# THE RELATION OF MEAN PARTICLE SIZE AND THE SIZE DISTRIBUTION TO DIFFUSION OF ACETONE VAPOR THROUGH AIR IN A PACKED COLUMN

Thesis for the Degree of M. S.

MICHIGAN STATE UNIVERSITY

ANDREW N. PAQUET

1974

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ABSTRACT

# THE RELATION OF MEAN PARTICLE SIZE AND THE SIZE DISTRIBUTION TO DIFFUSION OF ACETONE VAPOR THROUGH AIR IN A PACKED COLUMN

By

Andrew N. Paquet

The subject of diffusion of one vapor through another as occurring in a packed column or porous media is a very important area in many fields of science and engineering. One of these areas is in the field of soil science. In the soil many physico-chemical mechanisms occur, but one of special interest to this study is the rate of transfer of gaseous components. How these gases transfer helps determine the biological activity which will occur in the soil. This in turn determines uses of the soil by man.

The purpose of this study was to determine diffusion rates of gases through air in a porous media. More specifically, it was of interest to study the affect of the size distribution of particles comprising the porous matrix in relation to the diffusion rate through the matrix.

The experiments were conducted in glass columns packed with spherical glass beads of various sizes. Tests were conducted to determine the mean size and standard deviation

of the particle mixtures, the porosity, and the tortuousity of the bed. The procedure was initiated by running tests in empty columns so as to be sure that the literature (accepted) value of a diffusion coefficient for a particular vapor-air system could be obtained. The system under study in this work was acetone vapor diffusing through air. Acetone was metered into the glass columns and in a given period of time the amount that had evaporated could be measured by use of a calibrated pipet. This allowed for the calculation of the flux of acetone vapor for a given diffusion length. By using the ideal gas law, which approximately describes the behavior of the vapor-air mixture, and correcting for experimental temperature and pressure the diffusion coefficient could be obtained. All experiments were conducted in an environmental control chamber to facilitate constant experimental conditions.

The results of this study show that the particle distribution does affect the tortuousity of the porous matrix. However, a clear affect on the porosity by the particle distribution was not discerned. In regards to the above findings it can be stated that the particle distribution does affect the rate of diffusion of acetone in air through the packed bed. That is, as the distribution of particle sizes becomes narrower the path becomes less tortuous. This, in turn, results in an increased diffusion rate (higher diffusion coefficient).

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By

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# INTRODUCTION

The subject of diffusion through a porous media plays a fundamental role in many areas of science and engineering. This subject has been investigated by many people in the past. However, certain aspects of this area of study either remain unexplored or, if information is available, obscure.

One particular application of the subject of diffusion in a porous media is in the field of soil mechanics. In view of the recent concern for environmental control and pollution abatement, means for proper disposal and assimulation of human and animal body wastes into natural systems is of growing concern. One means of processing this waste and simultaneously deriving economic benefit is by spray irrigation. This involves applying the waste to a given area of land and taking advantage of natural processes, within the soil for decomposition and assimilation of the waste. To do this optimally requires a thorough understanding of the biological and physical mechanisms involved.

The research that was undertaken deals with a small part of the physical mechanisms that occur in the soil. In order to understand optimal use of the soil for waste disposal and assimilation, it is necessary to have information about gas exchange rates. This gas exchange occurs both within the soil and at the soil-atmosphere interface. The gas exchange rates involve the diffusion of the gas through a media, and the physical structure of the media.

In light of this, the following study was undertaken to investigate the relationship of the particle size and the particle size distribution to diffusion of a vapor through a packed column. Furthermore, it was desired to provide useful information for use in a mechanistic mathematical model to optimally describe spray irrigation procsses.

To obtain the desired information, the porosity and tortuousity of the packing were needed. These were independently obtained experimentally. Furthermore, the tortuousity of the porous media (packing) was related to the experimentally obtained diffusion coefficient (effective). The relationship between tortuousity and the diffusion coefficient was derived by use of the law of conservation of mass. Bear (1) gives the following expression:

$$\frac{\partial \bar{\rho}_A}{\partial t} = \frac{\partial((\mathcal{D}_{AB}\vec{T}_{ij}^{\,*})(\partial \bar{\rho}_A/\partial x_j))}{\partial x_i}$$

where $\mathcal{D}_{AB}$ is the diffusion coefficient for a binary gas system through an empty column.

In the following pages background information for this study is presented, followed by a description of the methods used to obtain experimental data. The experimental results are then presented and discussed.

BACKGROUND

In describing mass transfer processes in a porous media, one naturally relies upon the equation of mass conservation to describe, in mathematical terms, the physical process that is occurring. When this is done, it is readily seen that a term called the tortuousity is present. Bear (1) developed the conservation of mass equation for a porous medium. In his development, he assumed that the media was isotropic and that the porosity was constant. The following was his result:

$$\frac{\partial \bar{\rho}_A}{\partial t} = \frac{\partial[(\mathcal{D}_{ij}+\mathcal{D}_{AB}\bar{T}_{ij}^{*})\partial\bar{\rho}_A/\partial x_j}{\partial x_i} - \frac{\partial(\bar{\rho}_A\bar{V}_i)]}{\partial x_i}$$

where $\mathcal{D}_{AB}\bar{T}_{ij}^{*} \equiv \bar{\mathcal{D}}_{AB}^{*}$ is the "coefficient of molecular diffusion in a porous medium," and $\bar{T}_{ij}^{*}$ is the medium's tortuousity. Notice that for a fixed $\mathcal{D}_{AB}$ the value of $\bar{\mathcal{D}}_{AB}^{*}$ will decrease as the diffusion path becomes more tortuous. This requires $\bar{T}_{ij}^{*}$ ("tortuousity") to decrease as the path becomes more tortuous. Furthermore, if there is no bulk mechanical motion, the coefficient of mechanical dispersion, $\mathcal{D}_{ij}$, is equal to zero. Also, under these conditions $\bar{V}_i$ is equal to zero. Consequently, the equation describing diffusion in the porous media reduces to:

$$\frac{\partial \bar{\rho}_A}{\partial t} = \frac{\partial[(\mathcal{D}_{AB}\bar{T}_{ij}^{*})(\partial \bar{\rho}_A/\partial x_j)]}{\partial x_i} \quad .$$

The concept of tortuousity involves the concept of a matrix whose components are the products of cosines of angles between the direction of the streamlines of flow. It can therefore be expressed in terms of a coordinate system. Furthermore, the tortuousity can be interpreted as a characteristic path length formed by the connection of porous spaces in which diffusion occurs.

In determining the tortuousity of a porous media, it is helpful to express the transport phenomena occurring in this process in terms of fluxes as defined by Fick. For the problem at hand, concern is only with a single fluid saturating the porous media. It is assumed that transport does not take place in the solid phase. Furthermore, there are no interactions in the form of ion exchange, adsorption, etc., occurring between the constituents of the solid packing and the saturating fluid. Therefore for a homogenous fluid ($\bar{\rho}_A$ = constant) at rest ($\bar{V}=0$), taking the above conditions into consideration, the diffusive mass flux with respect to mass average velocity can be expressed as:

$$\vec{J}^{*} = -\mathcal{D}_d \cdot grad\ \rho_A$$

or, in terms of per unit area of porous media,

$$q = n\vec{J}^{*} = -n\mathcal{D}_d \vec{\bar{T}}^{*} \cdot grad\ \bar{\rho}_A = -n\bar{\mathcal{D}}_d^{*} \cdot grad\ \rho_A .$$

Therefore, $n\bar{\mathcal{D}}_d^{\,*} = n\mathcal{D}_d\bar{\bar{T}}^{\,*}$. The quantity $\bar{\mathcal{D}}_d^{\,*}$ is defined as the coefficient of molecular diffusion in a porous medium. If $\mathcal{D}_d$ is known, which in general it is (or can be determined), and $\bar{\mathcal{D}}_d^{\,*}$ can be experimentally obtained, it is readily seen how $\bar{\bar{T}}^{\,*}$, the medium's tortuousity, can be acquired.

The diffusion coefficient, $\mathcal{D}_d$, is the diffusion coefficient for a binary gas system obtained by diffusion of one gas through a stagnant layer of another gas. This involves the use of Fick's first law of diffusion through a stagnant gas film. The theoretical discussion and mathematical expressions are developed in numerous books and articles; the following is from Bird, et al. (2). The most useful expression being the following:

$$N_{AZ}\Big|_{Z=Z_1} = \frac{(p\mathcal{D}_{AB}/RT)}{(Z_2-Z_1)} \ \ell n \left[\frac{P_{B2}}{P_{B1}}\right]$$

$$= \frac{(p\mathcal{D}_{AB}/RT)}{(Z_2-Z_1)(P_B)_{\ell n}} \cdot (P_{A1}-P_{A2}) \ .$$

This form, as can be seen, allows for the determination of $\mathcal{D}_d = \mathcal{D}_{AB}$, the diffusion coefficient, by measuring the flux, the diffusion path length, and the particle pressures of the binary components (ref. Lee and Wilke). The partial pressures can be determined by temperature measurements. The diffusion path length should remain constant as a theoretical consideration. However, by assuming a quasi-steady state condition, and using an average of the initial and final lengths, the problem of a changing diffusion path length can be circumvented. The flux can be determined experimentally by utilizing a vessel of constant dimensions and (determining by measurement) the amount of substance that has evaporated or diffused out of the column.

Tortuousity

The following explanation may be helpful in understanding how tortuousity is related to the distribution of particle sizes. The tortuousity is an indication of the effective length along which diffusion occurs. This effective length is caused by the manner in which the individual beads pack themselves, or in other words, the geometry of the packing. Furthermore, it is felt by this author, that this geometry is related to the mean size of the beads (also, ref. Brown (5)). Between the beads, pores occur (through) which the vapor diffuses. When the beads are of various sizes, smaller beads can occupy the porous spaces between larger beads. This in turn causes the vapor to take a more "tortuous" path as it diffuses through a porous media. If the distribution of particle sizes is broad, i.e. the standard deviation is fairly large, there is a greater chance of smaller beads occupying the space between larger beads. This will act to form a more tortuous path. Also, it may be that this situation results in a smaller porosity for the packing. As a result of the definition of $\vec{\bar{T}}^*$, it will decrease in value as the path becomes more tortuous.

Porosity

Porosity, as defined by Bear (1), Bird, et al. (2), and many others, is the ratio of the volume of the void space ($V_v$) to the bulk volume ($V_B$) of a porous medium:

$$\varepsilon = \frac{V_v}{V_B} = \frac{(1 - V_S)}{V_B}$$

where epsilon is the porosity and $V_S$ is the volume of the solids contained in the bulk volume. As can be seen, the porosity is a dimensionless quantity and is expressed as a percentage. In a porous medium, the pores may be interconnected or not. In regards to flow through a porous media, only interconnected pores are of interest. Therefore, the measurement of an effective porosity is desirable because the fraction of interconnected pore volume is measured. The porosity of unconsolidated materails depends on the packing of the particles, their shape, arrangement, and the size distribution. The particle size distribution affects the porosity in that smaller particles may occupy the pores formed by the larger particles. This may act to reduce the porosity. Porosity may vary with depth into a column due to compaction from the weight of the material above. For short distances, though, this effect is small.

The measurement of porosity can be done directly by measuring the volume displacement of water by the beads, or by dividing the weight of the beads by their density.

In previous work on diffusion in porous media, many investigators found various relationships between the porosity of the medium and the diffusion coefficient.

Smith and Brown (1933), in working with a $CO_2$-air-soil system, according to Linvill report a linear relationship between the porosity of the soil and the diffusion coefficient of the gases diffusing in the soil. Linvill also reports that Penman (1940) also found a linear relationship. For separate runs with $CO_2$, $CS_2$, and acetone where the porosity of the medium ranges from 0.0-0.7 Penman reports the expression $\bar{D}^{*}/D_d = 0.66\varepsilon$.

Linvill (1969); however, found that the ratio $\bar{D}^{*}_d/D_d$, or that the diffusion coefficient, varied exponentially with porosity. He worked with an $O_2$-air-soil system. The form of his relationship is $\bar{D}^{*}_d/D_d = a\varepsilon^{b}$, where $a$ and $b$ are experimentally obtained constants.

Actual values of porosities for various types of packing materials with different geometrical structures are given in Brown (5). For spheres (spherecity = 1.0), the porosities range from 0.38-0.47. Glass spheres (spherecity = 1.0) are reported to have a porosity of about 0.41. This same reference indicates that porosity may vary with the diameter of the particles comprising the packing.

## EXPERIMENTAL PROCEDURE AND APPARATUS

The experimental procedure and apparatus used in this study was quite similar to that employed by other investigators in obtaining vapor phase diffusion coefficients (ref. Lee and Wilke; Stefan; McMurtie and Keyes). The experimental work was separated into two phases. The first phase being conducted in empty columns while the second phase employed packed columns.

In the first phase of experimentation, the method consisted of having a liquid contained in the bottom of a vertical tube. This liquid was allowed to evaporate and its vapor to pass up the length of the empty column. At the tube opening, another gas (air) was passed by at a sufficient rate to keep the partial pressure of the vapor at a level corresponding to the initial composition of the gas. In the case where the gas is vapor free, this initial composition is zero. The diffusion coefficient can then be determined by the rate at which a given quantity of vapor has passed out of the apparatus.

The variables to consider in this method were the temperature at which the experiment was conducted, the ambient pressure, the flow rate of air passing over the tube opening, and the diffusion path length (as related to the air flow rate, and also the falling off of the liquid level as a result of evaporation).

Temperature affects the rate of evaporation. If the vapor behaves ideally, then there is a linear relationship between the rate of evaporation and temperature. It is desirable to maintain a constant temperature if a constant evaporation rate (or flux) is desired.

Pressure also affects the rate of evaporation for a well behaved vapor. A higher pressure will result in less vapor, and vice versa. Consequently, it is desired to maintain constant pressure during the experiment, or to isolate it from other factors and measure evaporation with changing pressure.

The flow rate of air passed by the tube opening facilitated the removal of vapor as it arrived there. It also allowed for the maintanance of a concentration difference from the liquid level at the bottom of the tube to the tube opening. With no concentration difference there would be no evaporation. However, the rate of evaporation can be affected if the air flow rate is too great or too small. This affect is manifested in the actual diffusion path length. If the air flow rate is too great, turbulence occurs at the tube opening with the result being a shortening of the actual diffusion path length. The opposite affect occurs if the air flow rate is too low (ref. Lee and Wilke).

A further problem with the diffusion path length varying was encountered due to the evaporation of the liquid. As the liquid evaporated, the liquid level dropped. Since it is desirable to maintain the liquid level at a constant position, a means to do just that was developed. A reservoir of liquid was connected to the column. Periodically, when the liquid level had dropped a small amount, a small amount of liquid could be added to the column. By this method the diffusion path length could be determined by using the arithmetic average of values at the beginning and at the end of the diffusion process. This resulted in a small error for the actual value of the diffusion coefficient experimentally measured. In regards to this, quasi-steady state conditions rather than steady state conditions were maintained.

In this study an environmental chamber was employed to control and adjust the ambient temperature and the air flow rate. Pressure was monitored by a barometer (calibrated) housed within the chamber.

It was of course necessary to calibrate and adjust the air flow rate within this chamber for reasons already mentioned. All conditions were set and monitored so that the affects of the air flow rate would be isolated. The temperature was set at 30°C, and pressure was monitored. Subsequently, it was found that an air flow rate of 30% of maximum was sufficient for operation. These conditions (temperature and air flow rate) were established as the experimental operating conditions.

After having established the operating conditions, experiments to obtain diffusion coefficients employing the following procedure were conducted (refer to Figure 1):

1. Read level in pipet.
2. Uncork pipet, open valve to transfer acetone to column.
3. Set level of acetone at a predetermined sight line on column reservoir.
4. Close valve, cork up pipet.
5. Read and record new level in pipet.
6. Repeat procedure at various time intervals.

In the course of these experiments many problems were encountered, incorporating changes in the apparatus, before good consistent results were obtained. These problems stemmed mainly from two sources, leaks in the system and the air flow rate. The problem with the air flow rate was due to not knowing the maximum flow rate (circulation rate) in the environmental chamber. The circulation rate was rheostatically controlled and the dial was calibrated in percentage of the maximum flow rate. Consequently, an acceptable flow rate of air was determined by trial and error. The importance of the circulation rate has been previously discussed. However, the problem with the air flow rate was alleviated only after the leaks were stopped. Only then could the affect of the flow rate be isolated.

