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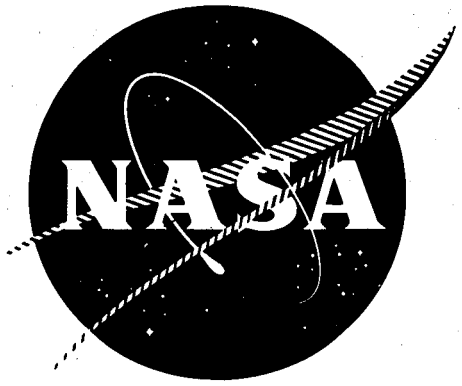

PERMEABILITY DATA FOR AEROSPACE APPLICATIONS

PREPARED FOR

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FOREWORD

This handbook was prepared by IIT Research Institute for the National Aeronautics and Space Administration, Western Operations Office, under Contract No. NAS7-388, IITRI Project C6070. The work was administered under the direction of the Jet Propulsion Laboratory, Liquid Propulsion Section, Propulsion Division. Mr. James H. Kelley and Mr. Richard L. Weiner of JPL served as Technical Managers, and Mr. Frank E. Compitello of NASA/Washington, Liquid Propulsion Systems, was Project Manager.

The program was administered by the Technical Information Research Section of IIT Research Institute under Miss Martha E. Williams, Manager. Mr. Peter B. Schipma, Associate Engineer, acted as Project Leader. He was responsible for the coordination of contributions and for the technical and editorial content of the handbook. The principal technical consultant and the author of the engineering description of the permeation section was Mr. William J. Courtney, Research Engineer, Fluid Systems.

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I-1 INTRODUCTION

The primary purpose of this book is to present a compilation of available information on the permeation of propellants and pressurant gases through metals, non-metals, and composite materials, in a form suitable for use by the designers of spacecraft liquid propulsion systems. It is intended that the information contained in this handbook be used in conjuction with the various methodologies currently employed to select component and material combinations and to establish the design details of suitable liquid propulsion systems.

The sections of this guidebook are established in the following order:

Section I, "Introduction" includes directions for use of the data and indices, a discussion of the units in which permeation data were reported, and unit conversion tables.

Section II, "Test Methods" describes the various methods used to measure permeation rates, compare their reliability and validity, and evaluate their utility.

Section III, "Mechanisms of Permeation" defines permeation and describes the mechanism thereof in engineering terms, with a discussion of the theories relating to permeation, and sample analyses and calculations.

Sections IV and V, "Data" present data collected from the literature and the aerospace industry. Factors affecting permeation, such as temperature, diffusivity, solubility, etc., are reported concurrent with permeation data. The data included

in these sections have been evaluated with respect to the literature -- they have not been verified by an experimental program under this contract.

The data are presented in two sections. Data for materials and fluids of primary spacecraft applications have been grouped in Section IV. Section V contains data for the systems which are not presently of primary application. The entire handbook is in looseleaf form to provide a capability for updating.

Section VI, "Coordinate Index" consists of an index to the data in coordinate form, and includes trade names and types as well as chemical nomenclature. The location of data for any permeant-material systems included in the handbook can be found rapidly by use of this index.

Section VII, "References" contains two listings of references used in the preparation of the handbook. The first list is arranged by arbitrarily assigned reference numbers and consists of authors and titles. The second list is arranged alphabetically by author's last name and contains complete bibliographic information.

I-2 HANDBOOK DATA ORGANIZATION

The data in each of the two data sections are ordered alphabetically by permeant and within each permeant group alphabetically by material.

The data for each permeant-material system are presented in the following format:

A. Column 1 - Type or trade name. For example, polychlorotrifluoroethylene may be called Kel F or Trithene. Common trade names, such as Mylar, Lexan, etc., are also referenced in the coordinate index. Data for each type or trade name within a permeant-material system are grouped.

B. Column 2 - Temperature in degrees Celsius. This is the secondary order of each group, by ascending order of temperature.

C. Column 3 - Permeability Rate, in scc cm/cm^2 sec Bar, with the understanding that each value is to be multiplied by 10^{-8}, e.g., the appearance of 3.46 in this column means that the permeability rate is 3.46×10^{-8} scc cm/cm^2 sec Bar. Use of the constant factor and units permits direct comparison between systems.

