77226	132.428	31551.320	29528.270	2023.047	1.865
19	0.79190	135.796	32437.820	30333.350	2104.465	1.934
20	0.80425	137.914	33002.300	30841.340	2160.965	1.980
21	0.76517	131.212	31317.230	29238.240	2078.992	1.863
22	0.72726	124.711	29690.390	27695.290	1995.094	1.753
23	0.68845	118.055	28065.960	26127.350	1938.602	1.656
24	0.65799	114.548	27210.630	25305.800	1705.035	1.600
25	0.59000	101.17%	23925.560	22202.410	1723.148	1.488
25	0.54399	94.141	22219.360	20588.070	1631.297	1.445
27	0.51408	68.154	20804.270	19223.420	1580.844	1.420
28	0.47476	61.413	19219.420	17696.590	1522.832	1.398
29	0.40429	69.328	16554.790	14985.460	1569.332	1.373
30	0.37461	64.233	15330.230	13852.930	1477.297	1.354
31	0.33820	57.994	13898.550	12471.530	1427.023	1.356
32	0.30745	52.721	12679.890	11311.000	1368.898	1.350
33	0.24806	42.537	10356.300	9055.551	1270.758	1.340
34	0.21242	36.425	8950.332	7759.730	1190.602	1.335
35	0.16065	27.549	6030.406	5546.652	1083.555	1.329
34	0.11997	20.573	5352.387	4353.555	998.832	1.326
37	0.06733	11.545	3317.074	2434.189	882.885	1.323
38	0.03267	5.603	1975.447	1178.482	796.965	1.320
39	0.01500	2.571	1316.$60	540.190	776.770	1.319

UNCONSOLIDATED SILICA SANDPACK
UATER ADSORPTION AT 187.32°C
DATA FROM PRESSURE TRANSDUCER 2
SAND GRAIN SIZE : 60 TO 65 MESH

THE SATURATION VAPOR FRESSURE = 11.6666 ATM. (171.48 PSIA)
DEAD VOLUHE FACTOR= 0.7309

*** ANALYSIS EASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTO? P/(1-P)X (1/MOLE)
0.176364	327.3511
0.255026	425.3093
0.297105	474.5251

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	12.7332	
THE MONOLAYER ADSORPTION IS	740.5100	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	383.2000	GRAMS
THE TOTAL SURFACE AREA IS	56.5897	SQUARE METERS
SPECIFIC SURFACE AREA IS	0.1477	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.339198	356.1064
0.307447	324.2988
0.246056	259.6001
0.212416	226.5290
0.160654	176.6445
0.119970	136.4848

THE VALUE OF "C" FACTOR IN EET ANALYSIS IS	77.0863	
THE MONOLAYER ADSORPTION IS	976.X62	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	383.2003	GRAMS
THE TOTAL SUPFACE AREA IS	74.6107	SQUARE IIETERS
SPECIFIC SURFACE AREA IS	0.1947	SQUARE METERS/GRAM

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSCRPTICN AT 106.65°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAPOR FRESSURE = 1.2620 ATfl. (18.55 PSIA)
DEAD VOLUME FACTOR= 0.1449

NUMBER	PRESSURE OF P/PO	SYSTEM (FSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROHOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01566	0.290	1498.605	14.654	1483.951	0.000
2	0.12661	2.348	5254.063	118.668	5135.371	0.000
3	0.22551	4.188	8088.547	212.058	7876.468	0.000
4	0.30020	5.568	10454.030	232.305	10181.720	0.000
5	0.35241	6.536	12255.670	331.715	11025.150	0.000
6	0.39157	7.262	14216.470	368.836	13847.630	0.000
7	0.43334	6.037	15574.220	408.490	15165.730	0.000
8	0.45814	8.497	16605.420	432.063	16173.360	0.000
9	0.47902	8.684	17723.710	451.931	17271.770	0.000
10	0.50382	9.344	19007.230	475.545	18531.690	0.000
11	0.51948	9.635	20135.870	490.470	19645.400	0.000
12	0.56647	10.506	21899.780	535.298	21364.460	0.000
13	0.61847	11.474	23267.100	585.199	22681.900	0.000
14	0.65130	12.080	24510.030	616.438	23993.590	0.000
15	0.67871	12.588	25815.120	642.703	25172.410	0.000
16	0.70873	13.145	26847.490	671.511	26175.980	0.000
17	0.73613	13.653	27759.050	697.640	27061.200	0.000
18	0.75310	13.968	28566.710	714.151	27852.560	0.000
19	0.76676	14.258	29296.480	729.219	28567.260	0.000
20	0.67359	12.493	26535.580	637.602	27897.780	0.000
21	0.65310	12.113	26239.460	618.158	27521.300	0.000
22	0.64285	11.923	28146.370	603.344	27538.030	0.000
23	0.56349	10.451	26770.670	532.457	26238.220	0.000
24	0.52768	9.757	25889.810	498.283	25391.530	0.000
25	0.49827	9.241	25026.930	470.258	24556.670	0.000
26	0.47015	8.720	23931.990	443.489	23488.500	0.000
27	0.40755	7.559	21930.760	384.002	21546.760	0.020
28	0.37053	6.872	20576.400	348.883	20227.520	0.000
29	0.32587	6.044	19010.730	306.582	18704.150	0.000
30	0.29653	5.500	17809.640	278.636	17530.600	0.000
31	0.26849	4.980	16518.440	252.333	16366.100	0.000
32	0.23250	4.318	15248.600	218.655	15029.940	0.000
33	0.20605	3.622	14051.050	193.437	13867.610	0.000
34	0.18567	3.444	12973.140	174.244	12798.900	0.000
35	0.16146	2.905	11903.150	151.473	11841.670	0.000
36	0.14494	2.688	11136.970	135.918	11001.050	0.000
37	0.12840	2.351	10330.690	120.369	10210.320	0.000
39	0.11557	2.145	9615.125	106.418	9506.707	0.000
39	0.10295	1.909	61'55.594	96.473	8869.117	0.000
40	0.09024	1.674	83S2.059	84.537	8297.520	0.000
41	0.08261	1.532	7847.934	77.378	7770.555	0.000
42	0.07752	1.433	7346.742	72.607	7274.133	0.000
43	0.07243	1.343	6878.473	67.838	6810.633	0.000
44	0.06735	1.249	6459.520	63.049	6396.449	0.000
45	0.05226	1.155	6031.676	58.302	6023.371	0.000

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FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSORPTIOII AT 106.65°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 0552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAPOR PRESSURE = 1.2620 ATU. (18.55 PSIA)
DEAD VOLUME FACTOR= 0.1449

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.126607	26.2278
0.225806	37.0298
0.300204	42.1331

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	5.4038	
THE MONOLAYER ADSCRPTION IS	10117.5500	MICRCIMOLES
THE UEIGHT OF THE SAIIPLE IS	144.2000	GRAMS
THE TOTAL SUPFACE AREA IS	732.7354	SQUARE METERS
SPECIFIC SURFACE AREA IS	5.0814	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.325869	25.8440
0.25'6534	24.0453
0.268485	22.4260
0.232802	20.1893
0.206050	18.7145
0.1 E5674	17.8148
0.161495	16.2632
0.144939	15.4082
0.128396	14.4276
0.1 15674	13.7592
0.102953	12.9403

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.1078	
THE MONOLAYER ADSORPTION IS	15549.8900	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	1126.1560	SQUARE METERS
SPECIFIC SURFACE AREA IS	7.8097	SQUARE METERS/GRAM

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSORPTION AT 106.65°C
DATA FROM PRESSURE TRANSDUCER 4
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATMATION VAPOR PRESSURE = 1.2620 ATM. (18.55 PSIA)
DEAD VOLUME FACTOR= 0.1449