In the original experimental setup, calibrated burets instead of pipets were used as part of the acetone reservoir. The burets had stopcocks so that acetone could be metered into the column. It was found that acetone leaked out of the burets at the stopcocks. Apparently the acetone dissolved the stopcock grease after a period of time so that the seal between the stopcock and the buret was destroyed. After varying attempts at correcting this problem, it was decided to change the experimental apparatus and use pipets and valves (see Figure 1). This helped correct much of the problem, but some leaks still remained. These leads came from the polyethylene hose--glass nipple joinings both at the pipet and the column. This problem was alleviated by using a silicone sealant at these points (manufactured by General Electric Company).

A third source of error was associated with the accuracy with which the calibration of the pipet could be read. This was overcome by using finely calibrated rulers placed next to the markings on the pipet and taking a sighting by a telescope (see Figure 2). This setup allowed readings accurate to the thousandths of a milliliter.

It was very important to take the time to obtain good consistent results from this phase (the first) of the experiment. Contingent upon these results and the subsequent operation of the apparatus was the basis for acceptance of the results for the second phase of the experiment. The first phase of the experiment was used to obtain a well working experimental apparatus and to verify the "literature" value of the binary diffusion coefficient of acetone vapor through air (as reported by Perry's Chemical Engineer's Handbook).

The result of correcting all the above mentioned problems resulted in the attainment of the goals of the first phase of experimentation.

Having established the correct procedure, as already stated, it was possible to procede to the second phase of the experimentation. In this phase the same operating conditions, methods, and equipment as used in the first phase were employed. However, instead of measuring diffusion through an empty column, diffusion was measured through a packed column.

The column was packed with glass beads of a certain size distribution and mean diameter. Furthermore, these beads were of a uniform spherical shape (approximately 90% true spheres), and their specific gravities ranged between 2.46 and 2.99 g/ml. These beads were manufactured by the Microbeads Division of the Cataphote Company. The porosity of the packing was measured by weighing a known volume of beads and then dividing this value by the density (specific gravity) of the beads. The value obtained was the volume of the beads in the known (bulk) volume weighed. The former volume was designated the bead volume ($V_S$), and the latter volume was called the bulk volume ($V_b$). The porosity was then calculated by use of the following expression:

$$\varepsilon = \frac{V_v}{V_b} = \frac{(V_b - V_s)}{V_b}$$

where $V_v$ is the void volume. The porosity obtained in this manner was checked by another procedure. If the known volume of beads ($V_b$) was placed in a given volume of water, the resoltant volume of beads plus water should be equal to the sum of the bead volume ($V_s$) and the given volume of water ($V_w$).

Apparatus

The apparatus used was similar to that which was employed by other investigators (see Figure 1). The diffusion columns were constructed of glass. Plastic columns were originally used, but they proved to be inadequate because it was desirable to use acetone. Acetone is a rather good solvent for the plasticizers in the plexiglass. The length to diameter ratio for the five glass columns used was approximately 12:1. The liquid reservoir was also constructed of glass. The reservoir had sight lines placed every sixteenth of an inch apart along its length. Furthermore, the reservoir and the column were joined by a ground glass joint.

A glass pipet with a volume of five milliliters, calibrated into tenths of a milliliter, was connected to the diffusion column by polyethylene tubing (OD=0.25 inches, ID=0.125 inches). Acetone was placed in the pipet and transferred through the tubing into the column. The acetone used was reagent grade (98.8% pure). Flow of the liquid was regulated by use of values equipped with Swagelok fittings.

The polyethylene tubing was secured to the pipet and the column at their respective nipples by using a silicone adhesive that set in 24 hours. The adhesive was manufactured by the General Electric Company.

After the liquid was transferred from the pipet to the column, the liquid level in the pipet was accurately determined. This was facilitated by use of a precisely calibrated ruler and a sighting telescope (see Figure 2). The ruler was placed behind the pipet, both being supported by a burst clamp. The liquid level could then be accurately read by magnifying the set-up with the telescope (Figure 2).

The pipet was cocked to prevent evaporation of acetone. The loss of acetone vapor out of the pipet when it is uncorked during the readings is small in volume therefore introducing negligible error in volume readings.

The whole set-up was housed in a controlled environment room. The use of this room allowed for the maintenance of a constant temperature and air flow rate. A barometer housed in this room allowed for the measurement of pressure when ever a reading of the acetone level was done.

The values for the column dimensions are listed in Table 4 in Appendix B.

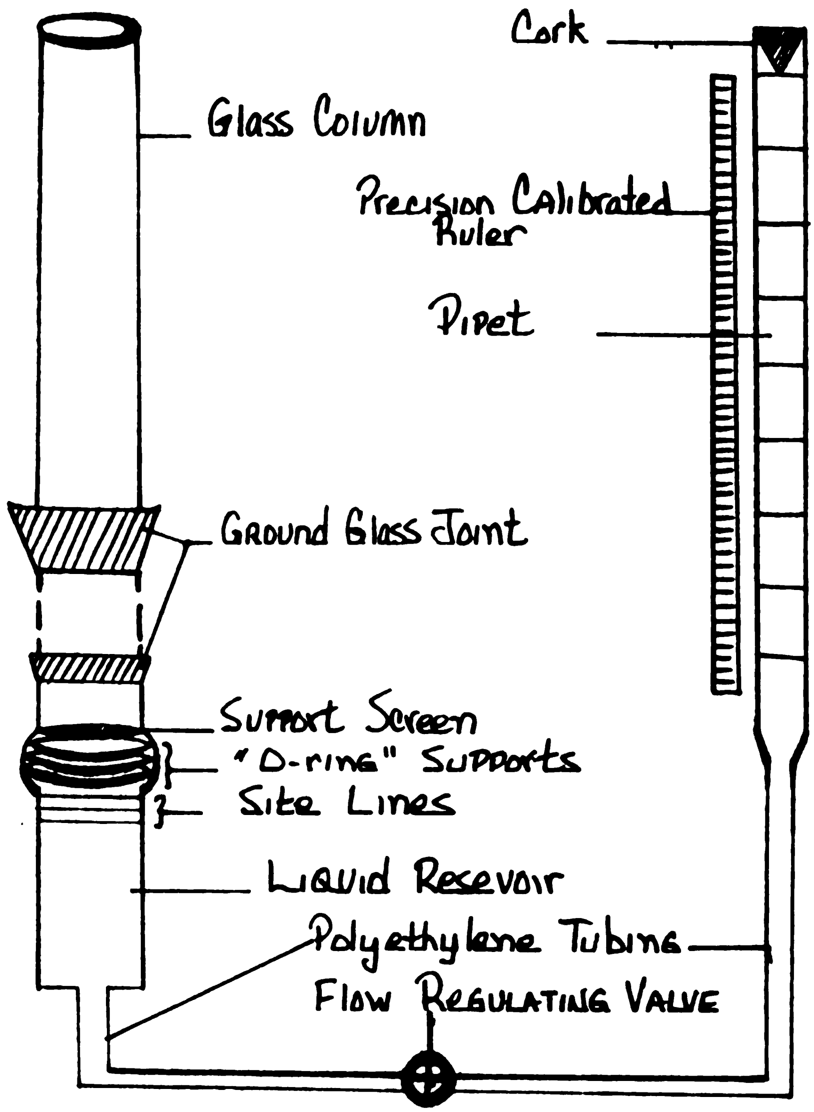


FIGURE 1. EXPERIMENTAL APPARATUS

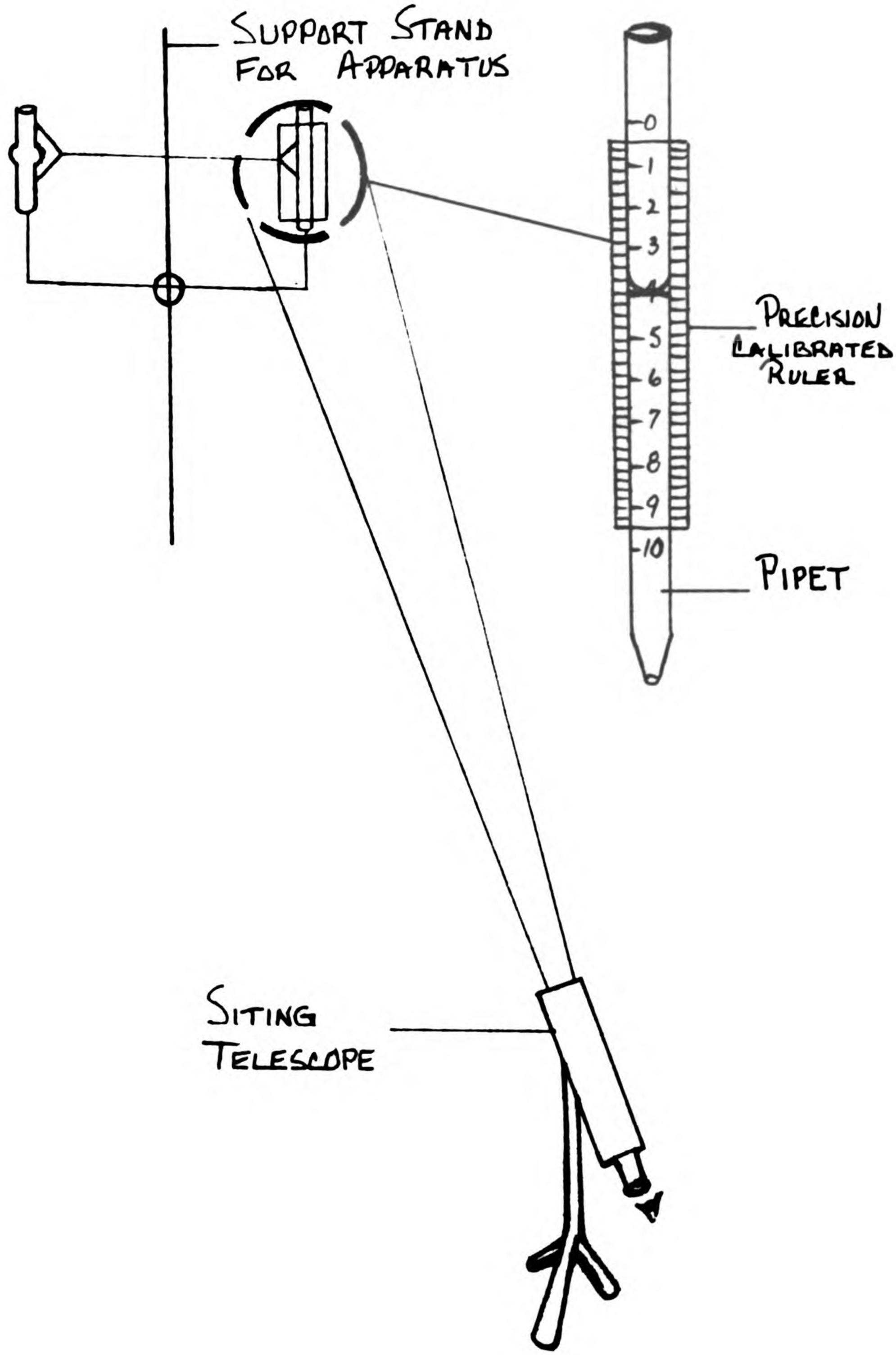


FIGURE 2. DETERMINATION OF ACETONE IN PIPET

# RESULTS AND DISCUSSION

Some representative results for the first phase of the experimentation are given in Table 1. It will be noticed that the error percentage of some of the experimentally obtained diffusion coefficients deviates greatly from the value of the diffusion coefficient as reported by Perry's Chemical Engineer's Handbook. These values are presented for illustrative purposes in regards to the problems encountered, as mentioned in the previous section. Obviously, the value with the large positive error indicates a leaky system as indeed was the case. The value with the significant negative deviation was a result of the air circulation rate being too low. Because the flow rate was slow, the acetone vapor was not removed from the tube opening at a sufficient rate. This resulted in effectively increasing the diffusion path length. Consequently, by using the tube length as the diffusion path length in the computations a negative error resulted. The value of the diffusion coefficient with the small error is an example of the experimental results after the problems with the set-up and the experimental method were corrected. Consistently good results, with the error less than 5%, were obtained when the apparatus and experimental technique became established.

Having proved that good results could be consistently obtained gave confidence in applying the technique to the second phase of the experiment.

For the first phase of the experiment a gas phase diffusion coefficient for acetone in air was established as 0.1345 square cm per second, at 30°C and 740.0 mm Hg pressure.

For the second phase of the experiment with diffusion of acetone through air in a column packed with glass beads, representative results are given in Table 2. In Table 3 values of the tortuousity resulting from various packing distributions are presented. The experimental conditions were 30°C and various pressures. A complete set of experimental data is given in Appendix C.

From Table 2 it can be seen that some of the bead distributions are not specifically known. These distributions are designated Mixes #1, #2, and #3. They are mixtures of various narrower bead distributions prepared to obtain added data on the affect of the size distribution with respect to the tortuousity, and also get a tighter packing arrangement (i.e. a smaller porosity). The bead mixtures were constructed around the basic narrow distribution with a mean size of 0.019896±0.002971 centimeters. Mix #1 was a broad distribution of sizes, with Mix #2 having a little narrower range, and Mix #3 still narrower than the other two. Figure 3 below illustrates the size distributions and how the three mixtures approach the basic narrow bead distribution (designated as

TABLE 1.--Experimental Results for Diffusion of Acetone in an Empty Column (Representative Values).

| $D_{ACE,EXP}$ ($cm^2 \cdot sec^{-1}$) | $D_{ACE,REAL}$ ($cm^2 \cdot sec^{-1}$) | Error(%) |
|---|---|---|
| 0.1345 | 0.1301 | + 3.4 |
| 0.1062 | 0.1294 | -17.9 |
| 0.1941 | 0.1327 | +46.3 |

TABLE 2.--Experimental Results for Diffusion of Acetone in a Packed Column (Representative Values).

| Porosity | $D_{ACE,EXP}(cm^2 \cdot sec^{-1})$ | $\tau$(tortuousity) | StD. Devia(cm) | Mean(cm) |
|---|---|---|---|---|
| 0.44 | 0.1118 | 0.8402 | 0.001961 | 0.008289 |
| 0.44 | 0.1106 | 0.8104 | 0.001961 | 0.008289 |
| 0.44 | 0.1058 | 0.7870 | 0.002971 | 0.019896 |
| 0.44 | 0.09382 | 0.6923 | 0.002971 | 0.019896 |
| 0.40 | 0.08925 | 0.6588 | 0.006522 | 0.031240 |
| 0.40 | 0.07718 | 0.5790 | 0.006522 | 0.031240 |
| 0.39 | 0.1166 | 0.8605 | 0.009078 | 0.050788 |
| 0.39 | 0.1149 | 0.8599 | 0.009078 | 0.050788 |
| 0.385 | 0.08935 | 0.6608 | 0.011525 | 0.165860 |
| 0.385 | 0.09863 | 0.7333 | 0.011525 | 0.165860 |
| 0.41 | 0.08079 | 0.5971 | Mix #1 | - |
| 0.41 | 0.08731 | 0.6523 | Mix #2 | - |
| 0.41 | 0.08997 | 0.6722 | Mix #3 | - |

TABLE 3.--Comparison of Tortuousity with Increasing Size Distribution Range.

| Average Tortuousity | Size Distribution(cm) | No. of Samples |
|---|---|---|
| 0.62918 | 0.165860± 6.9% | 5 |
| 0.71122 | 0.019896±14.9% | 6 |
| 0.77923 | 0.050788±17.9% | 4 |
| 0.57960 | 0.031240±20.9% | 5 |
| 0.82713 | 0.008289±23.7% | 6 |

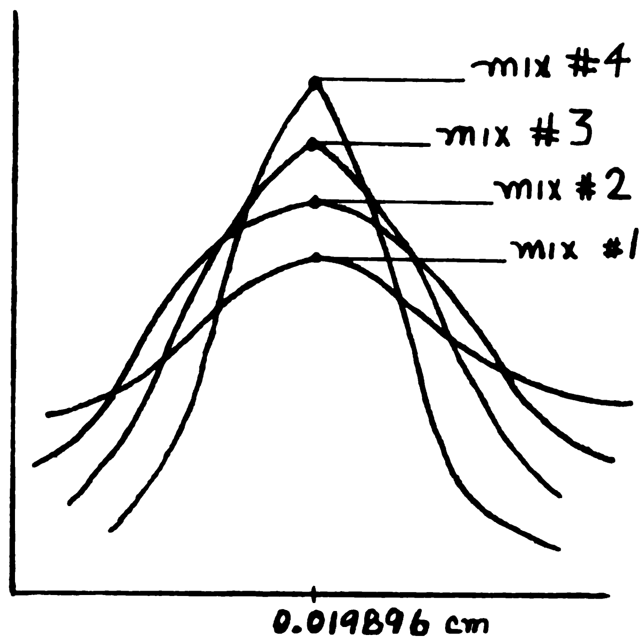


FIGURE 3. IllUSTRATIVE

DIAGRAM OF BEAD SIZE DISTRIBUTIONS
FOR FOUR BEAD MIXTURES

"Mix #4" for comparative purposes). From Table 2 it can be seen that as the bead size distribution of these mixtures approach the basic narrow distribution the tortuousity of the mixtures also approach the tortuousity of the basic mixture (Mix #4). This result indicates that tortuousity is affected by the distribution of sizes of the beads. If the size distribution is narrow, i.e. the beads are close in size and in relatively similar quantities, then the tortuousity ($\vec{T}^*$) is increased. If, however, the size distribution is broad, the tortuousity is generally decreased. This is shown in the results given in Tables 2 and 3. Table 3 shows an exception for the case with an average tortuousity of 0.57960. This can partially be accounted for by the character of the bead size distribution for this mixture. The distribution curve for this mixture was not smooth and unimodal, but had a "hump" at both ends as well as in the center of the distribution curve. With this being the case it is difficult to compare this set of data with the results from the other size distributions.