D. Column 4 - Permeability rate as reported. This is merely a transcription of the data found in the literature.

E. Column 5 - Units reported. This number is an arbitrarily chosen integer that refers to the unit system in which the given datum was reported. A complete list of units and their conversion factors to the standard is given in section I-3.

F. Column 6 - Reference. This number refers to the reference(s) in which the datum was found. The references are listed by number in section VI.

G. Column 7 - Solubility. This column gives the solubility in scc/cc Bar, if this datum was available for the system.

H. Column 8 - Diffusivity. This column gives the diffusivity in cm^2/sec, if this datum was available for the system.

I. Column 9 - Comments. Any relevant comments as to membrane composition, thickness, pressures, etc., are given here.

I-3 UNITS AND CONVERSION TABLES

I-3.1 Units Reported

In the course of the literature search and aerospace industry survey which were undertaken to obtain the data presented in this handbook, special attention was paid to the units used for reporting, the reasons for such use, and the desires of industry personnel for unit systems.

At least twenty-eight unit systems are currently in use for expression of permeation rates. It appears that the definitive factors in any experimentor's choice of a unit system are the physical characteristics of his test device and the conditions of his test. Thus, if he uses a small test cell, he chooses an area of one square inch, or one square centimeter. If he is testing large samples he may use 100 square inches or one square meter. Similarly, his collection method for the permeant may require measurements in seconds or days. Therefore, a great variety of combinations of units have arisen. Many of the units systems are not consistent within themselves -- cubic cemtimeters (CGS) and mils (English) units appear in the same system.

I-3.2 Standard Unit

With this multiplicity of units, direct comparisons among the data are impossible. We polled the aerospace industry to determine if any single units system was desirable as a standard. However, suggestions were as numerous as replies. Hence, we

have adopted, arbitrarily, the following unit system for this handbook:

$$\text{Unit}_p = \frac{\text{cc (S.T.P.) cm}}{\text{cm}^2 \text{ sec Bar}} \qquad \frac{\text{Volume-Thickness}}{\text{Area-Time-}\Delta\text{Pressure}}$$

This is the volume of permeant in cubic centimeters at standard temperature and pressure per square centimeter of area per second per Bar Δp per centimeter thickness of membrane. The abbreviation scc is used for cc(S.T.P.).

This unit system is comprised solely of cgs units, the most widely-accepted system. Any of the systems in use could have been used as a standard. However, we feel that this system is an improvement since it is self-consistent.

I-3.3 Conversion

Since the need currently exists to use other systems Table I-1 presents conversion factors to other unit systems. Some unit systems are not convertible, e.g., metal permeability is frequently reported in units inversely proportional to the square root of the Δ-pressure. These systems are listed in the table, with the comment 'Not Convertible.'

Table I-1

UNIT CONVERSION

Number	Units System	Multiplication Factor for Converting to Standard Units
1	$\frac{\text{scc cm}}{\text{cm}^2 \text{ sec cm Hg}}$	7.501×10^{1}
2	$\frac{\text{scc cm}}{\text{cm}^2 \text{ sec mm Hg}}$	7.501×10^{2}
3	$\frac{\text{scc mm}}{\text{cm}^2 \text{ sec cm Hg}}$	7.501
4	$\frac{\text{scc mm}}{\text{m}^2 \text{ day atm}}$	1.142×10^{-10}
5	$\frac{10^{-5} \text{ ft}^3 \text{ mil}}{\text{min ft}^2 \text{ atm}}$	1.273×10^{-8}
6	$\frac{\text{scc mm}}{\text{cm}^2 \text{ sec atm}}$	9.8692×10^{-2}
7	$\frac{\text{scc mil}}{100 \text{ in.}^2 \text{ day atm}}$	4.497×10^{-11}
8	$\frac{\text{scc cm}}{\text{cm}^2 \text{ sec atm}}$	9.8692×10^{-1}
9	$\frac{\text{scc mil}}{\text{cm}^2 \text{ day atm}}$	2.901×10^{-8}
10	$\frac{\text{scc mil}}{\text{in.}^2 \text{ hr lb/in.}^2}$	1.023×10^{-5}
11	$\frac{\text{liter mm}}{\text{cm}^2 \text{ sec mm Hg}}$	7.501×10^{4}
12	$\frac{\text{scc mm}}{\text{cm}^2 \text{ hr atm}}$	2.741×10^{-5}
13	$\frac{\text{scc mm}}{\text{cm}^2 \text{ sec atm}^{1/2}}$	Not convertible

Table I-1 (cont.)