NUMBER	PRESSURE OF P/PO	SYSTEN (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORPED (MICROMOLES)	CAPACITANCE [PICOFARADS]
1	0.01725	0.320	1493.325	16.144	1477.181	0.000
2	0.12849	2.383	5251.512	120.454	5131.055	0.000
3	0.22634	4.198	8093.816	212.566	7851.250	0.000
4	0.30025	5.569	10486.240	282.346	10203.890	0.000
5	0.35305	6.540	12279.500	332.319	11947.180	0.000
6	0.39050	7.243	14342.920	367.820	13975.100	0.000
7	0.43180	8.009	15703.080	407.026	15296.050	0.000
8	0.45773	8.490	16727.960	431.678	16296.280	0.000
9	0.47837	8.881	17816.340	451.785	17354.550	0.000
10	0.50192	9.309	19117.670	473.739	18643.920	0.000
11	0.51634	9.576	20253.260	487.473	19765.780	0.000
12	0.55342	10.450	2C030.370	532.339	21497.980	0.000
13	0.61532	11.412	23413.860	581.991	22831.870	0.000
14	0.44800	12.018	24780.020	613.278	24166.740	0.000
15	0.67588	12.536	26013.050	639.998	25373.050	0.000
16	0.70569	13.088	27051.510	658.594	26392.910	0.000
17	0.73261	13.588	27995.620	694.455	27301.170	0.000
18	0.74896	13.691	28840.500	710.171	28130.330	0.000
19	0.76435	14.176	29602.440	724.972	28377.490	0.000
20	0.66900	12.408	26834.810	633.402	28201.410	0.000
21	0.64914	12.040	28535.000	614.365	27920.630	0.000
22	0.63874	11.847	28441.270	604.403	27834.870	0.000
23	0.56030	10.392	27047.250	529.405	26537.840	0.000
24	0.52442	9.726	26188.280	405.174	25693.110	0.000
25	0.49422	9.166	25329.210	466.399	24852.810	0.000
26	0.46592	8.641	24231.850	439.465	23792.390	0.000
27	0.40182	7.453	22235.380	378.564	21857.820	0.000
28	0.36698	6.806	20570.400	345.515	20524.880	0.000
29	0.32086	5.951	19307.420	301.842	19005.530	0.000
30	0.29170	5.410	181C4.760	274.257	17830.500	0.000
31	0.26444	4.905	16915.990	248.511	16647.480	0.000
32	0.23061	4.277	15547.830	216.590	15531.240	0.000
33	0.20432	3.789	14362.870	191.802	14171.070	0.000
34	0.18460	3.424	13281.890	173.234	13108.660	0.000
35	0.16020	2.971	12317.100	150.273	12166.830	0.000
36	0.14519	2.693	11455.790	136.157	11319.630	0.000
37	0.12925	2.397	10655.610	121.172	10534.440	0.000
38	0.11519	2.136	9952.660	107.961	9844.719	0.000
39	0.10394	1.928	9304.523	97.398	9207.125	0.000
40	0.09176	1.702	8711.137	85.963	8625.172	0.000
41	0.08332	1.545	8178.406	78.051	8100.352	0.000
42	0.07854	1.458	7682.051	73.657	7608.391	0.000
43	0.07302	1.354	7222.052	68.386	7153.695	0.000
44	0.06833	1.267	6810.551	63.994	6746.555	0.000
45	0.06552	1.215	6429.289	61.359	6367.930	0.000

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSORPTION AT 106.65°C
DATA FROM PRESSURE TRANSDUCER 4
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAPOR PRESSURE = 1.2620 ATM. (18.55 PSIA)
DEAD VOLUME FACTOR= 0.1449

*** ANALYSIS GASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.128487	28.7328
0.226344	37.1216
0.300248	42.0503

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	5.1157	
THE MONOLAYER ADSORPTION IS	10318.8500	MICRCIMOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	747.3137	SQUARE METERS
SPECIFIC SURFACE AREA IS	5.1825	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-PIX (1/MOLE)
0.320859	24.8584
0.291701	23.0971
0.264438	21.5692
0.230611	19.5505
0.204315	18.1199
0.184601	17.2705
0.160203	15.6790
0.145194	15.0054
0.129251	14.0905
0.115187	13.2236
0.103939	12.5984

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.2297	
THE MONOLAYER ADSORPTION IS	15939.0600	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	CRAMS
THE TOTAL SURFACE AREA IS	1154.3430	SQUARE METERS
SPECIFIC SURFACE AREA IS	8.0052	SQUAPE METERS/GRAM

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
NATER CDSORPTION AT 124.39°C
DATA FEOM FRESSURE TRANSDUCER 3
DEFTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAFOR PRESSURE = 2.2476 ATM. (33.03 FSIA)
DEAD VOLUME FACTOR= 0.1449

NUMBER	PRESSURE OF SYSTEM P/PO	(FSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02345	0.775	1496.443	37.346	1459.097	0.000
2	0.03078	1.017	3294.120	49.026	3245.095	0.000
3	0.04031	1.331	4805.113	64.216	4743.695	0.000
4	0.10347	3.553	6145.527	173.101	7972.426	0.000
5	0.18982	6.270	11323.960	303.565	11020.400	0.000
6	0.25652	8.473	13915.140	410.934	13507.210	0.000
7	0.32467	10.724	16497.010	521.057	15975.950	0.000
8	0.36933	12.201	18526.050	593.505	17932.550	0.000
9	0.42654	14.089	20603.020	686.397	10916.620	0.000
10	0.48150	15.904	22627.690	775.937	21551.900	0.000
11	0.51003	16.543	23938.850	822.680	23116.170	0.000
12	0.55253	18.252	25662.180	892.256	24769.920	0.000
13	0.58848	19.433	27162.890	951.163	26211.720	0.000
14	0.62291	20.575	28440.250	1007.775	27432.470	0.000
15	0.68436	22.608	30682.470	1109.229	29573.240	0.000
16	0.73207	24.181	32693.640	1187.973	31505.890	0.000
17	0.77090	25.463	34337.080	1252.340	33054.740	0.000
18	0.80505	26.624	35737.910	1310.757	34427.150	0.000
19	0.63169	27.471	36911.970	1353.425	35558.550	0.000
20	0.85513	23.245	37854.130	1332.494	36491.640	0.000
21	0.68921	22.765	35007.370	1117.074	33890.300	0.000
22	0.65955	21.785	34145.410	1068.121	33077.290	0.000
23	0.65443	21.618	33800.1SO	1059.773	32740.410	0.000
24	0.59353	19.779	31943.200	968.166	30975.030	0.000
25	0.54900	18.134	30109.260	856.403	29222.860	0.000
26	0.47255	15.609	26984.400	761.385	26223.010	0.000
27	0.41925	13.845	24735.320	674.534	24110.780	0.000
28	0.38330	12.826	23484.220	624.226	22860.000	0.000
29	0.36888	12.184	22496.750	592.697	21904.050	0.000
30	0.34875	11.519	21502.790	560.048	20942.740	0.000
31	0.32287	10.665	20359.330	518.144	19841.190	0.000
32	0.25610	6.459	17654.140	410.266	17273.870	0.000
33	0.21164	6.901	15503.320	335.645	15164.670	0.000
34	0.17438	5.760	13704.450	278.765	13425.720	0.000
35	0.14432	4.767	12222.990	230.520	11992.460	0.000
36	0.12785	4.223	10970.600	204.146	10766.450	0.000
37	0.11049	3.656	9837.363	176.661	9660.699	0.000
33	0.09639	3.184	8807.180	153.783	8653.395	0.000
39	0.09068	2.995	7806.773	144.639	7644.133	0.000

FIELD CORE NUMBER 3 (FROM KELL MGS20-13)
WATER CDSCRPTION AT 124.39°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 9552 FT 9 IN TO 0553 FT 3 IN

THE SATURATION VAPOR PRESSURE = 2.2476 ATtl. (33.03 PSIA)
DEAD VOLUME FACTOR= 0.1449

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.108470	15.2610
0.189822	21.2603
0.256516	25.5433
0.324674	30.0931

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS 9.5110
THE MONOLAYER ADSORPTION IS 13103.3700 MICROMOLES
THE UEIGHT OF THE SAMPLE IS 144.2000 GRAMS
THE TOTAL SURFACE AREA IS 958.2505 SQUARE METERS
SPECIFIC SURFACE AREA IS 6.6453 SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.348747	25.5697
0.322874	24.0323
0.256101	10.0300
0.211640	17.7027
0.174334	15.7323
0.144316	14.0535
0.127859	13.6167
0.110694	12.8343

THE VALUE OF "C" FACTCR IN BET ANALYSIS IS 9.2359
THE MONOLAYER ADSORPTION IS 16573.0100 MICROMOLES
THE EIGHT OF THE SAMPLE IS 144.2000 GRAMS
THE TOTAL SURFACE AREA IS 1212.0510 SQUARE METERS
SPECIFIC SURFACE AREA IS 8.4053 SQUARE METERS/GRAM

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSORPTION AT 124.39°C
DATA FROM PRESSURE TRANSDUCER 4
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAFOR PRESSLTE = 2.2476 ATM. (33.03 PSIA)
DEAD VOLUME FACTOR= 0.1449