It will be noticed that a relatively narrow range of values were obtained for the porosities of the bead mixtures. The beads were randomly packed into the columns, and after each run the packing was changed. An investigation of the experimental results yield no progression of porosity with particle sizes. Unfortunately, though, the range of data (on porosity) is not extensive enough to provide reasons to the lack of progression in the data. As mentioned previously, it was hoped that the mixtures #1, #2, and #3 would have had lower porosities so as to broaden the range of data and help elucidate the affect of porosity on gas phase diffusion. As a result of these mixtures though, it is felt by this author that a combination of bead sizes with the influence of compaction of the bed will yield lower porosities.

It was mentioned that the columns were repacked after each run. This was done so as to maintain the randomness of the packing geometry which might possibly have been lost as a result of settling. Settling could occur by disturbing the columns as a result of activity in the environmental room and with taking readings of the acetone level in the columns.

The experiments were conducted to obtain data that would allow for the computation of the effective diffusion coefficient, $\bar{\mathcal{D}}_{ACE}$. The tortuousity could then be computed by using the value obtained for $\bar{\mathcal{D}}_{ACE}$ and $\mathcal{D}_{ACE}$, the diffusion coefficient of acetone through air from an empty column, in themanner described in the Background Section.

In the analysis of the data two statistical techniques were employed. A linear regression of the data was performed. This data was of a temporal sequence, or continuous with time. The linear regression of this data yielded information, via the computed slope of the line, as to the variability of results. It will be noticed in the results given in Appendix C that the slopes were very low, hence proving consistent results. If the slope of the line was very great, it would indicate that diffusion was not constant with time which would be false for the experimental conditions in this study.

The second statistical technique used was the least squares test. The purpose of this test was to find out again the consistency of the results. But, for this test, each time a data reading was taken it was considered a separate experiment. That is there was no consideration for continuity with time. The result from this test would yield an average value for the data and could be compared to the intercept of the line obtained from the linear regression technique for an indication of consistency of results.

In regards to the values shown on the computer outputs in Appendix C it will be noticed on a few of these sheets that some rather large exponents occur on some of the values. This is due to a programming error on the part of the author of not properly dimensioning the array in which these values are stored.

It was mentioned in the Background Section that in this exercise it was assumed that no Knudsen diffusion or that no adsorption on the bead surfaces occurs. The former can be verified mathematically. However, it is a little more difficult to prove that there is no adsorption on the bead surfaces. The beads are inert to the acetone vapor, and the porosity of the packing is sufficient for the vapor to pass through the column. Hence, it is generally accepted that if adsorption is occurring its affect is negligible.

In comparing the results of this study with those of studies given earlier in the paper, it will be noticed that generally agreement was not obtained. It was stated that Penman obtained an average tortuousity of 0.66. It is felt by this author that Penman's work was too simplistic, and it did not concern itself with the effect that different packing distributions have on the tortuousity of the matrix. The work that Linvill performed appears much more realistic, and hence it is felt that a logarithmic relationship exists for tortuousity and porosity.

## SUMMARY AND CONCLUSIONS

For diffusion of acetone vapor in air through an empty column it was found that the acceptable literature value could be obtained within 5% error.

For diffusion of acetone vapor in air through a packed column (a porous bed) it was found that the size distribution of beads influenced the tortuousity and porosity of the packing. This in turn determined the (effective) diffusion coefficient for the system being studied.

Narrow ranges of porosity were obtained. It is felt that this was partly due to improperly mixing the various bead sizes and partly due to a lack of compaction of the bead bed. The values of porosity that were obtained are generally near the maximum attainable value. These porosities represent packing geometries close to orthorhombic or cubic geometries.

The average diffusion coefficient obtained for a packed column system was 0.09660 square cm per second. This value is associated with a tortuousity of 0.7182±0.0665. However, the use of an average tortuousity may be rather limited due to the fact that the tortuousity is affected by the size distribution of the packing.

## RECOMMENDATIONS

There are many areas of engineering where information of the nature given in this work is desired. Much additional work is needed to complete the study undertaken here. Specifically additional information acquired at lower porosities is desired, for it is these lower porosities that occur in natural soil systems. Therefore it is recommended that additional experimentation, if it should be undertaken, focus on attaining packed columns with porosities around 0.30. Furthermore, a series of packed beds having a range of porosities is desired. Information from a study of this sort should yield a useful (empirical) mathematical expression that could be used in soil studies, fluidized bed systems, adsorption columns, and other important applications in the field of engineering.

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## BIBLIOGRAPHY


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# APPENDIX A

## GENERAL REFERENCES


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# APPENDIX B

TABLE 4.--Dimensions of the Glass Columns.

| Diameter (ID in inches) | Length of Tube (inches) |
|---|---|
| 0.5444 | 6.230 |
| 0.5800 | 6.341 |
| 0.5750 | 6.306 |
| 0.5758 | 6.211 |
| 0.5422 | 6.288 |

## NOMENCLATURE

| | |
|---|---|
| $\bar{\rho}_A$ | average density of component A ( $gm \cdot cm^{-3}$) |
| $D_{ij}$ | dispersion coefficient ($cm^2 \cdot sec^{-1}$ |
| $D_{AB} = D_d$ | diffusion coefficient ($cm^2 \cdot sec^{-1}$) |
| $\bar{T}^*_{ij} = \vec{\bar{T}}^*$ | average tortuousity tensor |
| $x_i$ | distance coordinate of component i (cm) |
| $\bar{D}^*_{AB} = \bar{D}^*_d$ | diffusion coefficient vector ($cm^2 \cdot sec^{-1}$) |
| $\bar{V}$ | average velocity ($cm \cdot sec^{-1}$) |
| $\vec{J}^*$ | mass flux relative to moving coordinates ($gm \cdot cm^{-2} \cdot sec^{-1}$) |
| $N_{AZ}$ | mass flux relative to stationary coordinates ($gm \cdot cm^{-2} \cdot sec^{-1}$) |
| $P$ | system pressure (mm Hg) |
| $P_i$ | partial pressure of component i (mm Hg) |
| $Z_i$ | length at level i (cm) |
| $R$ | gas constant ($cal \cdot gmole^{-1} \cdot {}^\circ K^{-1}$) |
| $T$ | temperature (°K) |
| $\eta = \varepsilon$ | media's porosity |
| $\tau$ | media's tortuousity |

# APPENDIX C

```
      PROGRAM RESRCH(INPUT,OUTPUT,TAPE3=OUTPUT)
C       THIS PROGRAM READS THE DATA SUPPLIED FROM EXPERIMENTS TO CALCULATE A
C       GAS PHASE DIFFUSION COEFFICIENT FOR ACETONE IN AIR.   WITH THIS EX-
C       PERIMENTALLY OBTAINED COEFFICIENT, THE TORTUOUSITY OF THE MEDIUM IS CALCU
C       LATED.  THE MEDIUM IS GLASS BEADS, AND THEY ARE OF A GIVEN SIZE DIS-
C       TRIBUTION AND MEAN SIZE.  A SUBROUTINE CALLED LREGSLS- LINEAR REGRESSION
C       BY LEAST SQUARES- IS USED TO COMPUTE AVERAGE VALUES FOR THE TOR-
C       TUOUSITY AND EXPERIMENTALLY OBTAINED DIFFUSION COEFFICIENT WHEN NEEDED.
C       THE FOLLOWING IS A LIST OF THE VARIABLES AND THEIR MEANING
C       TEMP - TEMPERATURE AT WHICH EXPERIMENT WAS RUN
C       N - NUMBER OF DATA READINGS
C       DIAMTR - DIAMETER OF COLUMN
C       ALDST - THE INITIAL LENGTH OF DIFFUSION PATH
C       EPSILON - POROSITY OF THE PACKING
C       ALDST2 - THE FINAL LENGTH OF THE DIFFUSION PATH
C       R - GAS LAW CONSTANT
C       AMPLE - MOLECULAR WEIGHT OF ACETONE
C       DA - TIME COUNTER  FOR DO LOOP
C       X - AVERAGE DIFFUSION PATH LENGTH
C       AREA - CROSS-SECTIONAL AREA OF COLUMN
C       PS - VAPOR PRESSURE OF ACETONE AT ALDST, OR XO
C       PO - VAPOR PRESSURE OF ACETONE AT MOUTH OF COLUMN
C       P,V,T(I) - PRESSURE, VOLUME OF ACETONE EVAPORATED, AND TIME TO
C           EVAPORATE V VOLUME OF ACETONE    INPUT DATA
C       W(I) - WEIGHT OF ACETONE EVAPORATED IN TIME T(I)
C       FLUX(I) - FLUX OF ACETONE EVAPORATING, WITH RESPECT TO STATIONARY CO-
C              ORDINATE SYSTEM
C       DMAEXP(I) - EXPERIMENTALLY MEASURED DIFFUSION COEFFICIENT OF ACETONE
C           AND AIR SYSTEM
C       DMAREL -  CORRECTED LITERATURE VALUE OF THE DIFFUSION COEFFICIENT (TO  TE
C       MPERATURE AND PRESSURE OF SYSTEM
C       TAU(I) - TORTUOUSITY  OF MEDIUM
C       DBESTO -  AVERAGE OF EXPERIMENTALLY OBTAINED DIFFUSION COEFFICIENTS
C           BY LEAST SQUARES METHOD
C       SIGMA - STANDARD DEVIATION OF BEAD SIZES IN A PARTICULAR BEAD MIXTURE
C       AVE -  THE AVERAGE BEAD SIZE IN A GIVEN BEAD MIXTURE
      DIMENSION W(8),FLUX(8),TAU(8),       Y(9,1),INFO(10)    ,IM(9)
      COMMON N, DMAEXP(8), T(8), DBESTO
      READ 15,J
   15 FORMAT (I5 )
      DO 3 K = 1,J
      READ 19,TEMP,N
   19 FORMAT (F10.4,I5)
      READ 18, COLUMN,DIAMTR,ALDST,EPSILON,ALDST2
   18 FORMAT (I1,4F10.5)
      R = 82.057 $ AMOLE = 58.08 $ DA = 1.0
      XO = ALDST*2.54  $  XF = ALDST2*2.54
      X = (XO + XF)/2.
      AREA = 3.14*(DIAMTR)**2.*(2.54)**2./4.
      PS=80191802.33*EXP(-3817.587726/TEMP)
      A = 0.0   $   PO = 0.0
      PRINT 17,COLUMN,DIAMTR,X
   17 FORMAT(*1*,15(/)       ,10X,*COLUMN NO.*,I2,2X,*HAS A DIAMETER OF*,F
     110.5,* INCHES AND A DIFFUSION LENGTH OF*,F10.5,* CM*,/,)
      PRINT 23
      DO 1 I = 1,N
      A = A + DA
      READ 20,P,V,T(I)
   20 FORMAT (3F10.4)
      W(I) = V*0.79
      FLUX(I) = W(I)/T(I)/AREA/AMOLE/EPSILON/3600.
```

```
      DMAEXP(I) = FLUX(I)*R*TEMP*X*760.*(PO-PS)/(PS-PO)*(1./P/ALOG((P-PS
     1)/(P-PO)))
      DMAREL = 0.1345*(TEMP/303.2)**1.5*(740./P)
      TAU(I) = DMAEXP(I)/DMAREL
    1 PRINT 21,T(I),P,V,A,T(I),TAU(I)
      PRINT 24
      DO 2 I = 1,N
    2 PRINT 22,W(I),FLUX(I),DMAEXP(I),         DMAREL
      PRINT26,PS,AREA,X,PO,TEMP
   21 FORMAT (* *,10X,3(5X,E11.4),5X,F4.1, 4X,* THE TORTUOUSITY AT TIME
     1=*,F7.2,* HRS. IS *,E11.4)
   22 FORMAT (* *,10X,4(5X,E11.4))
   23 FORMAT (* *,15X,*TIME(HR)*,6X,*PRESS(MM HG)*,3X,*VOL. EVAP.(ML)*,4
     1X,*COUNTER*,//)
   24 FORMAT(* *,/,15X,*GMS EVAP.*,9X,*FLUX*,10X,*DMAEXP*,10X,*DMAREL*,/
     1/)
   26 FORMAT (* *,//,10X,*PS*,3X,E11.4,/,10X,*AREA*,E11.4,/,10X,*X    *,
     1E11.4,/,10X,*PO    *,E11.4,/,10X,*TEMP *,E11.4,//)
      CALL LREGSLS
      TAUAVE = DBESTO/DMAREL
      PRINT 16,TAUAVE
   16 FORMAT(* *,11X,* THE TORTUOUSITY OF THE MEDIA IS*,E11.4,* FROM LEA
     1ST SQUARES TECHNIQUE*)
      READ 13,SIGMA,AVE
   13 FORMAT (2A10)
      PRINT 14,EPSILON,SIGMA,AVE
   14 FORMAT (* *,10X,* THE POROSITY IN THIS COLUMN IS*,F10.5,2X,/,10X,*
     1 THE MEDIAS STAND. DEVIA. IS*,2X,A10,*CM*,/,10X,* AND ITS MEAN SIZ
     2E IS*,2X,A10,*CM*)
    3 CONTINUE
      PRINT 1000
 1000 FORMAT (*1*)
      END
```

SUBROUTINE LREGSLS CDC 6500 FTN V3.0-P365 OPT=1 05/29/74 .11.43.51. PAGE 1

```
      SUBROUTINE LREGSLS
      COMMON N, DMAEXP(8), T(8), DBESTO
      TSSUM = 0.0 $ TSUM = 0.0 $ DTSUM = 0.0 $ DSSUM = 0.0
      DO 1 I = 1,N
      TSSUM = TSSUM + T(I)*T(I)
      TSUM = TSUM + T(I)
      DTSUM = DTSUM + DMAEXP(I)*T(I)
    1 DSSUM = DSSUM + DMAEXP(I)
      RN = N
      SLOPE = (RN*DTSUM - TSUM*DSSUM)/(RN*TSSUM - TSUM*TSUM)
      B =(DSSUM - SLOPE*TSUM)/RN
      PRINT 27,TSSUM,TSUM,DTSUM,DSSUM
   27 FORMAT (* *,//,10X,* SUMMATION OF T(I) SQUARED*,4X,E11.4,/,10X,* T
     1HE SUMMATION OF T(I)*,4X,E11.4,/,10X,* THE SUMMATION OF THE PRODUC
     2T DMAEXP(I) AND T(I)*,4X,E11.4,/,10X,* THE SUMMATION OF DMAEXP(I)
     3SQUARED*,4X,E11.4)
      PRINT 28,SLOPE,B,SLOPE,B
      DBEST = 0.0 $  DS = 0.0
      DO 4 I = 1,N
      DBESTI = 1./DMAEXP(I)
      DBEST = DBEST + DBESTI
    4 DS=DS + DBESTI*DBESTI
      DBESTO = DBEST/DS
      PRINT 25,DBESTO
   25 FORMAT (* *,10X,* BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS*,4
     1X,E11.4)
   28 FORMAT (* *,//,10X,* THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE
     1 IS*,4X,E11.4,/,10X,* THE INTERCEPT FOR THE LINEAR REGRESSION TECH
     2NIQUE IS*,4X,E11.4,/,10X,* DMAEXP(I) = *,E11.4,* T    +  *, E11.4)
      RETURN
      END
```