Number	Units System	Multiplication Factor for Converting to Standard Units
14	$\frac{\text{scc mm}}{\text{cm}^2\ \text{hr}\ \text{atm}^{1/2}}$	Not convertible
15	$\frac{\text{scc mm}}{\text{cm}^2\ \text{min}\ \text{atm}^{1/2}}$	Not convertible
16	$\frac{\text{scc mil}}{100\ \text{in.}^2\ \text{day}\ 17.3\ \text{psi}}$	3.82×10^{-9}
17	$\frac{\text{mg mil}}{\text{in.}^2\ \text{day atm}}$	Not convertible
18	$\frac{\text{mg mil}}{\text{in.}^2\ \text{hr atm}}$	Not convertible
19	$\frac{\text{mg mil}}{\text{in.}^2\ \text{hr}}$	Not convertible
20	$\frac{\text{scc mil}}{100\ \text{m}^2\ \text{day}\ 17.7\ \text{psi}}$	2.408×10^{-14}
21	$\frac{\text{mg}}{\text{cm}^2\ \text{hr}}$	Not convertible
22	$\frac{\text{mg}}{\text{in.}^2\ \text{hr}}$	Not convertible
23	$\frac{\text{scc mil}}{\text{in.}^2\ \text{day atm}}$	2.901×10^{-12}
24	$\frac{\text{gm mil}}{100\ \text{in.}^2\ \text{day atm}}$	Not convertible
25	$\frac{\text{scc}}{\text{hr in.}^2}$	Not convertible
26	$\frac{\text{lb mil}}{100\ \text{in.}^2\ \text{day atm}}$	Not convertible

Table I-1 (conc.)

Number	Units System	Multiplication Factor for Converting to Standard Units
27	$\frac{\text{scc mil}}{\text{cm}^2 \text{ sec atm}^{1/2}}$	Not convertible
28	$\frac{\text{scc mil}}{\text{cm}^2 \text{ hr atm}^{1/2}}$	Not convertible
29	$\frac{\text{lb}}{\text{in}^2 \text{ hr psi}}$	Not convertible
30	$\frac{\text{lb}}{\text{in}^2 \text{ hr}}$	Not convertible

II TEST METHODS

II-1 INTRODUCTION

The research performed for the collection of the data which are presented in this handbook has revealed that there presently exists little standardization in the field of permeability determination. This statement holds true for the test methods employed as well as for test conditions, choice of materials, and selection of unit systems. Indeed, the theories of permeation, and their distinction from leakage phenomena, are themselves diverse.

This situtation has arisen because of the multiplicity of purposes in measuring permeability. Measurements at high pressures, for example, are affected by factors not considered in simple diffusion theory, and experimenters who work with membranes at very high pressures must use different theories and test methods. The very fact that many people have devised methods for measuring permeation for their specific purposes, and have invested considerable time and money in equipment and training, indicate that a single test method will probably not be adopted as a standard in the near future.

There are several test methods currently in use, and these vary greatly in apparatus design and types of devices used to measure parameters. Some long-term methods have been used which involve placing a given weight of gas or liquid into a container made of the material whose permeability is to be

determined, and then weighing the remainder after several days or weeks. Such methods report permeability in terms of per cent of weight lost per day or week.

Most test methods, however, are designed to measure permeability rates for relatively short time periods. These may be used for short-duration tests, which are then reported in units including days as a time factor. Similarly, although most test devices measure the permeability of membranes on the order of thousandths of a centimeter thick and one or a few square centimeters in area, unit systems giving area in terms of square feet or square meters are not uncommon.

The most commonly used test methods can be divided into three primary classifications:

(1) Concentration-increasing method

(2) Volume-increasing method

(3) Pressure-increasing method.

The pressure-increasing method has the distinction of being an ASTM Standard, Method D1434-58. Further, it has been adapted to a continuous-recording form, although this adaptation, using mercury manometry is unsuitable for gases such as N_2O_4, which reacts with mercury.