NUMBER	FRESSURE OF P/PO	SYSTEM (FSIA)	TOTAL AHOUNT FLOU IN (MICROHOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.02315	0.765	1450.246	36.858	1443.387	0.000
2	0.02961	0.978	3271.827	47.153	3224.674	0.000
3	0.03984	1.316	4777.457	63.462	4713.992	0.000
4	0.10824	3.575	8092.211	172.730	7919.480	0.000
5	0.18908	6.245	11246.770	3C2.367	10944.400	0.000
6	0.25648	8.472	13834.890	410.882	13424.000	0.000
7	0.32446	10.717	16409.320	520.714	15898.600	0.000
8	0.34926	12.197	18427.610	593.313	17534.300	0.000
9	0.42541	14.051	20508.070	684.560	19823.510	0.000
10	0.48158	15.907	22509.580	776.120	21733.460	0.000
11	0.50913	16.617	23819.180	821.135	22995.050	0.000
12	0.55236	18.245	25533.010	891.901	24641.110	0.000
13	0.58911	19.458	27026.180	952.201	26075.960	0.000
14	0.62208	20.545	28316.050	1006.411	27309.640	0.000
15	0.68318	22.566	30579.760	1107.123	29472.640	0.000
16	0.73023	24.120	32612.480	1184.924	31427.550	0.000
17	0.76863	25.388	34274.550	1248.584	33025.960	0.000
18	0.E0434	26.568	356E3.540	1307.902	34375.640	0.000
19	0.82923	27.390	36888.010	1349.322	35539.690	0.000
20	0.65303	28.176	37681.240	1·189.000	36492.240	0.000
21	0.69516	22.961	34591.620	1126.913	33664.710	0.000
22	0.66412	21.935	34147.300	1075.657	33071.640	0.000
23	0.65930	21.777	33806.670	1067.717	32735.950	0.000
24	0.60369	19.940	31$51.640	976.165	30975.470	0.000
25	0.55297	18.265	30122.070	E92.896	29229.170	0.000
26	0.47672	15.746	26977.750	765.191	26203.560	0.000
27	0.42137	13.918	24790.840	677.960	24112.860	0.000
28	0.39053	12.699	23437.870	627.846	22870.020	0.000
29	0.37097	12.259	22537.420	595.930	21941.480	0.000
33	0.35176	11.619	21525.380	564.926	20960.450	0.000
31	0.32522	10.742	20386.150	521.943	19964.210	0.000
32	0.25897	8.554	17724.360	414.895	17303.460	0.000
33	0.21399	7.060	15551.190	342.434	15206.760	0.000
34	0.17700	5.546	13748.110	282.960	13465.150	0.000
35	0.14479	4.792	12284.430	231.201	12053.150	0.000
36	0.12791	4.225	11042.160	204.225	10837.940	0.000
37	0.10973	3.633	9917.163	175.520	9741.668	0.000
39	0.09522	3.145	8903.203	151.912	8751.289	0.000
39	0.09101	3.006	7901.113	145.172	7755.938	0.000

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSORPTIOII AT 124.39°C
DATA FROM PRESSURE TRANSDUCER 4
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAPOR PRESSURE = 2.2476 ATH. (33.03 PSIA)
DEAD VOLUME FACTOR= 0.1449

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.108237	15.3261
0.189077	21.3043
0.256483	25.6971
0.324462	30.2293

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.5153	
THE MONOLAYER ADSORPTION IS	13033.4100	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	953.1343	SQUARE METERS
SFECIFIC SURFACE AREA IS	6.6098	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.325221	24.2631
0.258971	20.1898
0.213993	17.9011
0.176997	15.3717
0.144791	14.0455
0.127909	13.5329
0.109981	12.6848

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.2332	
THE MONOLAYER ADSORPTION IS	16599.4600	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	1213.0210	SSUCEE METERS
SFECIFIC SURFACE AREA IS	8.4183	SQUARE METERS/GRAM

FIELD CCRE NUMBER 3 (FROM KELL MGS20-13)
WATER ADSORPTION AT 142.80°C
DATA FROM FRESSURE TRANSDUCER 3
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAPOR PRESSURE = 3.6571 ATM. (56.68 PSIA)
DEAD VOLUME FACTOR= 0.1449

NUMBER	FRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE [PICOFARADS)
1	0.01708	0.968	1135.049	44.617	1090.433	0.000
2	0.03557	2.033	2426.659	93.75s	2332.901	0.000
3	0.04570	2.590	3858.889	119.472	3739.418	0.000
4	0.11104	6.204	6713.653	290.985	6422.895	0.000
5	0.14691	8.328	6146.644	385.493	7763.348	0.000
6	0.17467	9.901	9296.922	458.794	8838.125	0.000
7	0.10944	11.335	10227.600	524.326	9703.273	0.000
8	0.22293	12.635	11144.190	586.579	10557.610	0.000
9	0.25282	14.331	12346.160	665.966	11680.190	0.000
10	0.26904	15.251	13061.210	709.135	12352.080	0.000
11	0.33437	18.954	15756.610	883.476	14873.330	0.000
12	0.41378	23.455	16996.870	1096.574	17902.300	0.000
13	0.48762	27.640	21774.920	1295.939	20476.980	0.000
14	0.54992	31.172	24240.450	1465.072	22775.380	0.000
15	0.62928	35.670	27816.420	1681.741	26134.680	0.000
16	0.69240	39.243	30375.830	1855.122	28520.700	0.000
17	0.74271	42.100	32280.120	1993.958	30286.130	0.000
18	0.76656	43.453	33555.880	2050.087	31495.790	0.000
19	0.70216	44.933	34842.530	2131.052	32711.480	0.000
20	0.62661	35.519	31671.820	1674.437	29997.390	0.000
21	0.59396	33.668	30596.370	1585.146	29011.230	0.000
22	0.54949	31.147	29033.930	1463.884	2i620.050	0.000
23	0.50126	28.413	27398.980	1332.880	26066.100	0.000
24	0.45520	25.802	25543.130	1206.253	24334.870	0.000
25	0.39923	22.573	23397.100	1054.751	22342.340	0.000
26	0.34994	19.779	21231.830	$22.477	20309.350	0.000
27	0.32201	18.253	20110.350	650.422	19259.930	0.000
28	0.29174	16.537	18603.220	760.613	17923.600	0.000
29	0.21034	11.923	15384.580	553.205	14831.370	0.000
30	0.15601	6.957	12723.690	414.790	12308.890	0.000
31	0.12458	7.062	10633.900	326.625	10307.270	0.009
32	0.09828	5.571	8991.801	257.425	6734.375	0.000
33	0.08243	4.672	7607.168	215.733	7391.383	0.000
34	0.06659	3.774	6404.602	174.215	6230.363	0.000

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSORPTION AT 142.80°C
DATA FROM FRESSURE TRANSDUCER 3
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAFCR PRESSURE = 3.8571 ATM. (56.68 PSIA)
DEAD VOLUME FACTOR= 0.1449

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.11 1038	19.4473
0.146912	22.1627
0.174671	23.9460
0.199439	25.6743
0.222927	27.1728
0.25261 8	26.0589
0.269045	29.7984
0.334373	33.7747

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	5.9807	
THE MONOLAYER ADSORFTION IS	13095.6700	MICROHOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	968.5676	SGUARE METERS
SPECIFIC SURFACE AREA IS	6,7168	SQUARE METERS/GRAM

*** ANALYSIS EASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR Pi(1-P)X (1/MOLE)
0.348943	26.3900
0.32201 2	24.660 1
0.291744	22.96 19
0.210340	17.9597
0.15601 3	15.2465
0.124578	13.8063

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.8002	
THE NONOLAYER ADSORPTICN IS	15821.6100	MICROMOLES
THE WEIGHT OF THE SAMFLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	1170.1790	SSUARE METERS
SPECIFIC SURFACE AREA IS	8.1 150	SQUARE METERS/GRAM

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSORPTION AT 142.80°C
DATA FROM PRESSURE TRANSDUCER 4
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAPOR PRESSVAE ◻ 3.8571 ATM. (56.68 PSIA)
DEAD VOLUME FACTOR:: 0.1449