COLUMN NO. 5 HAS A DIAMETER OF .54220 INCHES AND A DIFFUSION LENGTH OF 16.09217 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML). | COUNTER | | |
|---|---|---|---|---|---|
| .2400E+02 | .7345E+03 | .5430E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS | .8590E+00 |
| .4800E+02 | .7347E+03 | .1021E+01 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS | .8079E+00 |
| .7200E+02 | .7350E+03 | .1650E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS | .8709E+00 |
| .9600E+02 | .7389E+03 | .2071E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS | .8253E+00 |
| .1200E+03 | .7423E+03 | .2542E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS | .8152E+00 |
| .1440E+03 | .7400E+03 | .3078E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS | .8193E+00 |
| .1680E+03 | .7483E+03 | .3549E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS | .8213E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .4290E+00 | .1305E-06 | .1164E+00 | .1330E+00 |
| .8066E+00 | .1227E-06 | .1094E+00 | .1330E+00 |
| .1303E+01 | .1322E-06 | .1179E+00 | .1330E+00 |
| .1636E+01 | .1244E-06 | .1112E+00 | .1330E+00 |
| .2008E+01 | .1222E-06 | .1093E+00 | .1330E+00 |
| .2432E+01 | .1233E-06 | .1102E+00 | .1330E+00 |
| .2804E+01 | .1218E-06 | .1092E+00 | .1330E+00 |

PS .2729E+03
AREA .1489E+01
X .1609E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .7455E+02
THE SUMMATION OF DMAEXP(I) SQUARED .7837E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.4262E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1160E+00
DMAEXP(I) = -.4262E-04 T + .1160E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1118E+00
THE TORTUOUSITY OF THE MEDIA IS .8402E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.001961 CM
AND ITS MEAN SIZE IS 0.008289 CM

```
COLUMN NO. 2  HAS A DIAMETER OF    .58000 INCHES AND A DIFFUSION LENGTH OF  16.22552 CM
      TIME(HR)        PRESS(MM HG)    VOL. EVAP.(ML)   COUNTER

       .2400E+02       .7291E+03       .4070E+00        1.0      THE TORTUOUSITY AT TIME =  24.00 HRS. IS    .6423E+00
       .4800E+02       .7345E+03       .9350E+00        2.0      THE TORTUOUSITY AT TIME =  48.00 HRS. IS    .7448E+00
       .7200E+02       .7347E+03       .1464E+01        3.0      THE TORTUOUSITY AT TIME =  72.00 HRS. IS    .7777E+00
       .9600E+02       .7350E+03       .1900E+01        4.0      THE TORTUOUSITY AT TIME =  96.00 HRS. IS    .7574E+00
       .1200E+03       .7389E+03       .2350E+01        5.0      THE TORTUOUSITY AT TIME = 120.00 HRS. IS    .7545E+00
       .1440E+03       .7423E+03       .2758E+01        6.0      THE TORTUOUSITY AT TIME = 144.00 HRS. IS    .7422E+00
       .1680E+03       .7400E+03       .3143E+01        7.0      THE TORTUOUSITY AT TIME = 168.00 HRS. IS    .7221E+00
     GMS EVAP.          FLUX          DMAEXP           DMAREL

       .3215E+00       .9768E-07       .8769E-01       .1345E+00
       .7386E+00       .1122E-06       .1009E+00       .1345E+00
       .1157E+01       .1171E-06       .1054E+00       .1345E+00
       .1591E+01       .1140E-06       .1026E+00       .1345E+00
       .1856E+01       .1126E-06       .1016E+00       .1345E+00
       .2179E+01       .1103E-06       .9952E-01       .1345E+00
       .2483E+01       .1078E-06       .9713E-01       .1345E+00

PS      .2729E+03
AREA   .1704E+01
X       .1623E+02
PO     0.
TEMP    .3032E+03


 SUMMATION OF T(I) SQUARED         .8064E+05
 THE SUMMATION OF T(I)         .6720E+03
 THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)        .6722E+02
 THE SUMMATION OF DMAEXP(I) SQUARED       .6948E+00

 THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS       .3241E-04
 THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS       .9615E-01
 DMAEXP(I) =    .3241E-04 T    +     .9615E-01
  BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS        .9863E-01
   THE TORTUOUSITY OF THE MEDIA IS   .7333E+00 FROM LEAST SQUARES TECHNIQUE
  THE POROSITY IN THIS COLUMN IS     .38500
 THE MEDIAS STAND. DEVIA. IS  0.011525  CM
 AND ITS MEAN SIZE IS  0.165860  CM
```

COLUMN NO. 5 HAS A DIAMETER OF .54220 INCHES AND A DIFFUSION LENGTH OF 16.09217 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | | |
|---|---|---|---|---|---|
| .2400E+02 | .7438E+03 | .5570E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS | .8954E+00 |
| .4800E+02 | .7449E+03 | .1028E+01 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS | .8278E+00 |
| .7200E+02 | .7403E+03 | .1514E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS | .8064E+00 |
| .9600E+02 | .7357E+03 | .2050E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS | .8125E+00 |
| .1200E+03 | .7410E+03 | .2550E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS | .8159E+00 |
| .1440E+03 | .7361E+03 | .3065E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS | .8104E+00 |
| .1680E+03 | .7291E+03 | .3536E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS | .7917E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .4400E+00 | .1339E-06 | .1198E+00 | .1365E+00 |
| .8121E+00 | .1235E-06 | .1106E+00 | .1365E+00 |
| .1196E+01 | .1213E-06 | .1084E+00 | .1365E+00 |
| .1619E+01 | .1232E-06 | .1099E+00 | .1365E+00 |
| .2014E+01 | .1226E-06 | .1096E+00 | .1365E+00 |
| .2421E+01 | .1228E-06 | .1096E+00 | .1365E+00 |
| .2793E+01 | .1214E-06 | .1081E+00 | .1365E+00 |

PS .2729E+03
AREA .1489E+01
X .1609E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .7363E+02
THE SUMMATION OF DMAEXP(I) SQUARED .7760E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.5375E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1160E+00
DMAEXP(I) = -.5375E-04 T + .1160E+00
BEST FIT OF DATA. FROM LEAST SQUARES TEST. IS .1106E+00
THE TORTUOUSITY OF THE MEDIA IS .8104E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.001961 CM
AND ITS MEAN SIZE IS 0.008289 CM

COLUMN NO. 2 HAS A DIAMETER OF .58000 INCHES AND A DIFFUSION LENGTH OF 16.22552 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7432E+03 | .4070E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6582E+00 |
| .4800E+02 | .7438E+03 | .8140E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6588E+00 |
| .7200E+02 | .7449E+03 | .1235E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .6676E+00 |
| .9600E+02 | .7403E+03 | .1621E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .6521E+00 |
| .1200E+03 | .7357E+03 | .2028E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .6475E+00 |
| .1440E+03 | .7410E+03 | .2436E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .6541E+00 |
| .1680E+03 | .7361E+03 | .3201E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .7305E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3215E+00 | .9768E-07 | .8814E-01 | .1352E+00 |
| .6431E+00 | .9768E-07 | .8816E-01 | .1352E+00 |
| .9756E+00 | .9880E-07 | .8921E-01 | .1352E+00 |
| .1281E+01 | .9726E-07 | .8767E-01 | .1352E+00 |
| .1602E+01 | .9735E-07 | .8760E-01 | .1352E+00 |
| .1924E+01 | .9744E-07 | .8786E-01 | .1352E+00 |
| .2529E+01 | .1098E-06 | .9878E-01 | .1352E+00 |

PS .2729E+03
AREA .1704E+01
X .1623E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .6094E+02
THE SUMMATION OF DMAEXP(I) SQUARED .6274E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .4417E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .8539E-01
DMAEXP(I) = .4417E-04 T + .8539E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8935E-01
THE TORTUOUSITY OF THE MEDIA IS .6608E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .38500
THE MEDIAS STAND. DEVIA. IS 0.011525 CM
AND ITS MEAN SIZE IS 0.165860 CM

COLUMN NO. 3 HAS A DIAMETER OF .57500 INCHES AND A DIFFUSION LENGTH OF 16.13662 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7424E+03 | .5710E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .8165E+00 |
| .4800E+02 | .7170E+03 | .1064E+01 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .7276E+00 |
| .7200E+02 | .7394E+03 | .1707E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .8094E+00 |
| .9600E+02 | .7434E+03 | .2214E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .7928E+00 |
| .1200E+03 | .7438E+03 | .2778E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .7963E+00 |
| .1440E+03 | .7449E+03 | .3300E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .7898E+00 |
| .1680E+03 | .7403E+03 | .3800E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .7734E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .4511E+00 | .1220E-06 | .1095E+00 | .1344E+00 |
| .8406E+00 | .1137E-06 | .1010E+00 | .1344E+00 |
| .1349E+01 | .1216E-06 | .1090E+00 | .1344E+00 |
| .1749E+01 | .1183E-06 | .1061E+00 | .1344E+00 |
| .2195E+01 | .1187E-06 | .1066E+00 | .1344E+00 |
| .2607E+01 | .1175E-06 | .1055E+00 | .1344E+00 |
| .3002E+01 | .1160E-06 | .1040E+00 | .1344E+00 |

PS .2729E+03
AREA .1674E+01
X .1614E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .7096E+02
THE SUMMATION OF DMAEXP(I) SQUARED .7416E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.1455E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1073E+00
DMAEXP(I) = -.1455E-04 T + .1073E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1058E+00
THE TORTUOUSITY OF THE MEDIA IS .7870E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.002971 CM
AND ITS MEAN SIZE IS 0.019896 CM

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COLUMN NO. 4  HAS A DIAMETER OF    .57580 INCHES AND A DIFFUSION LENGTH OF  15.89532 CM
      TIME(HR)         PRESS(MM HG)    VOL. EVAP.(ML)'   COUNTER

        .2400E+02        .7375E+03       .5640E+00       1.0      THE TORTUOUSITY AT TIME =  24.00 HRS. IS    .8863E+00
        .4800E+02        .7424E+03       .1100E+01       2.0      THE TORTUOUSITY AT TIME =  48.00 HRS. IS    .8716E+00
        .7200E+02        .7170E+03       .1636E+01       3.0      THE TORTUOUSITY AT TIME =  72.00 HRS. IS    .8266E+00
        .9600E+02        .7394E+03       .2107E+01       4.0      THE TORTUOUSITY AT TIME =  96.00 HRS. IS    .8304E+00
        .1200E+03        .7434E+03       .2614E+01       5.0      THE TORTUOUSITY AT TIME = 120.00 HRS. IS    .8299E+00
        .1440E+03        .7438E+03       .3257E+01       6.0      THE TORTUOUSITY AT TIME = 144.00 HRS. IS    .8623E+00
        .1680E+03        .7449E+03       .3807E+01       7.0      THE TORTUOUSITY AT TIME = 168.00 HRS. IS    .8655E+00
     GMS EVAP.          FLUX           DMAEXP          DMAREL

        .4456E+00        .1356E-06       .1196E+00        .1336E+00
        .8699E+00        .1322E-06       .1168E+00        .1336E+00
        .1292E+01        .1311E-06       .1147E+00        .1336E+00
        .1665E+01        .1266E-06       .1118E+00        .1336E+00
        .2065E+01        .1257E-06       .1111E+00        .1336E+00
        .2573E+01        .1305E-06       .1154E+00        .1336E+00
        .3008E+01        .1307E-06       .1156E+00        .1336E+00

PS     .2729E+03
AREA  .1679E+01
X      .1590E+02
PO    0.
TEMP   .3032E+03


 SUMMATION OF T(I) SQUARED       .8064E+05
 THE SUMMATION OF T(I)        .6720E+03
 THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)         .7685E+02
 THE SUMMATION OF DMAEXP(I) SQUARED        .8051E+00

 THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS      -.2746E-04
 THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS       .1177E+00
 DMAEXP(I) =  -.2746E-04 T    +     .1177E+00
  BEST FIT OF DATA. FROM LEAST SQUARES TEST. IS        .1149E+00
   THE TORTUOUSITY OF THE MEDIA IS  .8599E+00 FROM LEAST SQUARES TECHNIQUE
  THE POROSITY IN THIS COLUMN IS    .39000
 THE MEDIAS STAND. DEVIA. IS  0.009078  CM
 AND ITS MEAN SIZE IS  0.050788  CM
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COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 15.94358 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7375E+03 | .3860E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6636E+00 |
| .4800E+02 | .7424E+03 | .7290E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6319E+00 |
| .7200E+02 | .7170E+03 | .1029E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .5688E+00 |
| .9600E+02 | .7394E+03 | .1393E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .6006E+00 |
| .1200E+03 | .7434E+03 | .1686E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5856E+00 |
| .1440E+03 | .7438E+03 | .2000E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .5793E+00 |
| .1680E+03 | .7449E+03 | .2343E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .5828E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3049E+00 | .1012E-06 | .8955E-01 | .1336E+00 |
| .5759E+00 | .9558E-07 | .8472E-01 | .1336E+00 |
| .8129E+00 | .8994E-07 | .7896E-01 | .1336E+00 |
| .1130E+01 | .9132E-07 | .8085E-01 | .1336E+00 |
| .1332E+01 | .8842E-07 | .7840E-01 | .1336E+00 |
| .1580E+01 | .8740E-07 | .7751E-01 | .1336E+00 |
| .1851E+01 | .8777E-07 | .7786E-01 | .1336E+00 |

PS .2729E+03
AREA .1501E+01
X .1594E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5331E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5679E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.7446E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .8827E-01
DMAEXP(I) = -.7446E-04 T + .8827E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8073E-01
THE TORTUOUSITY OF THE MEDIA IS .6042E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .40000
THE MEDIAS STAND. DEVIA. IS 0.006522 CM
AND ITS MEAN SIZE IS 0.031240 CM

COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 15.94358 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7395E+03 | .3350E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5779E+00 |
| .4800E+02 | .7382E+03 | .6860E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .5904E+00 |
| .9600E+02 | .7393E+03 | .1257E+01 | 3.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .5419E+00 |
| .1200E+03 | .7366E+03 | .1635E+01 | 4.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5613E+00 |
| .1440E+03 | .7336E+03 | .1999E+01 | 5.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .5689E+00 |
| .1680E+03 | .7435E+03 | .2307E+01 | 6.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .5724E+00 |
| .1920E+03 | .7466E+03 | .2799E+01 | 7.0 | THE TORTUOUSITY AT TIME = 192.00 HRS. IS .6109E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .2646E+00 | .8784E-07 | .7778E-01 | .1333E+00 |
| .5419E+00 | .8994E-07 | .7960E-01 | .1333E+00 |
| .9930E+00 | .8240E-07 | .7296E-01 | .1333E+00 |
| .1292E+01 | .8574E-07 | .7584E-01 | .1333E+00 |
| .1579E+01 | .8736E-07 | .7719E-01 | .1333E+00 |
| .1823E+01 | .8642E-07 | .7663E-01 | .1333E+00 |
| .2211E+01 | .9174E-07 | .8144E-01 | .1333E+00 |