The other two methods also enjoy wide use, and probably will continue to do so for some time. Hence, we shall present a brief description of these three methods, and a list of references wherein more complete descriptions may be found.

Since no standard permeabilities are recognized, the relative accuracies of these three methods cannot be determined. However, Taylor, Karel, and Proctor[1] have found that the three methods are fairly well correlated, but that the degree of correlation decreases as the amorphous content of the films tested increases.

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[1] Taylor, A. A., Karel, M., and Proctor, B. E., "Measurement of O_2 Permeability."

II-2 CONCENTRATION-INCREASING METHOD

This method consists of the measurement of the increase in concentration of permeant in an isolated compartment of a test cell, with the total pressure difference being zero, and the permeant partial-pressure difference being on the order of one Bar.

The test cell for this method consists of a compartment that can be divided into two sections by a film sample. The area of the sample that is exposed to the permeant is determined by the cross-sectional area of the compartment. The film is not supported over the test area, and hence the pressure difference must be held equal to zero to prevent distortion (and resultant area and volume errors). Each half of the test cell is equipped with an inlet and outlet tube.

Once the film sample is fastened into the cell, the permeant is swept through one compartment, and a collecting gas through the second. A given period of time is arbitrarily chosen as the steady-state time (this time will, of course, vary with the permeant-material system being considered and the test method gives no indication of when steady-state has been reached).

The pressure of the collecting gas is then adjusted to one Bar (or one atm or whatever pressure unit is used in the unit system being employed), and the second compartment is then isolated. The permeant concentration is maintained at 100% through the first compartment for a measured length of time, and then a sample of the second compartment contents is analyzed. Permeability is calculated by:

$$P_c = \frac{y \cdot x \cdot c}{t \cdot p}$$

where

P_c = permeability constant for concentration-increase method (scc cm cm^{-2} sec^{-1} Bar^{-1})

x = membrane thickness (cm)

c = volumetric concentration of permeant

t = time (sec)

p = partial pressure difference (Bar)

y = cell constant (determined by geometry of cell) (scc sec sec^{-1} cm^{-2}).

II-3 VOLUME-INCREASING METHOD

This method consists of the measurement of the increase in volume of an isolated compartment of a test cell, with the partial-pressure difference being equal to the total-pressure difference of approximately one Bar, the low side being maintained at one Bar pressure.

The membrane divides the test cell into two compartments, one many times larger than the other. The large compartment contains a thermometer, and the pressure in each compartment is measured by means of mercury manometers. The small compartment is connected to a capillary tube constructed with a recess which contains a bead of mercury. The membrane is supported by a screen or perforated metal plate.

Once the membrane is sealed in the cell, a vacuum is drawn in both compartments and then permeant is flushed into the large compartment at approximately 2 Bars pressure. Both sides are then sealed, and the pressure in the capillary side drops rapidly to about 1 Bar. Pressure and temperature are then adjusted to desired levels (e.g., 1 Bar and 25°C) and the capillary is turned so that the mercury falls out of the recess and into the capillary.

The distance the bead of mercury travels for a relatively long time (one day) is then measured. This time will vary with the permeant-material system. Further, a reasonable distance must be traversed to minimize measurement precision errors, irregularities in capillary cross-section, etc.

Permeability is calculated by:

$$P_v = \frac{d \cdot u \cdot x \cdot 273°K}{A \cdot p \cdot t \cdot T}$$

where

P_v = Permeability constant for volume-increase method (scc cm cm^{-2} sec^{-1} Bar^{-1})

x = film thickness (cm)

u = volume of 1 cm length of capillary tube (cc)

d = bead movement (cm)

t = time (sec)

T = absolute temperature (°K)

A = area of membrane (cm^2)

p = partial-pressure difference (Bar).

II-4 PRESSURE INCREASING METHOD

This method consists of the measurement of an increase in pressure in an isolated compartment of a test cell, with the partial-pressure differential being equal to the total-pressure differential.

The test cell for this method consists of a small volume ($\simeq$1 cc) cell which can be divided by a membrane into two compartments, one very much larger than the other. The large compartment has an inlet and outlet for gas, and the small compartment is connected to a mercury manometer. The membrane is supported by a screen or porous metal plate.