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT AOSOFBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01757	0.996	1129.291	45.880	1083.411	0.000
2	0.03576	2.027	2414.287	93.471	2520.816	0.000
3	0.04581	2.537	3843.146	119.760	3723.386	0.000
4	0.11143	6.316	6686.387	292.024	6394.359	0.000
5	0.14757	8.365	8104.777	387.227	7717.547	0.C00
6	0.17523	9.933	9249.504	460.278	8789.223	0.000
7	0.20007	11.341	10165.600	526.006	9639.594	0.000
8	0.22356	12.678	11071.990	588.536	10483.450	0.000
9	0.25355	14.372	12255.110	667.923	11597.190	0.000
10	0.25960	15.282	12977.690	710.626	12267.060	0.000
11	0.33509	18.994	15669.970	885.398	14784.570	0.000
12	0.41 355	23.459	18903.000	1096.767	17806.230	0.000
13	0.48761	27.640	21678.620	1295.913	20362.700	0.000
14	0.54973	31.161	24151.350	1454.552	22686.800	0.000
15	0.62859	35.631	27729.680	1679.864	26049.810	0.000
16	0.69106	39.172	30305.660	1851.436	28454.230	0.000
17	0.74154	42.034	32217.460	1990.761	30226.690	0.000
18	0.76521	43.375	33494.760	2056.278	31438.480	0.000
19	0.791 40	44.860	34774.980	2128.943	32646.030	0.000
20	0.62777	35.585	31570.490	1677.618	29912.870	0.000
21	0.59478	33.715	30516.330	1587.383	28928.940	0.000
22	0.55054	31.207	28991.640	1456.742	27524.900	0.000
23	0.50228	28.471	27283.930	1335.663	25948.270	0.000
24	0.45598	25.647	25412.440	1210.373	24202.070	0.000
25	0.39852	22.590	23250.610	1055.534	22105.070	0.000
26	0.34960	19.817	21084.270	924.235	20160.030	0.000
27	0.32191	18.247	19969.530	850.141	19119.380	0.000
28	0.291 76	16.538	18541.320	769.664	17771.650	0.000
29	0.20902	11.699	15260.780	552.095	14i03.690	0.000
30	0.15862	8.991	12565.230	416.391	12168.830	0.000
31	0.12439	7.051	10521.710	326.124	10195.590	0.000
32	0.03914	5.619	8867.125	259.685	8607.438	0.000
33	0.08222	4.660	7491.738	215.235	72i6.500	0.000
34	0.06654	3.772	6259.922	174.107	6115.813	0.000

FIELD CORE NUMBER 3 (FROM WELL MGS20-13)
WATER ADSORPTION AT 142.80°C
DATA FEOM FRESSURE TRANSDUCER 4
DEPTH FROM 9552 FT 9 IN TO 9553 FT 3 IN

THE SATURATION VAFOR FRESSURE = 3.8571 ATM. (56.68 PSIA)
DEAD VOLUHE FACTOR= 0.1449

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.11 1433	19.6123
0.147569	22.4314
0.175232	Z4.1730
0.200074	25.9467
0.223664	27.4916
0.253555	29.2901
0.249605	30.0905
0.335091	34.0873

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	5.9830	
THE MONOLAYER ADSORPTION IS	12951.3500	MICRCMOLES
THE KEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	060.1 118	SQUARE METERS
SFECIFIC SURFACE AREA IS	6.6582	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.349599	26.6623
0.321 907	24.6295
0.291763	23.1805
0.209021	18.0639
0.158620	15.4923
0.124388	13.9332

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.7644	
THE MONOLAYER ADSORPTION IS	15729.3700	MICRCHOLES
THE WEIGHT OF THE SAMPLE IS	144.2000	GRAMS
THE TOTAL SURFACE AREA IS	1163.3570	SQUARE METERS
SPECIFIC SURFACE AREA IS	8.0677	SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 105.69°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSLIRE = 1.221 1 ATM. (17.94 PSIA)
DEAD VOLUtlE FACTOR= 0.1395

NUMBER	PRESSURE OF SYSTEM P/P0	(PSIA)	TOTAL AHOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.00944	0.169	143.723	8.254	135.475	0.000
2	0.02158	0.387	643.255	16.671	624.364	0.000
3	0.05261	0.944	2634.667	46.023	2588.844	0.000
4	0.10387	1.664	3962.527	90.946	3871.581	0.000
5	0.15918	2.857	5241.449	133.507	5101.941	0.000
6	0.20370	3.655	6265.46 1	178.661	6066.797	0.000
7	0.24957	4.47s	7291.160	219.066	7072.094	0.000
8	0.26060	5.035	8343.746	246.437	6097.309	0.000
9	0.31 637	5.713	9354.60 1	279.798	9075.00 0	0.000
10	0.34265	6.149	9928.660	301.268	9627.391	0.000
11	0.36289	6.512	10597.400	319.1 74	10276.220	0.000
12	0.40201	7.214	11697.740	353.629	11343.91 0	0.000
13	0.45327	8.13%	13085.500	399.31 5	12686.160	0.000
14	0.51397	9.223	14433.000	453.269	13979.71 0	0.000
15	0.56658	10.167	1565'6.270	500.163	15196.110	0.000
16	0.61515	11.039	16787.910	543.5 12	16244.400	0.000
17	0.65561	11.765	17811.580	579.695	17231.890	0.000
18	0.69203	12.419	18723.420	612.308	18111.1 10	0.000
19	0.72171	12.951	19566.550	638.913	16927.640	0.000
20	0.74734	13.41 1	20323.310	661.913	10661.390	0.000
21	0.77162	13.847	20993.510	683.726	20309.75'0	0.000
22	0.791 85	14.210	2155'4.430	701.916	20892.510	0.000
23	0.80939	14.52%	22160.630	717.692	21443.140	0.000
24	0.59995	14.355	22300.030	709.197	21590.830	0.000
25	0.62153	14.742	22631.760	726.622	22103.130	0.000
26	0.71 870	12.697	21611.660	636.213	20975.470	0.000
27	0.64589	11.570	20016.300	570.996	19447.300	0.000
28	0.54670	9.610	17916.510	482.436	17434.060	0.000
29	0.48856	6.767	16393.450	430.679	15762.770	0.000
30	0.41331	7.417	14643.980	363.847	14280.140	0.000
31	0.34998	6.280	13015.400	307.756	12707.640	0.000
32	0.29330	5.263	11572.540	257.655	11314.690	0.000
33	0.24720	4.436	10256.360	216.974	10039.370	0.000
34	0.20243	3.633	9165.105	177.543	8987.563	0.000
35	0.16557	2.971	8256.695	145.134	8111.559	0.000
36	0.14191	2.547	7464.453	124.330	7340.121	0.000
37	0.12087	2.169	6337.496	105.857	6731.637	0.000
36	0.10641	1.909	6276.785	93.166	6153.6 17	0.000
39	0.09852	1.768	5864.41 8	86.251	5776.164	0.000
40	0.09195	1.650	5452.1 60	80.488	5371.691	0.000
41	0.08538	1.532	5064.762	74.727	4990.031	0.000
42	0.07749	1.391	4710.406	67.616	4642.590	0.000

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 105.69°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 1.2211 ATM. (17.94 PSIAI
DEAD VOLUME FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-PIX (1/MOLE)
0.103874	29.9397
0.1591 84	37.1075
0.203702	42.0271
0.249568	47.0252
0.280596	43.1690
0.318368	51.4675
0.342651	54.1436

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	5.6314	
THE MONOLAYER ADSORPTION IS	8411.5030	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	608.8789	SQUARE HETERS
SPECIFIC SURFACE AREA IS	3.8807	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.349985	42.3702
0.293303	36.6803
0.2471 94	32.7078
0.202431	C8.2402
0.165584	Z4.4644
0.141909	22.5306
0.120869	20.4239
0.106407	19.2569

THE VALUE OF "C" FACTOR N EET ANALYSIS IS	11.6059	
THE MONOLAYER ADSORPTION IS	9602.9290	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	155.9300	GRAMS
THE TOTAL SURFACE AREA IS	695.1221	SQUARE METERS
SPECIFIC SURFACE AREA IS	4.4304	SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 105.69°C
DATA FROM PRESSURE TRANSDUCER 4
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAFOR PRESSURE = 1.2211 ATM. (17.94 PSIA)
DEAD VOLUME FACTOR= 0.1395