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PS     .2729E+03
AREA  .1501E+01
X      .1594E+02
PO    0.
TEMP   .3032E+03
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SUMMATION OF T(I) SQUARED      .1123E+06
THE SUMMATION OF T(I)       .7920E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)      .6142E+02
THE SUMMATION OF DMAEXP(I) SQUARED      .5414E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS      .6969E-05
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS      .7656E-01
DMAEXP(I) =    .6969E-05 T    +    .7656E-01
 BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS      .7718E-01
  THE TORTUOUSITY OF THE MEDIA IS  .5790E+00 FROM LEAST SQUARES TECHNIQUE
 THE POROSITY IN THIS COLUMN IS     .40000
THE MEDIAS STAND. DEVIA. IS  0.006522  CM
AND ITS MEAN SIZE IS  0.031240  CM
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COLUMN NO. 3 HAS A DIAMETER OF .57500 INCHES AND A DIFFUSION LENGTH OF 16.13662 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7357E+03 | .4930E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6969E+00 |
| .4800E+02 | .7410E+03 | .9680E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6904E+00 |
| .7200E+02 | .7361E+03 | .1443E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .6804E+00 |
| .9600E+02 | .7291E+03 | .1950E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .6812E+00 |
| .1200E+03 | .7345E+03 | .2550E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .7194E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3895E+00 | .1053E-06 | .9427E-01 | .1355E+00 |
| .7647E+00 | .1034E-06 | .9273E-01 | .1355E+00 |
| .1140E+01 | .1028E-06 | .9199E-01 | .1355E+00 |
| .1540E+01 | .1042E-06 | .9299E-01 | .1355E+00 |
| .2014E+01 | .1090E-06 | .9748E-01 | .1355E+00 |

PS .2729E+03
AREA .1674E+01
X .1614E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .3168E+05
THE SUMMATION OF T(I) .3600E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .3396E+02
THE SUMMATION OF DMAEXP(I) SQUARED .4695E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .2781E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .9189E-01
DMAEXP(I) = .2781E-04 T + .9189E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .9382E-01
THE TORTUOUSITY OF THE MEDIA IS .6923E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.002971 CM
AND ITS MEAN SIZE IS 0.019896 CM

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COLUMN NO. 1  HAS A DIAMETER OF     .54440 INCHES AND A DIFFUSION LENGTH OF  15.94358 CM
      TIME(HR)        PRESS(MM HG)    VOL. EVAP.(ML)'   COUNTER

        .2400E+02        .7403E+03        .5290E+00       1.0      THE TORTUOUSITY AT TIME =  24.00 HRS. IS     .9138E+00
        .4800E+02        .7357E+03        .8070E+00       2.0      THE TORTUOUSITY AT TIME =  48.00 HRS. IS     .6915E+00
        .7200E+02        .7410E+03        .1136E+01       3.0      THE TORTUOUSITY AT TIME =  72.00 HRS. IS     .6549E+00
        .9600E+02        .7361E+03        .1450E+01       4.0      THE TORTUOUSITY AT TIME =  96.00 HRS. IS     .6217E+00
        .1200E+03        .7291E+03        .1815E+01       5.0      THE TORTUOUSITY AT TIME = 120.00 HRS. IS     .6150E+00
        .1440E+03        .7345E+03        .2186E+01       6.0      THE TORTUOUSITY AT TIME = 144.00 HRS. IS     .6231E+00
        .1680E+03        .7347E+03        .2607E+01       7.0      THE TORTUOUSITY AT TIME = 168.00 HRS. IS     .6372E+00
     GMS EVAP.           FLUX          DMAEXP           DMAREL

        .4179E+00        .1387E-06        .1229E+00        .1355E+00
        .6375E+00        .1058E-06        .9355E-01        .1355E+00
        .8974E+00        .9929E-07        .8797E-01        .1355E+00
        .1145E+01        .9505E-07        .8406E-01        .1355E+00
        .1434E+01        .9518E-07        .8395E-01        .1355E+00
        .1727E+01        .9553E-07        .8443E-01        .1355E+00
        .2060E+01        .9766E-07        .8632E-01        .1355E+00

PS      .2729E+03
AREA   .1521E+01
X       .1594E+02
PO     0.
TEMP    .3032E+03


 SUMMATION OF T(I) SQUARED        .8064E+05
 THE SUMMATION OF T(I)        .6720E+03
 THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)        .5858E+02
 THE SUMMATION OF DMAEXP(I) SQUARED        .6431E+00

 THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS       -.1962E-03
 THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS         .1107E+00
 DMAEXP(I) =   -.1962E-03 T    +      .1107E+00
  BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS        .8925E-01
   THE TORTUOUSITY OF THE MEDIA IS  .6588E+00 FROM LEAST SQUARES TECHNIQUE
  THE POROSITY IN THIS COLUMN IS     .40000
 THE MEDIAS STAND. DEVIA. IS  0.006522  CM
 AND ITS MEAN SIZE IS  0.031240  CM
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COLUMN NO. 4 HAS A DIAMETER OF .57580 INCHES AND A DIFFUSION LENGTH OF 15.89532 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7403E+03 | .5930E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .9363E+00 |
| .4800E+02 | .7357E+03 | .1078E+01 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .8443E+00 |
| .7200E+02 | .7410E+03 | .1621E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .8542E+00 |
| .9600E+02 | .7361E+03 | .2121E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .8312E+00 |
| .1200E+03 | .7291E+03 | .2750E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .8517E+00 |
| .1440E+03 | .7345E+03 | .3250E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .8468E+00 |
| .1680E+03 | .7347E+03 | .3958E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .8842E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .4685E+00 | .1426E-06 | .1259E+00 | .1355E+00 |
| .8516E+00 | .1296E-06 | .1142E+00 | .1355E+00 |
| .1281E+01 | .1299E-06 | .1147E+00 | .1355E+00 |
| .1676E+01 | .1275E-06 | .1124E+00 | .1355E+00 |
| .2172E+01 | .1322E-06 | .1163E+00 | .1355E+00 |
| .2567E+01 | .1302E-06 | .1147E+00 | .1355E+00 |
| .3127E+01 | .1359E-06 | .1198E+00 | .1355E+00 |

PS .2729E+03
AREA .1679E+01
X .1590E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .7815E+02
THE SUMMATION OF DMAEXP(I) SQUARED .8180E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.2341E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1191E+00
DMAEXP(I) = -.2341E-04 T + .1191E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1166E+00
THE TORTUOUSITY OF THE MEDIA IS .8605E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .39000
THE MEDIAS STAND. DEVIA. IS 0.009078 CM
AND ITS MEAN SIZE IS 0.050788 CM

COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 15.94358 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7463E+03 | .2850E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .4974E+00 |
| .4800E+02 | .7410E+03 | .6210E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .5370E+00 |
| .7200E+02 | .7351E+03 | .9500E+00 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .5421E+00 |
| .9600E+02 | .7377E+03 | .1250E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .5374E+00 |
| .1200E+03 | .7375E+03 | .1550E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5329E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .2251E+00 | .7473E-07 | .6633E-01 | .1350E+00 |
| .4906E+00 | .8142E-07 | .7213E-01 | .1350E+00 |
| .7505E+00 | .8303E-07 | .7340E-01 | .1350E+00 |
| .9875E+00 | .8194E-07 | .7251E-01 | .1350E+00 |
| .1224E+01 | .8129E-07 | .7192E-01 | .1350E+00 |

PS .2729E+03
AREA .1501E+01
X .1594E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .3168E+05
THE SUMMATION OF T(I) .3600E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .2593E+02
THE SUMMATION OF DMAEXP(I) SQUARED .3563E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .4815E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .6779E-01
DMAEXP(I) = .4815E-04 T + .6779E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .7107E-01
THE TORTUOUSITY OF THE MEDIA IS .5266E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .40000
THE MEDIAS STAND. DEVIA. IS 0.006522 CM
AND ITS MEAN SIZE IS 0.031240 CM

COLUMN NO. 3 HAS A DIAMETER OF .57500 INCHES AND A DIFFUSION LENGTH OF 16.13662 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7456E+03 | .5210E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .7490E+00 |
| .4800E+02 | .7430E+03 | .1042E+01 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .7457E+00 |
| .7200E+02 | .7469E+03 | .1550E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .7444E+00 |
| .9600E+02 | .7463E+03 | .2100E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .7557E+00 |
| .1200E+03 | .7410E+03 | .2750E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .7845E+00 |
| .1440E+03 | .7351E+03 | .3221E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .7580E+00 |
| .1680E+03 | .7377E+03 | .3821E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .7742E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .4116E+00 | .1113E-06 | .9999E-01 | .1349E+00 |
| .8232E+00 | .1113E-06 | .9989E-01 | .1349E+00 |
| .1224E+01 | .1104E-06 | .9920E-01 | .1349E+00 |
| .1659E+01 | .1122E-06 | .1008E+00 | .1349E+00 |
| .2172E+01 | .1175E-06 | .1054E+00 | .1349E+00 |
| .2545E+01 | .1147E-06 | .1026E+00 | .1349E+00 |
| .3019E+01 | .1166E-06 | .1045E+00 | .1349E+00 |

PS .2729E+03
AREA .1674E+01
X .1614E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .6899E+02
THE SUMMATION OF DMAEXP(I) SQUARED .7123E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .3730E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .9818E-01
DMAEXP(I) = .3730E-04 T + .9818E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1017E+00
THE TORTUOUSITY OF THE MEDIA IS .7535E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.002971 CM
AND ITS MEAN SIZE IS 0.019896 CM

COLUMN NO. 4 HAS A DIAMETER OF .57580 INCHES AND A DIFFUSION LENGTH OF 15.89532 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7463E+03 | .3720E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5934E+00 |
| .4800E+02 | .7410E+03 | .8110E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6410E+00 |
| .7200E+02 | .7410E+03 | .1250E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .6587E+00 |
| .9600E+02 | .7351E+03 | .1736E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .6792E+00 |
| .1200E+03 | .7377E+03 | .2243E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .7052E+00 |
| .1440E+03 | .7375E+03 | .2675E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .7006E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .2939E+00 | .8943E-07 | .7914E-01 | .1350E+00 |
| .6407E+00 | .9748E-07 | .8610E-01 | .1350E+00 |
| .9875E+00 | .1002E-06 | .8847E-01 | .1350E+00 |
| .1371E+01 | .1043E-06 | .9196E-01 | .1350E+00 |
| .1772E+01 | .1078E-06 | .9514E-01 | .1350E+00 |
| .2113E+01 | .1072E-06 | .9455E-01 | .1350E+00 |

PS .2729E+03
AREA .1679E+01
X .1590E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .5242E+05
THE SUMMATION OF T(I) .5040E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .4626E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5354E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .1281E-03
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .7846E-01
DMAEXP(I) = .1281E-03 T + .7846E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8850E-01
THE TORTUOUSITY OF THE MEDIA IS .6557E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .39000
THE MEDIAS STAND. DEVIA. IS 0.009078 CM
AND ITS MEAN SIZE IS 0.050788 CM

COLUMN NO. 2 HAS A DIAMETER OF .58000 INCHES AND A DIFFUSION LENGTH OF 16.22552 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML)' | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7469E+03 | .3640E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5924E+00 |
| .4800E+02 | .7463E+03 | .7360E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .5983E+00 |
| .7200E+02 | .7410E+03 | .1021E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .5483E+00 |
| .9600E+02 | .7351E+03 | .1343E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .5354E+00 |
| .1200E+03 | .7377E+03 | .1686E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5402E+00 |
| .1440E+03 | .7375E+03 | .2000E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .5338E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .2876E+00 | .8736E-07 | .7894E-01 | .1350E+00 |
| .5814E+00 | .8832E-07 | .7979E-01 | .1350E+00 |
| .8666E+00 | .8168E-07 | .7365E-01 | .1350E+00 |
| .1061E+01 | .8058E-07 | .7250E-01 | .1350E+00 |
| .1332E+01 | .8093E-07 | .7288E-01 | .1350E+00 |
| .1580E+01 | .8000E-07 | .7204E-01 | .1350E+00 |

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PS      .2729E+03
AREA   .1704E+01
X       .1623E+02
PO     0.
TEMP    .3032E+03
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SUMMATION OF T(I) SQUARED      .5242E+05
THE SUMMATION OF T(I)      .5040E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)      .3711E+02
THE SUMMATION OF DMAEXP(I) SQUARED      .4498E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS      -.6707E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS      .8060E-01
DMAEXP(I) =  -.6707E-04 T   +    .8060E-01
 BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS      .7471E-01
  THE TORTUOUSITY OF THE MEDIA IS  .5536E+00 FROM LEAST SQUARES TECHNIQUE
 THE POROSITY IN THIS COLUMN IS    .38500
THE MEDIAS STAND. DEVIA. IS  0.011525  CM
AND ITS MEAN SIZE IS  0.165860  CM
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COLUMN NO. 5 HAS A DIAMETER OF .54220 INCHES AND A DIFFUSION LENGTH OF 16.09217 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7405E+03 | .6780E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .1084E+01 |
| .4800E+02 | .7451E+03 | .1328E+01 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .1070E+01 |
| .7200E+02 | .7426E+03 | .1900E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .1016E+01 |
| .9600E+02 | .7345E+03 | .2478E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .9801E+00 |
| .1200E+03 | .7202E+03 | .2981E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .9198E+00 |
| .1440E+03 | .7323E+03 | .3609E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .9480E+00 |
| .1680E+03 | .7300E+03 | .4138E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .9279E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .5356E+00 | .1629E-06 | .1457E+00 | .1363E+00 |
| .1049E+01 | .1596E-06 | .1429E+00 | .1363E+00 |
| .1501E+01 | .1522E-06 | .1362E+00 | .1363E+00 |
| .1958E+01 | .1489E-06 | .1328E+00 | .1363E+00 |
| .2355E+01 | .1433E-06 | .1271E+00 | .1363E+00 |
| .2851E+01 | .1445E-06 | .1288E+00 | .1363E+00 |
| .3269E+01 | .1421E-06 | .1265E+00 | .1363E+00 |

PS .2729E+03
AREA .1489E+01
X .1609E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .8797E+02
THE SUMMATION OF DMAEXP(I) SQUARED .9400E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.1408E-03
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1478E+00
DMAEXP(I) = -.1408E-03 T + .1478E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1336E+00
THE TORTUOUSITY OF THE MEDIA IS .9796E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.001961 CM
AND ITS MEAN SIZE IS 0.008289 CM

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COLUMN NO. 1  HAS A DIAMETER OF    .54440 INCHES AND A DIFFUSION LENGTH OF  15.94485 CM
      TIME(HR)       PRESS(MM HG)   VOL. EVAP.(ML)   COUNTER

        .2400E+02       .7405E+03       .3860E+00      1.0     THE TORTUOUSITY AT TIME =  24.00 HRS. IS    .6064E+00
        .4800E+02       .7451E+03       .7500E+00      2.0     THE TORTUOUSITY AT TIME =  48.00 HRS. IS    .5938E+00
        .7200E+02       .7426E+03       .1065E+01      3.0     THE TORTUOUSITY AT TIME =  72.00 HRS. IS    .5597E+00
        .9600E+02       .7345E+03       .1443E+01      4.0     THE TORTUOUSITY AT TIME =  96.00 HRS. IS    .5609E+00
        .1200E+03       .7202E+03       .1815E+01      5.0     THE TORTUOUSITY AT TIME = 120.00 HRS. IS    .5504E+00
        .1440E+03       .7323E+03       .2186E+01      6.0     THE TORTUOUSITY AT TIME = 144.00 HRS. IS    .5643E+00
        .1680E+03       .7300E+03       .2536E+01      7.0     THE TORTUOUSITY AT TIME = 168.00 HRS. IS    .5589E+00
     GMS EVAP.          FLUX           DMAEXP          DMAREL

        .3049E+00       .9201E-07       .8151E-01       .1363E+00
        .5925E+00       .8939E-07       .7932E-01       .1363E+00
        .8413E+00       .8462E-07       .7502E-01       .1363E+00
        .1140E+01       .8599E-07       .7601E-01       .1363E+00
        .1434E+01       .8653E-07       .7607E-01       .1363E+00
        .1727E+01       .8685E-07       .7670E-01       .1363E+00
        .2003E+01       .8636E-07       .7620E-01       .1363E+00