Once the film sample is sealed into the cell, the small compartment is evacuated, and the other flushed with permeant at approximately one Bar pressure. Both compartments are then sealed and mercury is tipped into the manometer. The permeability is computed from the steady-state pressure increase, measured by the depression of the mercury level in the capillary of the manometer.

The following formula is used:

$$P_p = \frac{Z \cdot \Delta h \cdot x}{t \cdot p}$$

where

P_p = permeability constant for pressure-increase method (scc cm cm^{-2} sec^{-1} Bar^{-1})

Δh = pressure increase (mmHg) (direct measurement)

x = film thickness (cm)

t = time (sec)

p = partial-pressure difference (mmHg) (converted from Bars to be in same units as measurement of Δh)

Z = cell constant-dependent on geometry (scc sec sec^{-1} cm^2 Bar).

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I. INTRODUCTION

Diffusion is the process by which a fluid moves through a membrane. There are other processes by which a fluid gets on and off of the membrane. All of these processes together make up permeation. A fluid arrives at one side of a membrane and leaves at the other side by the following steps: (1) condensation on or sorption by the membrane, (2) solution in the membrane, (3) diffusion, (4) dissolution, and (5) evaporation or desorption from the membrane. Gases must go through all five steps; liquids are already condensed so that they only go through steps 2, 3 and 4. Perhaps it is not out of place to emphasize that steps 1, 2, 3, 4 and 5 make up permeation and that step 3 and only step 3 is diffusion. Usually, though not always, step 3, diffusion, is rate controlling.

Diffusion of one species through another is a concentration dependent, molecular flow phenomena. This statement together with Fick's first and second laws:

$$F = -D \frac{dC}{dx} \tag{1}$$

$$\frac{dC}{dt} = +D \frac{d^2C}{dx^2} \tag{2}$$

contains a fairly complete definition of simple diffusion.

Simple diffusion is defined as diffusion wherein the diffusion constant is not concentration-dependent. Unless specifically stated, this discussion will pertain to simple diffusion. The following paragraphs will elaborate on these statements.

The system which will be used throughout this chapter is defined as follows (see Figure 1).

C concentration

x membrane thickness

t time

P flux of diffusion species or Permeation constant

D constant of diffusion

Diffusion, and hence permeation, is primarily dependent on the concentration gradient. If C_1 is the entrance side concentration and C_2 is the exit side concentration, then $(C_1 - C_2)\Delta x = \frac{\Delta C}{\Delta x}$ is the concentration gradient. If the system obeys Henry's Law, then the concentration (C) is a linear function of pressure. $C = S_p$ where S is the solubility of the permeant in the membrane. Thus, if the pressure gradient is due to an applied pressure of 15 psi on one side of a membrane of unit thickness and vacuum on the other, we obtain a permeation rate; if we raise the pressure to 115 psi on the entrance side and raise the pressure to 115 psi on the entrance side and raise the previously maintained vacuum to 100 psi, then the permeation rate does not change since the pressure gradient (and hence the concentration gradient) does not change. It should be noted that constant temperature must be maintained since the diffusion constant is very temperature-dependent.

A further remark on the concentration gradient is in order. The concentration is determined by the partial pressure of the permeating species. Considering a three gas system, if x, y,