NUMBER	FRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.00991	0.178	134.612	8.660	127.952	0.000
2	0.02081	0.373	634.162	16.190	615.972	0.000
3	0.051 52	0.925	2623.693	45.070	2578.623	0.000
4	0.10207	1.632	3S43.648	S9.362	3854.264	0.000
5	0.15657	2.646	5209.934	138.970	5070.96 1	0.000
6	0.20220	3.629	6220.141	177.341	6042.797	0.000
7	0.24663	4.429	7244.773	216.653	7028.11 7	0.000
8	0.27857	4.999	6269.664	244.651	8045.012	0.000
9	0.31627	5.675	9298.199	277.945	9020.254	0.000
10	0.34009	6.103	9671.563	298.999	9572.563	0.000
11	0.361 92	6.495	10533.900	318.316	10215.580	0.000
12	0.40062	7.169	11622.060	352.602	11269.460	0.000
13	0.45323	8.133	12956.380	399.281	12557.100	0.000
14	0.51 181	9.164	14328.410	451.363	13877.050	0.000
15	0.56544	10.147	15583.81 0	499.139	15084.670	0.000
16	0.61411	11.020	16668.720	542.584	16126.140	0.030
17	0.65384	11.733	17691.290	578.112	17113.170	0.000
18	0.69160	12.411	18599.890	611.918	17997.980	0.000
19	0.72141	12.946	19426.120	638.644	16787.460	0.000
20	0.74725	13.409	20176.100	661.833	19514.260	0.000
21	0.7721 0	13.655	20836.820	684.155	20152.670	0.000
22	0.791 98	14.212	21427.340	702.028	20725.310	0.000
23	0.80887	14.515	21992.540	717.231	21275.31 0	0.000
24	0.79893	14.337	22133.590	705.287	21425.30 0	0.000
25	0.82080	14.729	22673.320	727.970	21945.350	0.000
26	0.71 492	12.829	21459.870	632.819	20827.050	0.000
27	0.64062	11.496	19873.510	566.281	19307.230	0.000
28	0.54103	9.709	17773.870	477.385	17296.460	0.000
29	0.46350	8.676	16249.530	426.176	15823.350	0.000
30	0.40849	7.330	14505.320	359.574	14145.750	0.000
31	0.34426	6.178	12888.540	302.695	12585.850	0.000
32	0.28691	5.149	11464.760	252.010	11212.750	0.000
33	0.24029	4.312	10165.690	210.656	9954.81 3	0.000
34	0.19564	3.51 1	9087.723	171.570	8916.152	0.000
35	0.15782	2.832	8193.543	138.308	8055.234	0.000
35	0.13552	2.432	7403.352	118.723	7264.625	0.000
37	0.11518	2.067	6777.516	100.661	6676.652	0.000
38	0.09968	1.769	6230.930	87.265	6143.664	0.000
39	0.09290	1.667	5817.671	81.320	5736.551	0.000
40	0.08612	1.545	5417.062	75.377	5341.703	0.000
41	0.07934	1.424	5040.680	69.436	4971.242	0.000
42	0.07256	1.302	4682.590	63.497	4619.090	0.000

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 105.69°C
DATA FPOH FRESSUEE TRANSDUCER 4
DEPTH FROM 9562 FT 10 I N TO 9563 FT 7 I N

THE SATURATION VAFOR PRESSURE = 1.2211 ATH. (17.94 PSIA)
DEAD VOLUtlE FACTOR= 0.1395

*** ANALYSIS EASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.102068	29.491 7
0.156573	37.1640
0.202202	41.9425
0.246831	46.6303
0.278573	47.9977
0.316272	51.2813
0.340085	53.8358

THE VALUE OF "C" FACTOR I N 6ET ANALYSIS IS	5.6846	
THE MONOLAYER ADSCRFTION I S	8389.01 10	MICRC'MOLES
THE WEIGHT OF THE SAMPLE I S	156.9000	GRAMS
THE TOTAL SUEFACE APEA I S	607.251 0	SQUARE METERS
SPECIFIC SURFACE AREA I S	3.8703	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.344264	41.7139
0.286910	35.8830
0.240289	31.7725
0.105644	27.2798
0.157620	23.2537
0.135525	21.5208
0.1 15176	19.4959

THE VALUE OF "C" FACTOR I N BET ANALYSIS IS	12.7389	
THE MONOLAYER ADSORPTION IS	9502.2500	MICROMOLES
THE HEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA I S	687.6342	SQUARE METERS
SPECIFIC SURFACE AREA I S	4.3539	SQUARE METERWGRAM

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSCRPTION AT 125.56°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE S TUAATION VAPOR PRESSURE = 2.3300 ATM. (34.24 PSIA)
DEAD VOLUME FACTOR= 0.1395

NUMEER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.04242	1.452	1105.017	67.269	1037.728	0.000
2	0.06099	2.397	2001.189	111.106	1690.083	0.000
3	0.12655	4.333	3501.399	201.188	3300.211	0.000
4	0.16119	5.519	4548.316	256.496	4291.820	0.000
5	0.21351	7.311	5634.918	340.217	5494.699	0.000
6	0.24315	6.497	6756.016	395.762	6360.230	0.000
7	0.27007	9.247	7334.977	430.990	6903.984	0.000
8	0.29410	10.070	8053.738	469.653	7534.082	0.000
9	0.30753	10.530	8576.617	491.281	8085.336	0.000
10	0.32521	11.136	9280.215	519.762	8760.449	0.000
11	0.34654	11.934	10107.820	557.400	9550.422	0.000
12	0.36762	12.568	10722.720	568.230	10134.490	0.000
13	0.39095	13.367	11321.970	625.956	1C696.010	0.000
14	0.42488	14.549	11968.240	650.915	11307.320	0.000
15	0.46517	15.926	13019.660	746.314	12273.340	0.000
16	0.40204	16.848	13729.600	769.995	12939.800	0.000
17	0.54293	18.591	14932.000	872.940	14059.050	0.000
18	0.62774	21.495	17363.710	1011.711	16352.000	0.000
19	0.70053	23.967	19535.770	1131.360	16404.410	0.000
20	0.77945	27.374	20750.210	1294.800	19655.410	0.000
21	0.81356	27.858	21783.210	1318.227	20464.980	0.000
22	0.73397	25.132	20433.540	1186.512	19247.030	0.000
23	0.66902	22.903	16675.560	1079.500	17709.260	0.000
24	0.56044	19.675	16713.150	934.230	15778.920	0.000
25	0.51705	17.705	15104.010	630.744	14273.260	0.000
26	0.45210	15.623	13762.230	741.312	13040.920	0.000
27	0.39748	13.610	12108.140	636.515	11471.620	0.000
28	0.32185	11.021	10261.720	514.350	9747.375	0.000
29	0.26276	9.004	8466.660	419.576	8067.082	0.600
30	0.20969	7.180	6844.434	334.092	6510.340	0.000
31	0.15924	5.452	5325.941	253.372	5072.566	0.000
32	0.11989	4.105	4077.620	190.562	3867.056	0.000
33	0.09229	3.160	3089.621	146.506	2943.023	0.000
34	0.07506	2.570	2266.924	119.168	2147.755	0.000
35	0.05921	2.027	1593.580	93.965	1499.614	0.000
36	0.04474	1.532	1084.941	70.961	1013.960	0.000
37	0.03510	1.202	686.004	55.672	630.332	0.000
38	0.02822	0.966	373.187	44.744	328.443	0.000

FIELD CORE NUMBER 5 [FROM WELL MGS20-13)
WATER ADSORPTION AT 125.56°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 2.3300 ATM. (34.24 PSIA)
DEAD VOLUME FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.126550	43.9016
0.161 192	44.7753
0.21 3508	49.4056
0.248150	51.8931
0.270066	53.5902
0.2941 02	54.9355
0.307534	54.9284
0.325208	55.0128
0.348537	56.01 90

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	2.6446	
THE MONOLAYER ADSORPTION IS	10595.8300	MICROMOLES
THE WEIGHT OF THE SAtIPLE IS	155.9000	GRAMS
THE TOTAL SURFACE AREA IS	761.0556	SQUARE METERS
SPECIFIC SURFACE AREA IS	4.8506	SQUAEE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.32 1850	48.6901
0.262963	44.2272
0.2 09666	40.7536
0.159237	37.3371
0.11 9887	35.0438

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	3.5277	
THE MONOLAYER ADSORPTION IS	10612.1500	HICRCMOLES
THE UEIGHT OF THE SAtIFLE IS	156.0000	GRAMS
THE TOTAL SURFACE AREA IS	776.5062	SQUARE METERS
SPECIFIC SURFACE AREA IS	4.9496	SQUARE METERS/GRAM

FIELD CCRE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 125.56°C
DATA FROM PRESSUFE TRANSDUCER 4
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPCR PRESSURE = 2.3300 ATM. (34.24 PSIA)
DEAD VOLUME FACTOR= 0.1395