PS      .2729E+03
AREA   .1501E+01
X        .1594E+02
PO     0.
TEMP    .3632E+03


 SUMMATION OF T(I) SQUARED       .8064E+05
 THE SUMMATION OF T(I)        .6720E+03
 THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)        .5144E+02
 THE SUMMATION OF DMAEXP(I) SQUARED       .5408E+00

 THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS      -.2991E-04
 THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS       .8013E-01
 DMAEXP(I) =  -.2991E-04 T    +     .8013E-01
  BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS        .7715E-01
   THE TORTUOUSITY OF THE MEDIA IS  .5658E+00 FROM LEAST SQUARES TECHNIQUE
  THE POROSITY IN THIS COLUMN IS     .44000
 THE MEDIAS STAND. DEVIA. IS  0.002971  CM
 AND ITS MEAN SIZE IS    0.019896 CM
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COLUMN NO. 3 HAS A DIAMETER OF .57500 INCHES AND A DIFFUSION LENGTH OF 16.13789 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7405E+03 | .6210E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .8851E+00 |
| .4800E+02 | .7451E+03 | .1121E+01 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .8052E+00 |
| .7200E+02 | .7426E+03 | .1664E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .7934E+00 |
| .9600E+02 | .7345E+03 | .2193E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .7734E+00 |
| .1200E+03 | .7202E+03 | .2686E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .7390E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .4966E+00 | .1327E-06 | .1190E+00 | .1382E+00 |
| .8856E+00 | .1198E-06 | .1076E+00 | .1382E+00 |
| .1315E+01 | .1185E-06 | .1063E+00 | .1382E+00 |
| .1732E+01 | .1171E-06 | .1048E+00 | .1382E+00 |
| .2122E+01 | .1148E-06 | .1021E+00 | .1382E+00 |

PS .2729E+03
AREA .1674E+01
X .1614E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .3168E+05
THE SUMMATION OF T(I) .3600E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .3799E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5398E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.1518E-03
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1189E+00
DMAEXP(I) = -.1518E-03 T + .1189E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1074E+00
THE TORTUOUSITY OF THE MEDIA IS .7771E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.002971 CM
AND ITS MEAN SIZE IS 0.019896 CM

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COLUMN NO. 4  HAS A DIAMETER OF    .57580 INCHES AND A DIFFUSION LENGTH OF  15.89659 CM

      TIME(HR)        PRESS(MM HG)    VOL. EVAP.(ML)'   COUNTER

       .2400E+02       .7405E+03       .5290E+00        1.0     THE TORTUOUSITY AT TIME =  24.00 HRS. IS    .8356E+00
       .4800E+02       .7451E+03       .9290E+00        2.0     THE TORTUOUSITY AT TIME =  48.00 HRS. IS    .7395E+00
       .7200E+02       .7426E+03       .1550E+01        3.0     THE TORTUOUSITY AT TIME =  72.00 HRS. IS    .8191E+00
       .9600E+02       .7345E+03       .2036E+01        4.0     THE TORTUOUSITY AT TIME =  96.00 HRS. IS    .7958E+00
       .1200E+03       .7202E+03       .2550E+01        5.0     THE TORTUOUSITY AT TIME = 120.00 HRS. IS    .7776E+00
       .1440E+03       .7323E+03       .3072E+01        6.0     THE TORTUOUSITY AT TIME = 144.00 HRS. IS    .7974E+00
       .1680E+03       .7300E+03       .2663E+01        7.0     THE TORTUOUSITY AT TIME = 168.00 HRS. IS    .5901E+00

     GMS EVAP.          FLUX          DMAEXP            DMAREL

       .4179E+00       .1272E-06       .1123E+00        .1363E+00
       .7339E+00       .1117E-06       .9878E-01        .1363E+00
       .1224E+01       .1242E-06       .1098E+00        .1363E+00
       .1608E+01       .1224E-06       .1078E+00        .1363E+00
       .2014E+01       .1226E-06       .1075E+00        .1363E+00
       .2427E+01       .1231E-06       .1084E+00        .1363E+00
       .2104E+01       .9146E-07       .8046E-01        .1363E+00

PS     .2729E+03
AREA  .1679E+01
X      .1590E+02
PO    0.
TEMP   .3032E+03


 SUMMATION OF T(I) SQUARED      .8064E+05
 THE SUMMATION OF T(I)       .6720E+03
 THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)      .6771E+02
 THE SUMMATION OF DMAEXP(I) SQUARED      .7250E+00

 THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS     -.1171E-03
 THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS      .1148E+00
 DMAEXP(I) =  -.1171E-03 T    +     .1148E+00
  BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS      .1010E+00
   THE TORTUOUSITY OF THE MEDIA IS  .7408E+00 FROM LEAST SQUARES TECHNIQUE
  THE POROSITY IN THIS COLUMN IS     .39000
 THE MEDIAS STAND. DEVIA. IS  0.009078  CM
 AND ITS MEAN SIZE IS  0.050788  CM
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COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 15.94485 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7395E+03 | .3350E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5137E+00 |
| .2400E+02 | .7382E+03 | .3510E+00 | 2.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5371E+00 |
| .4800E+02 | .7393E+03 | .5710E+00 | 3.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .4377E+00 |
| .2400E+02 | .7366E+03 | .3780E+00 | 4.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5768E+00 |
| .2400E+02 | .7336E+03 | .3640E+00 | 5.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5525E+00 |
| .2400E+02 | .7435E+03 | .3080E+00 | 6.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .4756E+00 |
| .2400E+02 | .7466E+03 | .4920E+00 | 7.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .7637E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .2646E+00 | .7808E-07 | .6914E-01 | .1333E+00 |
| .2773E+00 | .8181E-07 | .7241E-01 | .1333E+00 |
| .4511E+00 | .6654E-07 | .5892E-01 | .1333E+00 |
| .2986E+00 | .8810E-07 | .7793E-01 | .1333E+00 |
| .2876E+00 | .8484E-07 | .7496E-01 | .1333E+00 |
| .2433E+00 | .7179E-07 | .6366E-01 | .1333E+00 |
| .3887E+00 | .1147E-06 | .1018E+00 | .1333E+00 |

PS .2729E+03
AREA .1501E+01
X .1594E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .5760E+04
THE SUMMATION OF T(I) .1920E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .1387E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5188E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.7388E-03
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .9439E-01
DMAEXP(I) = -.7388E-03 T + .9439E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .7057E-01
THE TORTUOUSITY OF THE MEDIA IS .5294E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .45000
THE MEDIAS STAND. DEVIA. IS 0.006522 CM
AND ITS MEAN SIZE IS 0.031240 CM

COLUMN NO. 2 HAS A DIAMETER OF .58000 INCHES AND A DIFFUSION LENGTH OF 16.22679 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7405E+03 | .3860E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6214E+00 |
| .4800E+02 | .7451E+03 | .7430E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6028E+00 |
| .7200E+02 | .7426E+03 | .1122E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .6042E+00 |
| .9600E+02 | .7345E+03 | .1443E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .5748E+00 |
| .1200E+03 | .7202E+03 | .1757E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5460E+00 |
| .1440E+03 | .7323E+03 | .2142E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .5666E+00 |
| .1680E+03 | .7300E+03 | .2450E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .5533E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3049E+00 | .9264E-07 | .8352E-01 | .1363E+00 |
| .5870E+00 | .8916E-07 | .8052E-01 | .1363E+00 |
| .8864E+00 | .8976E-07 | .8098E-01 | .1363E+00 |
| .1140E+01 | .8658E-07 | .7788E-01 | .1363E+00 |
| .1388E+01 | .8434E-07 | .7545E-01 | .1363E+00 |
| .1692E+01 | .8568E-07 | .7701E-01 | .1363E+00 |
| .1935E+01 | .8400E-07 | .7544E-01 | .1363E+00 |

PS .2729E+03
AREA .1704E+01
X .1623E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5199E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5508E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.5475E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .8394E-01
DMAEXP(I) = -.5475E-04 T + .8394E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .7849E-01
THE TORTUOUSITY OF THE MEDIA IS .5757E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .38500
THE MEDIAS STAND. DEVIA. IS 0.011525 CM
AND ITS MEAN SIZE IS 0.165860 CM

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COLUMN NO. 3  HAS A DIAMETER OF    .57500 INCHES AND A DIFFUSION LENGTH OF  16.13789 CM

      TIME(HR)       PRESS(MM HG)    VOL. EVAP.(ML)'   COUNTER

       .2400E+02      .7326E+03      .4430E+00      1.0    THE TORTUOUSITY AT TIME =  24.00 HRS. IS   .6229E+00
       .4800E+02      .7246E+03      .9860E+00      2.0    THE TORTUOUSITY AT TIME =  48.00 HRS. IS   .6835E+00
       .7200E+02      .7341E+03      .1472E+01      3.0    THE TORTUOUSITY AT TIME =  72.00 HRS. IS   .6917E+00
       .9600E+02      .7395E+03      .1951E+01      4.0    THE TORTUOUSITY AT TIME =  96.00 HRS. IS   .6940E+00
       .1200E+03      .7367E+03      .2472E+01      5.0    THE TORTUOUSITY AT TIME = 120.00 HRS. IS   .7001E+00
       .1440E+03      .7413E+03      .3015E+01      6.0    THE TORTUOUSITY AT TIME = 144.00 HRS. IS   .7172E+00
       .1680E+03      .7413E+03      .3493E+01      7.0    THE TORTUOUSITY AT TIME = 168.00 HRS. IS   .7122E+00

     GMS EVAP.          FLUX          DMAEXP          DMAREL

       .3500E+00      .9466E-07      .8462E-01      .1343E+00
       .7789E+00      .1053E-06      .9389E-01      .1343E+00
       .1163E+01      .1048E-06      .9378E-01      .1343E+00
       .1541E+01      .1042E-06      .9341E-01      .1343E+00
       .1953E+01      .1056E-06      .9458E-01      .1343E+00
       .2382E+01      .1074E-06      .9630E-01      .1343E+00
       .2759E+01      .1066E-06      .9562E-01      .1343E+00

PS     .2729E+03
AREA  .1674E+01
X      .1614E+02
PO    0.
TEMP   .3032E+03


 SUMMATION OF T(I) SQUARED       .8064E+05
 THE SUMMATION OF T(I)       .6720E+03
 THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)      .6354E+02
 THE SUMMATION OF DMAEXP(I) SQUARED      .6522E+00

 THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS      .5748E-04
 THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS      .8765E-01
 DMAEXP(I) =   .5748E-04 T   +    .8765E-01
  BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS      .9286E-01
   THE TORTUOUSITY OF THE MEDIA IS  .6916E+00 FROM LEAST SQUARES TECHNIQUE
  THE POROSITY IN THIS COLUMN IS    .44000
 THE MEDIAS STAND. DEVIA. IS  0.002971  CM
 AND ITS MEAN SIZE IS   0.019896 CM
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COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 15.94485 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML)' | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7326E+03 | .3710E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5750E+00 |
| .4800E+02 | .7246E+03 | .7210E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .5509E+00 |
| .7200E+02 | .7341E+03 | .1128E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .5842E+00 |
| .9600E+02 | .7395E+03 | .1507E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .5909E+00 |
| .1200E+03 | .7367E+03 | .1900E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5931E+00 |
| .1440E+03 | .7413E+03 | .2257E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .5918E+00 |
| .1680E+03 | .7413E+03 | .2643E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .5940E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .2931E+00 | .8844E-07 | .7811E-01 | .1343E+00 |
| .5696E+00 | .8593E-07 | .7567E-01 | .1343E+00 |
| .8911E+00 | .8963E-07 | .7921E-01 | .1343E+00 |
| .1191E+01 | .8981E-07 | .7953E-01 | .1343E+00 |
| .1501E+01 | .9058E-07 | .8013E-01 | .1343E+00 |
| .1783E+01 | .8967E-07 | .7946E-01 | .1343E+00 |
| .2088E+01 | .9000E-07 | .7975E-01 | .1343E+00 |

PS .2729E+03
AREA .1501E+01
X .1594E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5330E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5519E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .1994E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .7692E-01
DMAEXP(I) = .1994E-04 T + .7692E-01
BEST FIT OF DATA. FROM LEAST SQUARES TEST, IS .7878E-01
THE TORTUOUSITY OF THE MEDIA IS .5868E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.001961 CM
AND ITS MEAN SIZE IS 0.008289 CM

COLUMN NO. 4 HAS A DIAMETER OF .57580 INCHES AND A DIFFUSION LENGTH OF 15.89659 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7326E+03 | .5220E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .7210E+00 |
| .4800E+02 | .7246E+03 | .1100E+01 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .7491E+00 |
| .7200E+02 | .7341E+03 | .1700E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .7847E+00 |
| .9600E+02 | .7395E+03 | .2250E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .7862E+00 |
| .1200E+03 | .7367E+03 | .2900E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .8068E+00 |
| .1440E+03 | .7413E+03 | .3472E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .8113E+00 |
| .1680E+03 | .7413E+03 | .3958E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .7928E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .4124E+00 | .1112E-06 | .9795E-01 | .1343E+00 |
| .8690E+00 | .1172E-06 | .1029E+00 | .1343E+00 |
| .1343E+01 | .1207E-06 | .1064E+00 | .1343E+00 |
| .1777E+01 | .1199E-06 | .1058E+00 | .1343E+00 |
| .2291E+01 | .1236E-06 | .1090E+00 | .1343E+00 |
| .2743E+01 | .1233E-06 | .1089E+00 | .1343E+00 |
| .3127E+01 | .1205E-06 | .1064E+00 | .1343E+00 |

PS .2729E+03
AREA .1679E+01
X .1590E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .7176E+02
THE SUMMATION OF DMAEXP(I) SQUARED .7374E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .5976E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .9961E-01
DMAEXP(I) = .5976E-04 T + .9961E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1051E+00
THE TORTUOUSITY OF THE MEDIA IS .7827E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .44000
THE MEDIAS STAND. DEVIA. IS 0.001961 CM
AND ITS MEAN SIZE IS 0.008289 CM

COLUMN NO. 2 HAS A DIAMETER OF .58000 INCHES AND A DIFFUSION LENGTH OF 16.22679 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7326E+03 | .4000E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6352E+00 |
| .4800E+02 | .7246E+03 | .7800E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6154E+00 |
| .7200E+02 | .7341E+03 | .1171E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .6215E+00 |
| .9600E+02 | .7395E+03 | .1499E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .6022E+00 |
| .1200E+03 | .7367E+03 | .1849E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5914E+00 |
| .1440E+03 | .7413E+03 | .2306E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .6196E+00 |
| .1680E+03 | .7413E+03 | .2806E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .6462E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3166E+00 | .9600E-07 | .8630E-01 | .1343E+00 |
| .6209E+00 | .9432E-07 | .8453E-01 | .1343E+00 |
| .9251E+00 | .9368E-07 | .8426E-01 | .1343E+00 |
| .1184E+01 | .8994E-07 | .8106E-01 | .1343E+00 |
| .1461E+01 | .8876E-07 | .7990E-01 | .1343E+00 |
| .1822E+01 | .9224E-07 | .8318E-01 | .1343E+00 |
| .2217E+01 | .9621E-07 | .8676E-01 | .1343E+00 |

PS .2729E+03
AREA .1704E+01
X .1623E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5612E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5860E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.8426E-05
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .8452E-01
DMAEXP(I) = -.8426E-05 T + .8452E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8358E-01
THE TORTUOUSITY OF THE MEDIA IS .6225E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .38500
THE MEDIAS STAND. DEVIA. IS 0.011525 CM
AND ITS MEAN SIZE IS 0.165860 CM

COLUMN NO. 2 HAS A DIAMETER OF .58000 INCHES AND A DIFFUSION LENGTH OF 16.22552 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7454E+03 | .4210E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6417E+00 |
| .4800E+02 | .7392E+03 | .8640E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6515E+00 |
| .7200E+02 | .7346E+03 | .1271E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .6339E+00 |
| .9600E+02 | .7355E+03 | .1686E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .6316E+00 |
| .1200E+03 | .7448E+03 | .2150E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .6547E+00 |
| .1440E+03 | .7445E+03 | .2628E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .6666E+00 |
| .1680E+03 | .7436E+03 | .3107E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .6745E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3326E+00 | .9488E-07 | .8568E-01 | .1338E+00 |
| .6826E+00 | .9736E-07 | .8772E-01 | .1338E+00 |
| .1004E+01 | .9548E-07 | .8589E-01 | .1338E+00 |
| .1332E+01 | .9500E-07 | .8548E-01 | .1338E+00 |
| .1698E+01 | .9691E-07 | .8750E-01 | .1338E+00 |
| .2076E+01 | .9872E-07 | .8911E-01 | .1338E+00 |
| .2455E+01 | .1000E-06 | .9028E-01 | .1338E+00 |