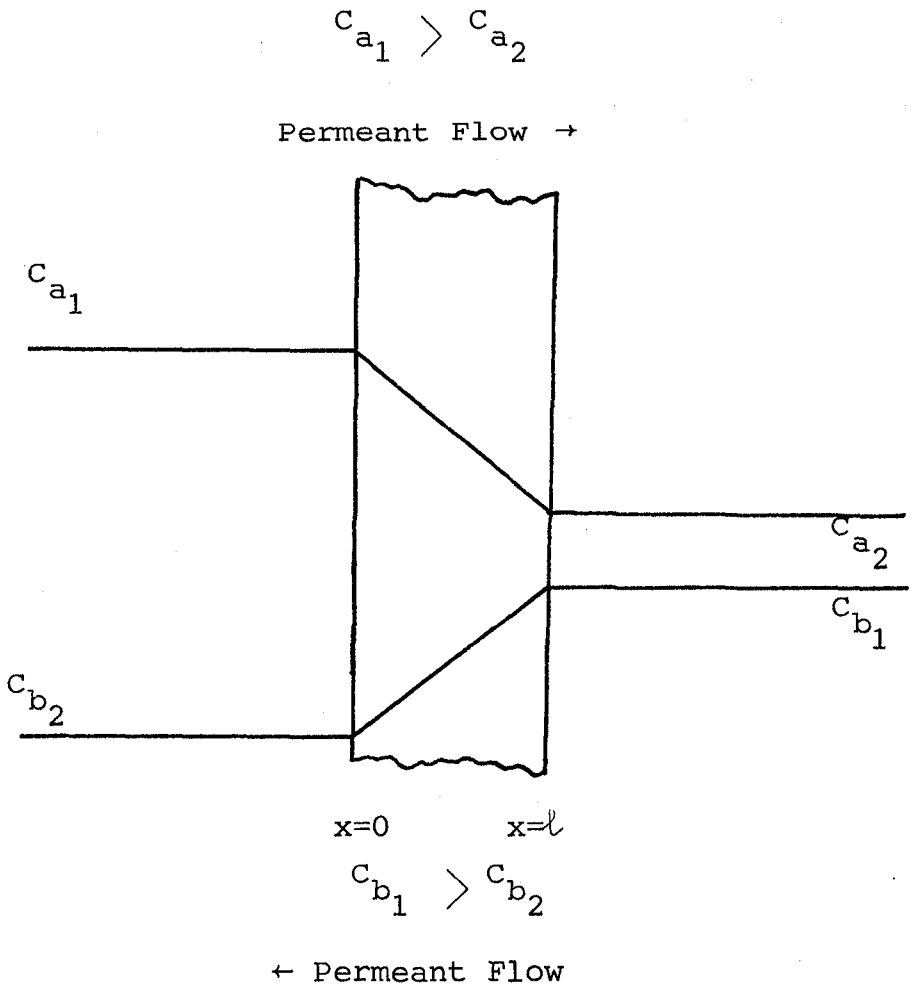

Figure 1 CONCENTRATION GRADIENT AND PERMEANT FLOW

and z are the gases and x is soluble in the membrane and y and z are not, then the pressure gradient (concentration gradient) is determined from the partial pressure p_x where $p = p_x + p_y + p_z$. This remark does not hold true in all cases, since at relatively high pressures additional relationships enter. Since permeation is a molecular flow phenomena, the diffusion of species 'a' in the + x direction is not affected by the presence of another species 'b' diffusing in the opposite direction. However, the membrane can be changed by the permeation of one species, and this history effect would make the transport of species a different than it would have been had not species b previously permeated through the membrane.

Consider the case where a membrane separates two fluids. If simple diffusion pertains, each gas will permeate through the membrane as though the other fluid were not present. The fact that one fluid is permeating through a membrane does not affect the other fluid's permeation rate unless there is a chemical reaction involving the two fluids and/or the membrane.

The following sections will be devoted to two illustrative types of diffusion: (a) permeation of hydrogen through palladium in order to exemplify an activated diffusion, and (b) permeation through plastic membranes, to illustrate permeation through a polymer. Following the illustrative discussion, Part II will consist of a derivation of the Diffusivity and Permeation constants to clarify the relationship between the theoretical development and experimentally determined values.

After this, there is a discussion of leakage compared to permeation flow.

A. Permeation of Hydrogen Through Palladium

The palladium leak is a standard method of introducing hydrogen into a vacuum system. Less well known is the fact that the hydrogen in a vacuum system at a pressure of 10^{-4} torr will permeate back to the outside of the system if the necessary conditions are maintained. If the hydrogen supply source is removed, and, the palladium leak is maintained at temperature, the hydrogen in the vacuum system will permeate back through the palladium even though the total pressure ratio is $\frac{760}{10^{-4}} = 7.6 \times 10^6$. Note that the partial pressure of the hydrogen on the outside of the system is less than hydrogen pressure inside the system.

Hydrogen in contact with palladium dissociates into protons. It can be shown that, if a bi-atomic molecule dissociates upon absorption by a surface, the rate of absorption, and hence the solubility, will be proportional to the square root of the absorbate pressure.

The protons go into the palladium crystal as palladium hydride; they do not travel along the grain boundaries. The palladium lattice expands as more and more sites are filled with hydrogen. The palladium lattice expands from a unit cell with an edge (Pd - Pd) distance of 3.886 A° to 4.020 A° at room temperature.