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOPBED (MICROMOLES)	CAPACITANCE [PICOFARADS)
1	0.041 54	1.423	1102.602	65.899	1036.703	0.000
2	0.06908	2.365	1992.794	109.650	1863.144	0.000
3	0.12624	4.323	3484.086	200.691	3283.395	0.000
4	0.16055	5.497	4526.941	255.470	4273.469	0.000
5	0.21256	7.278	5811.562	335.689	5472.691	0.000
6	0.24637	8.436	6735.648	392.925	6342.723	0.000
7	0.26979	9.238	7305.973	430.541	6875.430	0.000
8	0.29373	10.058	6027.750	469.047	7558.699	0.000
9	0.30726	10.521	8551.199	490.838	6C60.359	0.000
10	0.32392	11.091	9262.262	517.682	6744.578	0.000
11	0.34735	11.894	10095.330	555.479	9539.652	0.000
12	0.36557	12.518	10717.470	584.91 4	10132.550	0.000
13	0.38849	13.302	11322.320	621.967	10700.350	0.000
14	0.42287	14.460	119S3.130	677.645	11305.480	0.000
15	0.46246	15.635	13023.440	741.907	12281.530	0.000
16	0.46904	16.745	13741.900	785.120	12956.780	0.000
17	0.54064	18.512	14940.71 0	869.211	14071.500	0.000
18	0.62459	21.367	17371.420	1006.551	16364.870	0.000
19	0.6971 0	23.870	19564.030	1125.714	16438.320	0.000
20	0.79572	21.247	20982.21 0	1288.625	19693.550	0.000
21	0.61033	27.747	21602.700	1312.849	20469.650	0.C00
22	0.73053	25.014	20451.250	1180.826	19270.420	0.000
23	0.66541	22.765	16654.190	1073.569	17610.620	0.000
24	0.57922	19.799	16708.490	930.604	15777.880	0.000
25	0.51539	17.648	15071.650	828.036	14243.61 0	0.000
26	0.45966	15.746	13744.170	737.662	13006.490	0.000
27	0.39620	13.557	12052.980	634.456	11416.520	0.000
28	0.31 935	10.935	10203.420	510.314	9693.113	0.000
29	0.26003	8.904	8432.750	414.860	8017.887	0.000
30	0.20744	7.103	6779.769	330.500	6449.289	0.000
31	0.15749	5.303	5260.598	250.583	5010.01 2	0.000
32	0.11 773	4.033	4022.634	167.216	3835.418	0.000
33	0.00084	3.110	3040.524	144.281	2806.242	0.000
34	0.07407	2.535	2215.094	117.598	2097.497	0.090
35	0.05384	2.015	1545.994	93.373	1452.621	0.000
35	0.04462	1.528	1038.709	70.792	$67.917	0.000
37	0.03498	1.198	641.115	55.484	5S5.631	0.000
38	0.02839	0.972	324.276	45.018	279.258	0.000

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 125.56°C
DATA FROtl FRESSVRE TRANSDUCER 4
DEPTH FROM 9562 FT 10 I N TO 9563 FT 7 I N

THE SATURATION VAPOR PRESSURE = 2.3300 ATM. (34.24 PSIA)
DEAD VOLUME FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-PIX (1/MOLE)
0.126238	44.0022
0.160549	44.7541
0.21 2555	49.3213
0.246370	51.5412
0.269786	53.7365
0.293726	55.0202
0.307260	55.0276
0.323918	54.7833
0.347347	55.7878

THE VALUE OF "C" FACTCR I N BET ANALYSIS I S	2.6233	
THE MONOLAYER ADSORPTION I S	10445.5000	MICROMOLES
THE WEIGHT OF THE SAMPLE I S	156.9000	GRAMS
THE TOTAL SURFACE AREA I S	764.401 1	SQUAE'E HETERS
SFECIFIC SURFACE AREA I S	4.8719	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.31 9347	48.4032
0.260028	43.8273
0.207444	40.5843
0.1 57491	37.3115
0.1 17768	34.81 10

THE VALUE OF "C" FACTOR I N BET ANALYSIS I S	3.4927	
THE MONOLAYER ADSORPTION I S	1068it.0500	MICRONOLES
THE WEIGHT OF THE SAMPLE I S	155.9000	GRAMS
THE TOTAL SURFACE AREA I S	781.8582	SQUARE METERS
SPECIFIC SURFACE AREA I S	4.9832	SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTIOH AT 147.35°C
DATA FRCN PRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 4.3718 ATM. (64.25 PSIA)
DEAD VOLUME FACTOR= 0.1395

NUMBER	PRESSURE OF SYSTEM P/PO	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01959	1.259	901.053	55.275	845.778	0.000
2	0.06820	4.362	2636.055	192.760	2443.295	0.000
3	0.10588	6.602	3543.293	299.695	3343.598	0.000
4	0.15788	10.143	5088.191	447.761	4640.410	0.000
5	0.20987	13.484	6523.500	596.474	5927.023	0.000
6	0.25546	16.412	7729.910	727.354	7002.555	0.000
7	0.26765	16.494	6631.477	620.665	7860.809	0.000
8	0.33155	21.301	10075.930	946.915	9127.020	0.000
9	0.36239	24.568	11641.930	1094.406	10547.520	0.000
10	0.44528	28.608	13573.440	1277.708	12295.730	0.000
11	0.51631	33.300	16141.320	1491.847	14649.470	0.000
12	0.61164	39.296	18946.100	1767.513	17180.580	0.000
13	0.63251	44.492	21473.530	2008.263	19465.240	0.000
14	0.77935	50.071	24272.650	2268.863	22003.980	0.000
15	0.79326	50.965	25502.730	2310.766	23191.940	0.000
16	0.81280	52.220	26015.990	2369.792	23646.200	0.000
17	0.75349	46.410	24709.310	2191.038	22518.270	0.000
18	0.65025	41.777	21646.640	1882.235	19764.400	0.000
19	0.59066	37.948	19906.760	1705.329	18t01.430	0.000
20	0.49713	31.939	17129.740	1429.598	15700.140	0.000
21	0.43255	27.790	15467.820	1240.524	14227.300	0.000
22	0.35619	22.884	13193.780	1016.313	12175.460	0.000
23	0.29004	18.634	11066.350	626.982	10239.370	0.000
24	0.21702	13.943	8417.566	616.975	7800.590	0.000
25	0.13683	8.791	6046.756	387.766	5659.000	0.000
26	0.09037	5.607	4481.332	255.697	4225.633	0.000
27	0.05911	3.798	3469.732	167.024	3302.708	0.000

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 147.35°C
DATA FROH PRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 4.3718 ATM. (64.25 PSIA)
DEAD VOLUtIE FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	TtiE FACTOR P/(1-P)X (1/MOLE)
0.105679	35.4161
0.157676	40.4002
0.209670	44.6141
0.255455	48.9968
0.287853	51.4201
0.331548	54.3314

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	4.1470	
THE MONOLAYER ADSORPTION IS	6969.9720	MICROMOLES
THE KEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	665.4087	SQUARE METERS
SPECIFIC SURFACE AREA IS	4.2410	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.290043	39.8085
0.217022	35.5325
0.136629	26.0118

TtiE VALUE OF "C" FPCTOR IN BET ANALYSIS IS	5.5801	
THE MONOLAYER ADSCRPTION IS	10458.1800	MICRCMOLES
THE WEIGHT OF THE SAMPLE IS	156.9300	GRAMS
THE TOTAL SURFACE AREA IS	775.6071	SQUAPE HETERS
SPECIFIC SURFACE AREA IS	4.9446	SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORFTION AT 147.35°C
DATA FROM PRESSURE TRANSDUCER 4
OEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 4.3718 ATM. (64.25 PSIA)
DEAD VOLUME FACTOR= 0.1395

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.01937	1.245	014.739	54.654	860.085	0.000
2	0.06728	4.323	2642.907	190.155	2452.752	0.000
3	0.10524	6.762	3644.410	297.891	3346.518	0.000
4	0.15682	10.075	5039.961	444.775	4645.184	0.000
5	0.20844	13.372	6531.008	592.357	5935.641	0.000
6	0.25397	16.317	7736.328	723.092	7013.234	0.000
7	0.26520	18.357	8685.648	815.891	7869.754	0.000
8	0.32983	21.190	10085.010	941.934	9143.078	0.000
9	0.38043	24.441	11654.200	1088.686	10565.510	0.000
10	0.44328	28.480	13578.910	1271.877	12307.030	0.000
11	0.51479	33.074	16156.020	1461.497	14674.520	0.000
12	0.60776	39.047	16970.860	1756.001	17214.860	0.000
13	0.66765	44.180	21511.220	1993.772	19517.440	0.000
14	0.77423	49.742	24333.310	2253.423	22079.890	0.000
15	0.78914	50.636	25557.450	22'95.361	23262.090	0.000
16	0.80763	51.888	26054.160	2354.163	23709.990	0.000
17	0.75129	48.269	24742.490	2184.440	22558.050	0.000
18	0.64745	41.597	21685.550	1873.912	19811.640	0.000
19	0.56800	37.777	19928.070	16'97.454	18230.610	0.000
20	0.49343	31.704	17168.540	1418.871	15749.670	0.000
21	0.42907	27.567	15502.400	1230.365	14272.030	0.030
22	0.35244	22.643	13231.080	1007.428	12223.660	0.000
23	0.28621	18.388	11102.290	615.919	10265.370	0.000
24	0.21362	13.725	8440.980	607.229	7833.750	0.000
25	0.13287	8.536	6098.191	376.482	5721.707	0.000
26	0.08719	5.602	4538.336	246.628	4291.707	0.000
27	0.05519	3.546	3535.754	155.904	3379.850	0.000