PS .2729E+03
AREA .1704E+01
X .1623E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5916E+02
THE SUMMATION OF DMAEXP(I) SQUARED .6117E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .2704E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .8478E-01
DMAEXP(I) = .2704E-04 T + .8478E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8731E-01
THE TORTUOUSITY OF THE MEDIA IS .6523E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .41000
THE MEDIAS STAND. DEVIA. IS MIX 2 CM
AND ITS MEAN SIZE IS NO AVERAGECM

COLUMN NO. 4 HAS A DIAMETER OF .57580 INCHES AND A DIFFUSION LENGTH OF 15.89532 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7454E+03 | .4720E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .7151E+00 |
| .4800E+02 | .7392E+03 | .9000E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6746E+00 |
| .7200E+02 | .7346E+03 | .1336E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .6623E+00 |
| .9600E+02 | .7355E+03 | .1757E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .6543E+00 |
| .1200E+03 | .7448E+03 | .2222E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .6726E+00 |
| .1440E+03 | .7445E+03 | .2626E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .6621E+00 |
| .1680E+03 | .7436E+03 | .3036E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .6551E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3729E+00 | .1079E-06 | .9549E-01 | .1338E+00 |
| .711?E+00 | .1029E-06 | .9083E-01 | .1338E+00 |
| .1055E+01 | .1018E-06 | .8974E-01 | .1338E+00 |
| .1388E+01 | .1004E-06 | .8854E-01 | .1338E+00 |
| .1755E+01 | .1016E-06 | .8988E-01 | .1338E+00 |
| .2075E+01 | .1001E-06 | .8851E-01 | .1338E+00 |
| .2398E+01 | .9918E-07 | .8768E-01 | .1338E+00 |

PS .2729E+03
AREA .1679E+01
X .1590E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5988E+02
THE SUMMATION OF DMAEXP(I) SQUARED .6307E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.4152E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .9408E-01
DMAEXP(I) = -.4152E-04 T + .9408E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8997E-01
THE TORTUOUSITY OF THE MEDIA IS .6722E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .41000
THE MEDIAS STAND. DEVIA. IS MIX 3 CM
AND ITS MEAN SIZE IS NO AVERAGECM

COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 15.94358 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7454E+03 | .3640E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6188E+00 |
| .4800E+02 | .7392E+03 | .7070E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .5946E+00 |
| .7200E+02 | .7346E+03 | .1064E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .5919E+00 |
| .9600E+02 | .7355E+03 | .1421E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .5938E+00 |
| .1200E+03 | .7448E+03 | .1743E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5920E+00 |
| .1440E+03 | .7445E+03 | .2078E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .5879E+00 |
| .1680E+03 | .7436E+03 | .2457E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .5949E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .2876E+00 | .9312E-07 | .8263E-01 | .1338E+00 |
| .5585E+00 | .9043E-07 | .8006E-01 | .1338E+00 |
| .8406E+00 | .9073E-07 | .8019E-01 | .1338E+00 |
| .1123E+01 | .9088E-07 | .8035E-01 | .1338E+00 |
| .1377E+01 | .8918E-07 | .7911E-01 | .1338E+00 |
| .1642E+01 | .8860E-07 | .7859E-01 | .1338E+00 |
| .1941E+01 | .8979E-07 | .7962E-01 | .1338E+00 |

PS .2729E+03
AREA .1501E+01
X .1594E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5350E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5606E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.1939E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .8194E-01
DMAEXP(I) = -.1939E-04 T + .8194E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8005E-01
THE TORTUOUSITY OF THE MEDIA IS .5980E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .41000
THE MEDIAS STAND. DEVIA. IS MIX 1 CM
AND ITS MEAN SIZE IS NO AVERAGECM

COLUMN NO. 3 HAS A DIAMETER OF .57500 INCHES AND A DIFFUSION LENGTH OF 16.13662 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7454E+03 | .5150E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .7943E+00 |
| .4800E+02 | .7392E+03 | .9430E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .7196E+00 |
| .7200E+02 | .7346E+03 | .1415E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .7141E+00 |
| .9600E+02 | .7355E+03 | .1886E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .7150E+00 |
| .1200E+03 | .7448E+03 | .2365E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .7288E+00 |
| .1440E+03 | .7445E+03 | .2872E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .7371E+00 |
| .1680E+03 | .7436E+03 | .3279E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .7203E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .4068E+00 | .1181E-06 | .1061E+00 | .1338E+00 |
| .7450E+00 | .1081E-06 | .9688E-01 | .1338E+00 |
| .1118E+01 | .1082E-06 | .9675E-01 | .1338E+00 |
| .1490E+01 | .1081E-06 | .9675E-01 | .1338E+00 |
| .1868E+01 | .1085E-06 | .9739E-01 | .1338E+00 |
| .2269E+01 | .1098E-06 | .9855E-01 | .1338E+00 |
| .2590E+01 | .1074E-06 | .9641E-01 | .1338E+00 |

PS .2729E+03
AREA .1674E+01
X .1614E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .6552E+02
THE SUMMATION OF DMAEXP(I) SQUARED .6888E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.3720E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1020E+00
DMAEXP(I) = -.3720E-04 T + .1020E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .9821E-01
THE TORTUOUSITY OF THE MEDIA IS .7337E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .41000
THE MEDIAS STAND. DEVIA. IS MIX 3 CM
AND ITS MEAN SIZE IS NO AVERAGECM

COLUMN NO. 2 HAS A DIAMETER OF .58000 INCHES AND A DIFFUSION LENGTH OF 16.22552 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7384E+03 | .3790E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .5708E+00 |
| .4800E+02 | .7344E+03 | .7790E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .5826E+00 |
| .7200E+02 | .7395E+03 | .1164E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .5855E+00 |
| .9600E+02 | .7354E+03 | .1593E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .5967E+00 |
| .1200E+03 | .7420E+03 | .2014E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .6104E+00 |
| .1440E+03 | .7372E+03 | .2443E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .6120E+00 |
| .1680E+03 | .7356E+03 | .2857E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .6117E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .2994E+00 | .8542E-07 | .7694E-01 | .1353E+00 |
| .6154E+00 | .8778E-07 | .7895E-01 | .1353E+00 |
| .9196E+00 | .8745E-07 | .7880E-01 | .1353E+00 |
| .1258E+01 | .8976E-07 | .8076E-01 | .1353E+00 |
| .1591E+01 | .9078E-07 | .8168E-01 | .1353E+00 |
| .1930E+01 | .9177E-07 | .8262E-01 | .1353E+00 |
| .2257E+01 | .9199E-07 | .8277E-01 | .1353E+00 |

PS .2729E+03
AREA .1704E+01
X .1623E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5469E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5627E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .4153E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .7640E-01
DMAEXP(I) = .4153E-04 T + .7640E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8028E-01
THE TORTUOUSITY OF THE MEDIA IS .5933E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .41000
THE MEDIAS STAND. DEVIA. IS MIX2 CM
AND ITS MEAN SIZE IS NO AVERAGECM

COLUMN NO. 4 HAS A DIAMETER OF .57570 INCHES AND A DIFFUSION LENGTH OF 15.89532 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7384E+03 | .4650E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6964E+00 |
| .4800E+02 | .7344E+03 | .8860E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6589E+00 |
| .7200E+02 | .7395E+03 | .1336E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .6682E+00 |
| .9600E+02 | .7354E+03 | .1786E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .6652E+00 |
| .1200E+03 | .7420E+03 | .2186E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .6588E+00 |
| .1440E+03 | .7372E+03 | .2686E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .6690E+00 |
| .1680E+03 | .7356E+03 | .3093E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .6585E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3673E+00 | .1064E-06 | .9386E-01 | .1353E+00 |
| .6999E+00 | .1013E-06 | .8929E-01 | .1353E+00 |
| .1055E+01 | .1019E-06 | .8993E-01 | .1353E+00 |
| .1411E+01 | .1021E-06 | .9003E-01 | .1353E+00 |
| .1727E+01 | .1000E-06 | .8837E-01 | .1353E+00 |
| .2122E+01 | .1024E-06 | .9033E-01 | .1353E+00 |
| .2443E+01 | .1011E-06 | .8910E-01 | .1353E+00 |

PS .2729E+03
AREA .1679E+01
X .1590E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .6024E+02
THE SUMMATION OF DMAEXP(I) SQUARED .6309E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.2051E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .9210E-01
DMAEXP(I) = -.2051E-04 T + .9210E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .9007E-01
THE TORTUOUSITY OF THE MEDIA IS .6657E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .41000
THE MEDIAS STAND. DEVIA. IS MIX 3 CM
AND ITS MEAN SIZE IS NO AVERAGECM

COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 15.94358 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER | |
|---|---|---|---|---|
| .2400E+02 | .7384E+03 | .3920E+00 | 1.0 | THE TORTUOUSITY AT TIME = 24.00 HRS. IS .6585E+00 |
| .4800E+02 | .7344E+03 | .7500E+00 | 2.0 | THE TORTUOUSITY AT TIME = 48.00 HRS. IS .6256E+00 |
| .7200E+02 | .7395E+03 | .1064E+01 | 3.0 | THE TORTUOUSITY AT TIME = 72.00 HRS. IS .5969E+00 |
| .9600E+02 | .7354E+03 | .1321E+01 | 4.0 | THE TORTUOUSITY AT TIME = 96.00 HRS. IS .5519E+00 |
| .1200E+03 | .7420E+03 | .1764E+01 | 5.0 | THE TORTUOUSITY AT TIME = 120.00 HRS. IS .5963E+00 |
| .1440E+03 | .7372E+03 | .2142E+01 | 6.0 | THE TORTUOUSITY AT TIME = 144.00 HRS. IS .5984E+00 |
| .1680E+03 | .7356E+03 | .2446E+01 | 7.0 | THE TORTUOUSITY AT TIME = 168.00 HRS. IS .5841E+00 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL |
|---|---|---|---|
| .3097E+00 | .1003E-06 | .8876E-01 | .1353E+00 |
| .5925E+00 | .9593E-07 | .8478E-01 | .1353E+00 |
| .8406E+00 | .9073E-07 | .8034E-01 | .1353E+00 |
| .1044E+01 | .8448E-07 | .7469E-01 | .1353E+00 |
| .1394E+01 | .9025E-07 | .7999E-01 | .1353E+00 |
| .1692E+01 | .9133E-07 | .8080E-01 | .1353E+00 |
| .1932E+01 | .8939E-07 | .7904E-01 | .1353E+00 |

PS .2729E+03
AREA .1501E+01
X .1594E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .8064E+05
THE SUMMATION OF T(I) .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5367E+02
THE SUMMATION OF DMAEXP(I) SQUARED .5684E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.5578E-04
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .8655E-01
DMAEXP(I) = -.5578E-04 T + .8655E-01
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .8079E-01
THE TORTUOUSITY OF THE MEDIA IS .5971E+00 FROM LEAST SQUARES TECHNIQUE
THE POROSITY IN THIS COLUMN IS .41000
THE MEDIAS STAND. DEVIA. IS MIX 1 CM
AND ITS MEAN SIZE IS NO AVERAGECM

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COLUMN NO. 3  HAS A DIAMETER OF    .57500 INCHES AND A DIFFUSION LENGTH OF  16.13662 CM
      TIME(HR)        PRESS(MM HG)    VOL. EVAP.(ML)'   COUNTER

        .2400E+02        .7384E+03        .5790E+00       1.0       THE TORTUOUSITY AT TIME =  24.00 HRS. IS    .8824E+00
        .4800E+02        .7344E+03        .9930E+00       2.0       THE TORTUOUSITY AT TIME =  48.00 HRS. IS    .7515E+00
        .7200E+02        .7395E+03        .1436E+01       3.0       THE TORTUOUSITY AT TIME =  72.00 HRS. IS    .7309E+00
        .9600E+02        .7354E+03        .1850E+01       4.0       THE TORTUOUSITY AT TIME =  96.00 HRS. IS    .7012E+00
        .1200E+03        .7420E+03        .2293E+01       5.0       THE TORTUOUSITY AT TIME = 120.00 HRS. IS    .7032E+00
        .1440E+03        .7372E+03        .2729E+01       6.0       THE TORTUOUSITY AT TIME = 144.00 HRS. IS    .6917E+00
        .1680E+03        .7356E+03        .3136E+01       7.0       THE TORTUOUSITY AT TIME = 168.00 HRS. IS    .6795E+00
     GMS EVAP.          FLUX           DMAEXP           DMAREL

        .4574E+00        .1328E-06        .1184E+00        .1353E+00
        .7845E+00        .1139E-06        .1018E+00        .1353E+00
        .1134E+01        .1098E-06        .9837E-01        .1353E+00
        .1461E+01        .1061E-06        .9490E-01        .1353E+00
        .1811E+01        .1052E-06        .9433E-01        .1353E+00
        .2156E+01        .1043E-06        .9339E-01        .1353E+00
        .2477E+01        .1027E-06        .9193E-01        .1353E+00

PS      .2729E+03
AREA   .1674E+01
X       .1614E+02
PO     0.
TEMP    .3032E+03


SUMMATION OF T(I) SQUARED       .8064E+05
THE SUMMATION OF T(I)       .6720E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I)       .6415E+02
THE SUMMATION OF DMAEXP(I) SQUARED       .6937E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS      -.1517E-03
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS       .1137E+00
DMAEXP(I) =  -.1517E-03 T    +     .1137E+00
 BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS       .9784E-01
  THE TORTUOUSITY OF THE MEDIA IS  .7231E+00 FROM LEAST SQUARES TECHNIQUE
 THE POROSITY IN THIS COLUMN IS     .41000
THE MEDIAS STAND. DEVIA. IS   MIX 2     CM
AND ITS MEAN SIZE IS  NO AVERAGECM
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```
      PROGRAM RESRCH (INPUT,OUTPUT,TAPE3=OUTPUT)
      DIMENSION W(9),FLUX(9),DMAREL(9),ERROR(9)
      COMMON N,DMAEXP(9),T(9),DBESTO
      READ 15,J
   15 FORMAT ( I5 )
      DO 3 K = 1,J
      READ 19,TEMP,N
   19 FORMAT (F10.4,I5)
      READ 18, COLUMN,DIAMTR,ALDST,ALDST2
   18 FORMAT (I1,3F10.5)
      R = 82.057  $  AMOLE = 58.08  $  DA = 1.0
      XO = ALDST*2.54  $  XF = ALDST2*2.54
      X = (XO + XF)/2.
      AREA = 3.14*(DIAMTR)**2.*(2.54)**2./4.
      PS = 80191802.33*EXP(-3817.587726/TEMP)
      A = 0.0  $  PO = 0.0
      PRINT 17,COLUMN,DIAMTR,X
   17 FORMAT(*1*,15(/)      ,10X,*COLUMN NO.*,I2,2X,*HAS A DIAMETER OF*,F
     110.5,* INCHES AND A DIFFUSION LENGTH OF*,F10.5,* CM*,/,)
      PRINT 23
      DO 1 I = 1,N
      A = A + DA
      READ 20,P,V,T(I)
   20 FORMAT (3F10.4)
      W(I) = V*0.79
      FLUX(I) = W(I)/T(I)/AREA/AMOLE/3600.
      DMAEXP(I) = FLUX(I)*R*TEMP*X*760.*(PO-PS)/(PS-PO)*(1./P/ALOG((P-PS
     1)/(P-PO)))
      DMAREL(I) = 0.109*(TEMP/273.2)**1.5*(760./P)
      ERROR(I) = (DMAEXP(I) - DMAREL(I))/DMAREL(I)*100.
    1 PRINT21,T(I),P,V,A
      PRINT 24
      DO 2 I = 1,N
    2 PRINT 22,W(I),FLUX(I),DMAEXP(I),DMAREL(I),ERROR(I)
      PRINT 26,PS,AREA,X,PO,TEMP
   21 FORMAT (* *,10X,3(5X,E11.4),5X,F4.1)
   22 FORMAT (* *,10X,5(5X,E11.4))
   23 FORMAT (* *,15X,*TIME(HR)*,6X,*PRESS(MM HG)*,3X,*VOL. EVAP.(ML)*,4
     1X,*COUNTER*,//)
   24 FORMAT(* *,/,15X,*GMS EVAP.*,9X,*FLUX*,10X,*DMAEXP*,10X,*DMAREL*,1
     10X,*ERROR*,//)
   26 FORMAT (* *,//,10X,*PS*,3X,E11.4,/,10X,*AREA*,E11.4,/,10X,*X    *,
     1E11.4,/,10X,*PO   *,E11.4,/,10X,*TEMP *,E11.4,//)
      CALL LREGSLS
    3 CONTINUE
      PRINT 1000
 1000 FORMAT (*1*)
      END
```

SUBROUTINE LREGSLS    CDC 6500 FTN V3.0-P365 OPT=1  05/29/74 .11.37.49.    PAGE 1