When the protons arrive at the outer boundary of the palladium they re-combine to become hydrogen molecules and evaporate from the palladium.

Usually the diffusion through the palladium is rate governing. However, the surface condition of the palladium can have an order of magnitude effect. A standard precaution that is used during permeation tests is to maintain the palladium at a high temperature, admit oxygen, oxidize the surface and then admit hydrogen to reduce the oxide. Thus, any contaminants will be "burnt" off and then reduced by the hydrogen.

B. Permeation Through Plastic Membranes

Diffusion into plastics is not different qualitatively from diffusion into metals or glass but can be significantly different in degree.

Flows governed by activated and nonactivated diffusion are not easy to evaluate separately. Permeation that is essentially determined by nonactivated diffusion will be approximately inversely proportional to the square root of the mass divided by the absolute temperature of the permeant. If the permeation is due to activated diffusion then the rate will be a much more complicated function of temperature, solubility and diffusivity; the permeability will be an exponential function of temperature.

For gas-polymer combinations which obey Henry's Law of solution ($S = kp$), and Fick's Law of Diffusion ($\frac{dC}{dt} = D \frac{d^2C}{dx^2}$), the prediction and/or determination of permeation is relatively

straightforward. There are a considerable number of gas-polymer combinations which do obey the two laws.

Many polymeric compounds consist of crystalline and amorphous components. Diffusion does not take place through the crystallites but through the amorphous matrix. This is quite important since many polymers go through a glass transition point at relatively low temperatures. This can and does have a profound effect on the permeation rate.

If the permeant obeys Henry's Law and Fick's Law, and if the rate of permeation for one simple gas is known, then the rate of permeation for another simple gas can be predicted based on the molecular diameter. This condition holds if the temperature is not close to the critical temperature of the permeant. Also, if there are a number of permeants, each permeates and diffuses independently of the rest, unless one of the permeants has an "effect" on the membrane.

II. THEORETICAL DEVELOPMENT

A. Diffusivity

In order to develop a mathematical model we shall assume the validity of Fick's Laws as a beginning. (For the interested reader a pertinent theoretical discussion of diffusion can be found beginning on p. 185 of "Kinetic Theory of Gases," E. H. Kennard, McGraw-Hill Book Co., Inc., New York, 1938.) This development assumes constant temperature conditions unless specifically noted otherwise. An implied condition pertinent

to this development is that the constant of diffusion governs the transport rate. Usually this is so; however, if the permeant is part of a mixture of fluids (liquids or gases) and there is not some mechanism which operates to maintain the concentration at C then the determined value of the diffusivity constant will not be correct because the concentration at the entrance was not maintained constant. Also, the adsorption rate in some rare cases is lower than the permeation rate determined by the diffusivity constant.

Recall that Fick's Laws are:

$$\text{I} \quad F = -D \left(\frac{\partial C}{\partial x} + \frac{\partial C}{\partial y} + \frac{\partial C}{\partial z}\right) \tag{1}$$

$$\text{II} \quad \frac{dC}{dt} = D \left(\frac{\partial^2 C}{\partial x^2} + \frac{\partial^2 C}{\partial y^2} + \frac{\partial^2 C}{\partial z^2}\right) \tag{2}$$

By definition, a membrane is very small in thickness compared to area. For this reason Fick's Laws will be developed, based on a semi-infinite mathematical model, in uni-dimensional terms; i.e.,

$$F = -D \frac{dC}{dx} \text{ and } \frac{dC}{dt} = D \frac{d^2C}{dx^2}$$

Except where specifically noted otherwise, D will be assumed to be independent of concentration. From Fick's Laws, an equation specifying the concentration at any point in the membrane and at a time ($t > 0$) will be developed (see Figure 1).

We shall start the development for the following conditions:

At, $t = 0$, for all values of x, $C = C_o$

$t > 0$ and $x = 0$, $C = C_1$

$t > 0$ and $x = \ell$, $C = C_2$ (3)

Note that in Figure 1, for the conditions stated in (3), the gradient of C, depicted as a straight line, is just what we are about to develop. This straight-line gradient will be developed for the condition when the time after permeation is initiated has become large.