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSDRFTION AT 147.35°C
DATA FROH FRESSURE TRANSDUCER 4
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATL'RATION VAPOR PRESSURE = 4.3718 ATH. (64.25 PSIA)
DEAD VOLUNE FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.105245	35.1462
0.156823	40.0393
0.208437	44.3406
0.253974	48.5419
0.286197	50.9479
0.329827	53.8278

THE VALUE OF "C" FACTOR IN BET AIIALYSIS IS	4.1460	
THE HONOLAYER ADSORPTION IS	9032.0740	MICROMOLES
THE UEIGHT OF THE SAMPLE IS	156.9000	CRAMS
THE TOTAL SLRFACE AREA IS	670.0154	SQUARE METERS
SPECIFIC SURFACE AREA IS	4.2703	SQUAFE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.286207	36.9803
0.213623	34.6774
0.132668	26.7799

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	5.6057	
THE MONOLAYER ADSORFTION IS	10359.1600	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SUPFACE AREA IS	768.4614	SQUARE HETERS
SPECIFIC SURFACE AREA IS	4.6978	SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FRCM UELL MGS20-13)
WATER CDSORPTION AT 166.61°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 7.1932 ATM. (105.71 PSXA)
DEAD VOLUME FACTOR- 0.1395

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03366	3.559	1302.795	149.563	1153.232	0.000
2	0.05290	5.532	1837.490	235.263	1602.227	0.000
3	0.06733	7.117	2519.857	299.650	2220.207	0.000
4	0.10626	11.232	3478.01 9	473.677	3004.142	0.000
5	0.11885	12.564	3809.797	530.396	3279.40 1	0.000
6	0.18960	20.043	5529.523	649.329	4660.191	0.000
7	0.22920	24.229	6530.137	1028.934	5501.199	0.000
8	0.26285	27.765	7654.516	1182.140	6472.375	0.000
9	0.29236	30.906	8631.832	1317.044	7314.785	0.000
10	0.32462	34.316	9725.902	1464.989	8260.91 0	0.000
11	0.43117	45.579	13591.140	1957.641	11633.500	0.000
12	0.50632	53.523	16246.190	2306.957	13937.230	0.000
13	0.57867	61.171	18766.690	2650.273	16116.620	0.000
14	0.66575	70.376	21747.550	3065.327	16662.250	0.000
15	0.72949	77.115	24400.610	3372.226	21028.380	0.000
16	0.76407	82.884	26796.880	3637.116	23161.760	0.000
17	0.64405	89.224	29375.830	3930.514	25445.320	0.000
18	0.81262	85.902	28514.590	3776.455	25038.130	0.000
19	0.62333	65.945	22818.090	2864.930	19953.160	0.000
20	0.531 56	56.191	19939.800	2427.659	17512.140	0.000
21	0.47463	50.173	15235.240	2160.380	16077.650	0.000
22	0.39429	41.680	15845.560	1786.406	14059.160	0.000
23	0.33828	35.759	14037.790	1527.774	12570.01 0	0.000
24	0.29692	31.367	12731.320	1337.635	11393.420	0.000
25	0.24477	25.874	10930.670	1099.734	9880.938	0.000
26	0.20089	21.235	9694.020	900.412	8793.586	0.000
27	0.14698	15.537	7950.5 12	656.902	7293.609	0.000
28	0.09505	10.048	6187.051	423.646	5763.402	0.000
29	0.05113	5.405	4713.555	227.390	4486.172	0.000
30	0.03369	3.562	3747.1 10	149.697	3597.41 3	0.000
31	0.02007	2.122	3122.692	69.114	3033.578	0.000
32	0.01 204	1.273	2735.62 1	53.430	2686.391	0.000
33	0.00763	0.825	2491.758	34.617	2457.141	0.000

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTIOII AT 166.61°C
DATA FROM FRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 7.1932 ATH. (105.71 PSIA)
DEAD VOLUME FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.106257	33.5753
0.116851	41.1301
0.189601	49.9893
0.229203	54.0533
0.262846	55.0908
0.292365	55.4825
0.324623	58.1841

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	3.7522	
THE KONOLAYER ADSORPTION IS	8415.1600	MICROMOLES
THE HE■GHT OF THE SAMPLE S■	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	632.7390	SPUAFE METERS
SPECIFIC SURFACE AREA IS	4.0328	SQUARE METERS/GRAM

*** ANALYSIS PASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.338276	40.6685
0.296918	37.0661
0.244766	32.7998
0.200856	28.5874
0.146979	23.6240

THE VALUE OF "C" FACTOR IN EET ANALYSIS IS	9.3095	
THE MONOLAYER ADSORPTION IS	10034.1500	MICRCHOLES
THE KEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	754.4722	SQUARE METERS
SPECIFIC SURFACE AREA IS	4.8086	SFUARE METERS/GRAM

FIELD CORE NUMBER 5 (FROM KELL MGS20-13)
WATER ADSORPTION AT 166.61°C
DATA FROM PRESSURE TRANSDUCER 4
DEPTH FROM 0562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 7.1932 ATM. (105.71 PSIA)
DEAD VOLUME FACTOR= 0.1395

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AHOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICRONOLES)	AMOUNT ADSOREED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.03332	3.522	1297.230	145.012	1149.218	0.000
2	0.05234	5.533	1630.604	232.774	1537.831	0.000
3	0.06666	7.047	2510.907	296.671	2214.236	0.000
4	0.10526	11.127	3471.865	469.407	3002.458	0.000
5	0.11791	12.464	3797.731	526.168	3271.563	0.000
6	0.18813	19.837	5517.461	842.666	4674.793	0.000
7	0.22749	24.043	6520.965	1021.163	5479.801	0.000
8	0.261 13	27.604	7645.184	1174.31 2	6470.871	0.000
9	0.29338	30.696	8628.672	1307.969	7320.699	0.000
10	0.32218	34.057	9733.359	1453.760	8279.598	0.000
11	0.42792	45.235	13600.060	1942.508	11657.550	0.000
12	0.50252	53.121	16263.600	2291.102	13972.500	0.000
13	0.57421	60.700	18798.860	2629.158	16169.700	0.000
14	0.66121	69.896	21774.670	3043.558	18731.110	0.000
15	0.72446	76.553	24430.150	3347.909	21082.240	0.000
16	0.77658	82.335	26641.320	3611.812	23229.500	0.000
17	0.83893	88.663	29435.440	3905.367	25530.070	0.000
18	0.81128	85.761	26871.420	3769.925	25101.500	0.000
19	0.62226	65.779	22671.190	2657.465	20013.720	0.000
20	0.52970	55.994	19979.760	2418.895	17540.870	0.000
21	0.47271	49.970	18271.190	2151.428	16119.760	0.000
22	0.39266	41.508	15879.320	1778.840	14100.480	0.000
23	0.33679	35.602	14125.640	1520.953	12604.690	0.000
24	0.29555	31.242	12751.140	1331.614	11419.530	0.000
25	0.24384	25.775	10982.710	1095.506	9887.211	0.000
26	0.19999	21.141	9685.609	896.367	6759.242	0.000
27	0.14613	15.447	79i3.977	653.073	7290.902	0.000
28	0.09482	10.024	6172.445	422.639	5749.605	0.000
29	0.05095	5.375	4703.457	226.118	4477.336	0.000
30	0.03354	3.546	3734.752	147.019	3595.733	0.000
31	0.02021	2.136	3102. 213	89.727	3012.486	0.000
32	0.01215	1.285	2715.705	53.937	2661.768	0.000
33	0.00772	0.816	2470.333	34.242	Z436.091	0.000

FIELD CORE NUMBER 5 (FRCM KELL MGS20-13)
WATER ADSORPTION AT 166.6 1°C
DATA FROM FRESSURE TRANSDUCER 4
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATICN VAPOR PRESSURE = 7.1932 ATM. (105.71 PSIAI
DEAD VOLUME FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.105260	39.1824
0.1 17910	40.8584
0.188128	49.5682
0.227493	53,5449
0.261 130	54.6168
0.290382	55.5976
0.322179	57.4080