```
      SUBROUTINE LREGSLS
      COMMON N, DMAEXP(8), T(8), DBESTO
      TSSUM = 0.0 $ TSUM = 0.0 $ DTSUM = 0.0 $ DSSUM = 0.0
      DO 1 I = 1,N
      TSSUM = TSSUM + T(I)*T(I)
      TSUM = TSUM + T(I)
      DTSUM = DTSUM + DMAEXP(I)*T(I)
    1 DSSUM = DSSUM + DMAEXP(I)
      RN = N
      SLOPE = (RN*DTSUM - TSUM*DSSUM)/(RN*TSSUM - TSUM*TSUM)
      B =(DSSUM - SLOPE*TSUM)/RN
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```
      PRINT 27,TSSUM,TSUM,DTSUM,DSSUM
27    FORMAT (* *,//,10X,* SUMMATION OF T(I) SQUARED*,4X,E11.4,/,10X,* T
     1HE SUMMATION OF T(I)*,4X,E11.4,/,10X,* THE SUMMATION OF THE PRODUC
     2T DMAEXP(I) AND T(I)*,4X,E11.4,/,10X,* THE SUMMATION OF DMAEXP(I)
     3SQUARED*,4X,E11.4)
      PRINT 28,SLOPE,B,SLOPE,B
      DBEST = 0.0 $  DS = 0.0
      DO 4 I = 1,N
      DBESTI = 1./DMAEXP(I)
      DBEST = DBEST + DBESTI
4     DS=DS + DBESTI*DBESTI
      DBESTO = DBEST/DS
      PRINT 25,DBESTO
25    FORMAT (* *,10X,* BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS*,4
     1X,E11.4)
28    FORMAT (* *,//,10X,* THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE
     1 IS*,4X,E11.4,/,10X,* THE INTERCEPT FOR THE LINEAR REGRESSION TECH
     2NIQUE IS*,4X,E11.4,/,10X,* DMAEXP(I) = *,E11.4,* T    +   *, E11.4)
      RETURN
      END
```

COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 16.34744 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER |
|---|---|---|---|
| .2500E+01 | .7335E+03 | .1600E+00 | 1.0 |
| .2300E+02 | .7335E+03 | .1381E+01 | 2.0 |
| .2650E+02 | .7335E+03 | .1567E+01 | 3.0 |
| .4750E+02 | .7442E+03 | .2781E+01 | 4.0 |
| .4900E+02 | .7446E+03 | .2859E+01 | 5.0 |
| .5300E+02 | .7446E+03 | .3081E+01 | 6.0 |
| .7100E+02 | .7430E+03 | .4024E+01 | 7.0 |
| .9600E+02 | .7429E+03 | .5467E+01 | 8.0 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL | ERROR |
|---|---|---|---|---|
| .1264E+00 | .1611E-06 | .1459E+00 | .1320E+00 | .1052E+02 |
| .1091E+01 | .1511E-06 | .1369E+00 | .1320E+00 | .3692E+01 |
| .1238E+01 | .1488E-06 | .1348E+00 | .1320E+00 | .2118E+01 |
| .2197E+01 | .1474E-06 | .1340E+00 | .1301E+00 | .2986E+01 |
| .2259E+01 | .1469E-06 | .1336E+00 | .1301E+00 | .2703E+01 |
| .2434E+01 | .1463E-06 | .1331E+00 | .1301E+00 | .2325E+01 |
| .3179E+01 | .1427E-06 | .1297E+00 | .1304E+00 | -.5099E+00 |
| .4319E+01 | .1434E-06 | .1303E+00 | .1304E+00 | -.4971E-01 |

PS .2729E+03
AREA .1501E+01
X .1635E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .5672+279
THE SUMMATION OF T(I) -.2382+140
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) -.3476+139
THE SUMMATION OF DMAEXP(I) SQUARED .1078E+01

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.5345-141
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1332E+00
DMAEXP(I) = -.5345-141 T + .1332E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1345E+00

COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 16.61795 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER |
|---|---|---|---|
| .2000E+01 | .7461E+03 | .6700E-01 | 1.0 |
| .2200E+02 | .7447E+03 | .1067E+01 | 2.0 |
| .2400E+02 | .7447E+03 | .1153E+01 | 3.0 |
| .5100E+02 | .7374E+03 | .2525E+01 | 4.0 |
| .6900E+02 | .7376E+03 | .3382E+01 | 5.0 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL | ERROR |
|---|---|---|---|---|
| .5293E-01 | .8433E-07 | .8194E-01 | .1292E+00 | -.3656E+02 |
| .8429E+00 | .1221E-06 | .1186E+00 | .1294E+00 | -.8376E+01 |
| .9109E+00 | .1209E-06 | .1175E+00 | .1294E+00 | -.9242E+01 |
| .1995E+01 | .1246E-06 | .1207E+00 | .1307E+00 | -.7616E+01 |
| .2672E+01 | .1234E-06 | .1195E+00 | .1307E+00 | -.8509E+01 |

PS .2617E+03
AREA .1501E+01
X .1662E+02
PO 0.
TEMP .3022E+03

SUMMATION OF T(I) SQUARED .5672+279
THE SUMMATION OF T(I) -.2382+140
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) -.1951+139
THE SUMMATION OF DMAEXP(I) SQUARED .5583E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .1559-140
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1191E+00
DMAEXP(I) = .1559-140 T + .1191E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1062E+00

COLUMN NO. 2 HAS A DIAMETER OF .58000 INCHES AND A DIFFUSION LENGTH OF 16.67764 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER |
|---|---|---|---|
| .1000E+01 | .7336E+03 | .1000E+00 | 1.0 |
| .2000E+01 | .7336E+03 | .2500E+00 | 2.0 |
| .2400E+02 | .7391E+03 | .2450E+01 | 3.0 |
| .2600E+02 | .7391E+03 | .2600E+01 | 4.0 |
| .4800E+02 | .7390E+03 | .4750E+01 | 5.0 |
| .5000E+02 | .7387E+03 | .5000E+01 | 6.0 |
| .7300E+02 | .7264E+03 | .6750E+01 | 7.0 |
| .7500E+02 | .7255E+03 | .7050E+01 | 8.0 |
| .9600E+02 | .7370E+03 | .9100E+01 | 9.0 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL | ERROR |
|---|---|---|---|---|
| .7900E-01 | .2218E-06 | .1950E+00 | .1327E+00 | .4698E+02 |
| .1975E+00 | .2772E-06 | .2438E+00 | .1327E+00 | .8373E+02 |
| .1935E+01 | .2264E-06 | .1995E+00 | .1317E+00 | .5150E+02 |
| .2054E+01 | .2218E-06 | .1954E+00 | .1317E+00 | .4840E+02 |
| .3752E+01 | .2195E-06 | .1934E+00 | .1317E+00 | .4683E+02 |
| .3950E+01 | .2218E-06 | .1954E+00 | .1318E+00 | .4830E+02 |
| .5332E+01 | .2051E-06 | .1798E+00 | .1340E+00 | .3419E+02 |
| .5569E+01 | .2085E-06 | .1827E+00 | .1342E+00 | .3619E+02 |
| .7189E+01 | .2102E-06 | .1851E+00 | .1321E+00 | .4016E+02 |

PS .2844E+03
AREA .1704E+01
X .1668E+02
PO 0.
TEMP .3042E+03

SUMMATION OF T(I) SQUARED .1702E+05
THE SUMMATION OF T(I) .2992E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5599E+02
THE SUMMATION OF DMAEXP(I) SQUARED .1770E+01

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.4040E-03
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .2101E+00
DMAEXP(I) = -.4040E-03 T + .2101E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1941E+00

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      PRINT 27,TSSUM,TSUM,DTSUM,DSSUM
   27 FORMAT (* *,//,10X,* SUMMATION OF T(I) SQUARED*,4X,E11.4,/,10X,* T
     1HE SUMMATION OF T(I)*,4X,E11.4,/,10X,* THE SUMMATION OF THE PRODUC
     2T DMAEXP(I) AND T(I)*,4X,E11.4,/,10X,* THE SUMMATION OF DMAEXP(I)
     3SQUARED*,4X,E11.4)
      PRINT 28,SLOPE,B,SLOPE,B
      DBEST = 0.0 $  DS = 0.0
      DO 4 I = 1,N
      DBESTI = 1./DMAEXP(I)
      DBEST = DBEST + DBESTI
    4 DS=DS + DBESTI*DBESTI
      DBESTO = DBEST/DS
      PRINT 25,DBESTO
   25 FORMAT (* *,10X,* BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS*,4
     1X,E11.4)
   28 FORMAT (* *,//,10X,* THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE
     1 IS*,4X,E11.4,/,10X,* THE INTERCEPT FOR THE LINEAR REGRESSION TECH
     2NIQUE IS*,4X,E11.4,/,10X,* DMAEXP(I) = *,E11.4,* T    +   *, E11.4)
      RETURN
      END
```

COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 16.34744 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER |
|---|---|---|---|
| .2500E+01 | .7335E+03 | .1600E+00 | 1.0 |
| .2300E+02 | .7335E+03 | .1381E+01 | 2.0 |
| .2650E+02 | .7335E+03 | .1567E+01 | 3.0 |
| .4750E+02 | .7442E+03 | .2781E+01 | 4.0 |
| .4900E+02 | .7446E+03 | .2859E+01 | 5.0 |
| .5300E+02 | .7446E+03 | .3081E+01 | 6.0 |
| .7100E+02 | .7430E+03 | .4024E+01 | 7.0 |
| .9600E+02 | .7429E+03 | .5467E+01 | 8.0 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL | ERROR |
|---|---|---|---|---|
| .1264E+00 | .1611E-06 | .1459E+00 | .1320E+00 | .1052E+02 |
| .1091E+01 | .1511E-06 | .1369E+00 | .1320E+00 | .3692E+01 |
| .1238E+01 | .1488E-06 | .1348E+00 | .1320E+00 | .2118E+01 |
| .2197E+01 | .1474E-06 | .1340E+00 | .1301E+00 | .2986E+01 |
| .2259E+01 | .1469E-06 | .1336E+00 | .1301E+00 | .2703E+01 |
| .2434E+01 | .1463E-06 | .1331E+00 | .1301E+00 | .2325E+01 |
| .3179E+01 | .1427E-06 | .1297E+00 | .1304E+00 | -.5099E+00 |
| .4319E+01 | .1434E-06 | .1303E+00 | .1304E+00 | -.4971E-01 |

PS .2729E+03
AREA .1501E+01
X .1635E+02
PO 0.
TEMP .3032E+03

SUMMATION OF T(I) SQUARED .5672+279
THE SUMMATION OF T(I) -.2382+140
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) -.3476+139
THE SUMMATION OF DMAEXP(I) SQUARED .1078E+01

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.5345-141
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1332E+00
DMAEXP(I) = -.5345-141 T + .1332E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1345E+00

COLUMN NO. 1 HAS A DIAMETER OF .54440 INCHES AND A DIFFUSION LENGTH OF 16.61795 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER |
|---|---|---|---|
| .2000E+01 | .7461E+03 | .6700E-01 | 1.0 |
| .2200E+02 | .7447E+03 | .1067E+01 | 2.0 |
| .2400E+02 | .7447E+03 | .1153E+01 | 3.0 |
| .5100E+02 | .7374E+03 | .2525E+01 | 4.0 |
| .6900E+02 | .7376E+03 | .3382E+01 | 5.0 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL | ERROR |
|---|---|---|---|---|
| .5293E-01 | .8433E-07 | .8194E-01 | .1292E+00 | -.3656E+02 |
| .8429E+00 | .1221E-06 | .1186E+00 | .1294E+00 | -.8376E+01 |
| .9109E+00 | .1209E-06 | .1175E+00 | .1294E+00 | -.9242E+01 |
| .1995E+01 | .1246E-06 | .1207E+00 | .1307E+00 | -.7616E+01 |
| .2672E+01 | .1234E-06 | .1195E+00 | .1307E+00 | -.8509E+01 |

PS .2617E+03
AREA .1501E+01
X .1662E+02
PO 0.
TEMP .3022E+03

SUMMATION OF T(I) SQUARED .5672+279
THE SUMMATION OF T(I) -.2382+140
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) -.1951+139
THE SUMMATION OF DMAEXP(I) SQUARED .5583E+00

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS .1559-140
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .1191E+00
DMAEXP(I) = .1559-140 T + .1191E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1062E+00

COLUMN NO. 2 HAS A DIAMETER OF .58000 INCHES AND A DIFFUSION LENGTH OF 16.67764 CM

| TIME(HR) | PRESS(MM HG) | VOL. EVAP.(ML) | COUNTER |
|---|---|---|---|
| .1000E+01 | .7336E+03 | .1000E+00 | 1.0 |
| .2000E+01 | .7336E+03 | .2500E+00 | 2.0 |
| .2400E+02 | .7391E+03 | .2450E+01 | 3.0 |
| .2600E+02 | .7391E+03 | .2600E+01 | 4.0 |
| .4800E+02 | .7390E+03 | .4750E+01 | 5.0 |
| .5000E+02 | .7387E+03 | .5000E+01 | 6.0 |
| .7300E+02 | .7264E+03 | .6750E+01 | 7.0 |
| .7500E+02 | .7255E+03 | .7050E+01 | 8.0 |
| .9600E+02 | .7370E+03 | .9100E+01 | 9.0 |

| GMS EVAP. | FLUX | DMAEXP | DMAREL | ERROR |
|---|---|---|---|---|
| .7900E-01 | .2218E-06 | .1950E+00 | .1327E+00 | .4698E+02 |
| .1975E+00 | .2772E-06 | .2438E+00 | .1327E+00 | .8373E+02 |
| .1935E+01 | .2264E-06 | .1995E+00 | .1317E+00 | .5150E+02 |
| .2054E+01 | .2218E-06 | .1954E+00 | .1317E+00 | .4840E+02 |
| .3752E+01 | .2195E-06 | .1934E+00 | .1317E+00 | .4683E+02 |
| .395[illegible]E+01 | .2218E-06 | .1954E+00 | .1318E+00 | .4830E+02 |
| .5332E+01 | .2051E-06 | .1798E+00 | .1340E+00 | .3419E+02 |
| .5569E+01 | .2085E-06 | .1827E+00 | .1342E+00 | .3619E+02 |
| .7189E+01 | .2102E-06 | .1851E+00 | .1321E+00 | .4016E+02 |

PS .2844E+03
AREA .1704E+01
X .1668E+02
PO 0.
TEMP .3042E+03

SUMMATION OF T(I) SQUARED .1702E+05
THE SUMMATION OF T(I) .2992E+03
THE SUMMATION OF THE PRODUCT DMAEXP(I) AND T(I) .5599E+02
THE SUMMATION OF DMAEXP(I) SQUARED .1770E+01

THE SLOPE FOR THE LINEAR REGRESSION TECHNIQUE IS -.4040E-03
THE INTERCEPT FOR THE LINEAR REGRESSION TECHNIQUE IS .2101E+00
DMAEXP(I) = -.4040E-03 T + .2101E+00
BEST FIT OF DATA, FROM LEAST SQUARES TEST, IS .1941E+00

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