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	3.7242	
THE MONOLAYER ADSORPTIL" IS	8505.1790	MICROMOLES
THE WEIGHT OF THE SAMFLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	639.5 078	SQUARE HETERS
SFECIFIC SURFACE AREA IS	4.0759	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE FRESSURE (P/PO)	THE FACTOR P/(1-PIX (1/MOLE)
0.335794	40.2887
0.295547	36.7389
0.243837	32.6145
0.199989	28.441 9
0.146 129	23.4727

THE VALUE OF "C" FACTOR IN 6ET ANALYSIS IS	9.1355	
THE MONOLAYER ADSORPTION IS	10125.3900	MICROMOLES
THE WEIGHT OF THE SAtIPLE IS	156.9000	GRAMS.
THE TOTAL SURFACE AEEA IS	761.3320	SGUAEE METERS
SPECIFIC SURFACE AREA IS	4.8523	SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FRCM WELL MGS20-13)
UATER ADSORPTION AT 187.93°C
DATA FROH PRESSURE TRANSDUCER 3
DEPTH FROM 9552 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSLIRE = 11.6274 ATM. (173.81 PSIA)
DEAD VOLUtIE FACTOR= 0.1395

NUMBER	PRESSURE OF SYSTEM P/P0	(PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUHE (MICROMOLES)	AHOUNT ADSORBED (MICROHOLES)	CAPACITANCE (PICOFARADS)
1	0.00933	1.622	674.639	64.945	609.694	0.000
2	0.02103	3.655	1197.356	144.487	1050.869	0.000
3	0.03231	5.616	1636.909	225.243	1411.667	0.000
4	0.14288	24.834	5701.871	1003.777	4698.094	0.000
5	0.20007	34.775	7036.734	1411.462	5627.270	0.000
6	0.24763	43.042	6319.551	1i53.165	6566.303	0.000
7	0.29057	50.506	9405.070	2063.634	7341.234	0.000
6	0.33001	57.350	10416.390	2351.009	8065.379	0.000
9	0.36386	63.244	11322.690	2598.998	8723.691	0.000
10	0.39492	68.642	12255.000	2827.696	9427.301	0.000
11	0.42304	73.530	13242.620	3035.818	10206.600	0.000
12	0.44657	77.620	14159.560	3210.732	10948.620	0.000
13	0.46552	60.914	14633.780	3352.125	11281.660	0.000
14	0.54410	94.572	17520.450	3943.439	13577.010	0.000
15	0.57415	99.795	16491.890	41il.754	14320.140	0.000
16	0.67134	116.689	22672.210	4919.051	17753.160	0.000
17	0.75805	131.916	26337.410	5604.766	20732.650	0.000
18	0.83867	145.774	29534.180	6239.438	23574.750	0.000
19	0.70424	122.407	25935.410	5175.160	20760.250	0.000
20	0.57947	100.721	Z2257.460	4212.352	18075.110	0.000
21	0.44420	77.203	18114.670	3193.100	14921.570	0.000
22	0.31766	55.246	13811.260	2262.318	11548.940	0.000
23	0.21320	37.058	10323.650	1505.542	8818.305	0.000
24	0.13400	23.291	7616.539	940.798	6675.738	0.000
25	0.05835	10.143	4645.031	407.510	4437.520	0.000
26	0.02688	4.672	3604.124	187.312	3416.811	0.090
27	0.01424	2.476	2940.795	99.167	2841.628	0.003
28	0.00800	1.391	2541.825	55.676	2486.149	0.000

FIELD CORE NUMBER 5 (FROM UELL MGS20-13)
WATER ADSORPTION AT 187.93°C
DATA FROM PRESSURE TRANSDUCER 3
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATICN VAPOR PRESSURE = 11.8274 ATM. (173.81 PSIA)
DEAD VOLUME FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE FRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.142876	35.4507
0.200071	44.4463
0.247633	50.1247
0.290573	55.7929
0.330009	61.0705

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.0682	
THE MONOLAYER ADSORPTION IS	6597.2770	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SLRFACE AREA IS	504.4187	SPUAF'E METERS
SFECIFIC SURFACE AREA IS	3.2149	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORFTION DATA ***

RELATIVE PRESSURE (P/P0)	THE FACTOR P/(1-P)X (1/MOLE)
0.317856	40.3471
0.213203	30.7288
0.133997	23.1779

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	9.6926	
THE MONOLAYER ADSORPTION IS	9611.6470	MICROMOLES
THE WEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SUFFACE AREA IS	734.9102	SQUARE METERS
SPECIFIC SURFACE AREA IS	4.6839	SQUARE METERS/GRAM

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 187.93°C
DATA FROM PRESSURE TRANSDUCER 4
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATION VAPOR PRESSURE = 11.8274 ATM. (173.81 PSIA)
DEAD VOLUME FACTOR= 0.1395

NUMBER	PRESSURE OF P/PO	SYSTEM (PSIA)	TOTAL AMOUNT FLOW IN (MICROMOLES)	DEAD VOLUME (MICROMOLES)	AMOUNT ADSORBED (MICROMOLES)	CAPACITANCE (PICOFARADS)
1	0.00900	1.565	674.879	62.656	612.223	0.000
2	0.02067	3.593	1197.345	143.979	1053.366	0.000
3	0.03183	5.533	1638.683	221.898	1416.765	0.000
4	0.14226	24.727	5684.624	999.420	4685.402	0.000
5	0.19034	34.648	7022.578	1405.203	5616.375	0.000
6	0.24667	42.874	8300.883	1746.199	6551.630	0.000
7	0.26937	50.206	9358.707	2055.086	7333.707	0.000
8	0.32845	57.090	10407.390	2330.657	8067.738	0.000
9	0.36238	62.967	11317.040	2588.105	8728.934	0.000
10	0.39330	68.351	12246.990	2815.766	9631.227	0.000
11	0.42112	73.196	13246.000	3021.576	10224.420	0.000
12	0.44399	77.171	14198.750	3191.505	11007.240	0.000
13	0.46274	80.430	14681.500	3331.349	11350.150	0.000
14	0.54085	94.008	17586.910	3915.826	13668.050	0.000
15	0.57092	99.235	16566.070	4147.203	14418.870	0.000
16	0.66807	116.120	22770.550	4893.656	17576.890	0.000
17	0.75552	131.320	26464.970	5577.711	20867.260	0.000
18	0.83527	145.182	29063.980	6212.109	23751.870	0.000
19	0.70287	122.169	26049.070	5164.504	20864.570	0.000
20	0.57767	100.443	22385.820	4200.152	18185.660	0.000
21	0.46324	77.041	18213.190	3185.938	15027.260	0.000
22	0.31689	55.079	13899.740	2255.252	11644.430	0.000
23	0.21231	36.903	10397.280	1439.189	8898.058	0.000
24	0.13332	23.174	7697.965	936.028	6761.934	0.000
25	0.05797	10.076	4926.309	404.844	4521.465	0.000
26	0.02651	4.608	3692.066	184.739	3507.326	0.000
27	0.01399	2.432	3038.805	97.412	2941.392	0.000
28	0.00759	1.320	2660.238	52.829	2607.408	0.000

FIELD CORE NUMBER 5 (FROM WELL MGS20-13)
WATER ADSORPTION AT 187.93°C
DATA FPOM FRESSURE TRANSDUCER 4
DEPTH FROM 9562 FT 10 IN TO 9563 FT 7 IN

THE SATURATICN VAPOR PRESSURE = 11.8274 ATM. (173.81 PSIA)
DEAD VOLUME FACTOR= 0.1395

*** ANALYSIS BASED ON ADSORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTOR P/(1-P)X (1/MOLE)
0.142262	35.3986
0.199336	44.3282
0.246667	49.9542
0.289368	55.5242
0.328455	60.6245

THE VALUE OF "C" FACTOR IN BET ANALYSIS IS	8.9028	
THE MONOLAYER ADSORPTION IS	6639.7420	HICROMOLES
THE WEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	507.6655	SQUARE METERS
SPECIFIC SURFACE AREA IS	3.2356	SQUARE METERS/GRAM

*** ANALYSIS BASED ON DESORPTION DATA ***

RELATIVE PRESSURE (P/PO)	THE FACTO? P/(1-P)X (1/MOLE)
0.316887	39.8374
0.212315	30.2922
0.133324	22.7499

THE VALUE OF "C" FACTOR IN 6ET AIIALYSIS IS	9.9217	
THE MONOLAYER ADSCRPTICN IS	9669.6910	EIICROMOLES
THE WEIGHT OF THE SAMPLE IS	156.9000	GRAMS
THE TOTAL SURFACE AREA IS	739.3315	SQUARE METERS
SPECIFIC SURFACE AREA IS	4.7121	SQUARE METERS/GRAM