When $t \to \infty$, the gradient no longer changes and,

$$\frac{dC}{dt} = 0 = D \frac{d^2C}{dx^2} \tag{4}$$

Equation (4) can be integrated twice and we can determine the concentration after a constant rate of permeation has been established as:

$$C = C_1 + (C_2 - C_1) \frac{x}{\ell} \tag{5}$$

Equation (5) not only tells us the concentration after a long period of time but also is a part of the general solution. Recall that we want a general solution for a specific purpose. The purpose is to enable one to rationally evaluate the experimental evidence.

A solution for Equation (2) can be derived by the separation of variables;

$$\text{Let } C = X(x)\ T(t)$$

$$\text{then } \frac{dC}{dt} = \dot{T}(t)\ X(x) = D\ T(t)\ X''(x) = D\ \frac{d^2C}{dx^2}$$

$$\text{where } \dot{T}(t) = \frac{dT(t)}{dt} \text{ and } X'(x) = \frac{dX(x)}{dx} \tag{6}$$

When the variables are separated,

$$\frac{\dot{T}(t)}{T(t)} = +D\ \frac{X''(x)}{X(x)} = \text{constant} = -\lambda^2 D \tag{7}$$

The constant is chosen as $-\lambda^2 D$ in order to simplify the algebra; then

$$\dot{T}(t) + \lambda^2 D\ T(t) = 0 \tag{8}$$

$$X''(x) + \lambda^2 X(x) = 0 \tag{9}$$

Equations (8) and (9) can be solved. By using Fourier series, our stated boundary conditions (Equation 3) and the solution for $t \to \infty$ (Equation 5), we have the general solution:

$$C = C_1 + (C_1 - C_2)\ \frac{x}{\ell} + \frac{2}{\pi} \sum_{n=1}^{\infty} \left(\frac{C_2 \cos n\pi - C_1}{n} \right.$$
$$\left. \sin \frac{n\pi x}{\ell} \exp \left(-\left(\frac{n\pi}{\ell}\right)^2 Dt \right) \right) + \frac{4C_0}{\pi} \sum_{m=2}^{\infty} \left(\frac{1}{m} \sin \frac{m\pi x}{\ell} \right.$$
$$\left. \exp \left(-\frac{(m\pi)^2}{\ell} Dt \right) \right) \tag{10}$$

where n = 1, 2, 3...n for $\frac{n\pi}{\ell}$; m = 2, 4, 6...m for $\frac{m\pi}{\ell}$,

the rate at which the permeant passes through the membrane which can be determined experimentally can be determined from

$$F = -D\ \left(\frac{dC}{dx}\right)_{x = \ell} \tag{11}$$

Equation (10) is differentiated with respect to x and then the value of $x = \ell$ is inserted thus determining $\frac{dC}{dx}$. Also a quantity that we can measure is the amount of permeant that passes through the membrane in a time t as

$$q = \int_o^t F \, dt \tag{12}$$

Using our stated conditions (Equation 3), Equations (11) and (12), and $C_2 = 0 = C_o$, we obtain

$$\frac{q}{D} = C_1 \frac{t}{\ell} - \frac{2C_1\ell}{D\pi^2} \sum_n^\infty \frac{(-1)^n}{n^2} + \frac{2C_1\ell}{D\pi^2} \sum_n^\infty \frac{(-1)^n}{n^2} \exp\left(-\left(\frac{n\pi}{\ell}\right)^2 Dt\right) \tag{13}$$

Now the summation,

$$\sum_n^\infty \frac{(-1)^n}{n^2} = -0.815$$

and

$$\frac{-2}{\pi^2} \sum_n^\infty \frac{(-1)^n}{n^2} = \frac{1}{6}$$

Now let $t \to \infty$ in Equation (13), and then:

$$q = \frac{C_1 Dt}{\ell} - \frac{C_1}{6} = \frac{D\,C_1}{\ell}\left(T - \frac{\ell}{6D}\right) \tag{14}$$

If (14) is plotted as q versus t, then q will approach a straight line asymptote. If the asymptote is extended to cross the t axis at q = 0, we can determine the value of D from the plotted experimentally determined values as:

$$t = \frac{\ell^2}{6D} \quad \text{or} \quad D = \frac{\ell^2}{6t} \tag{15}$$

Note that this is only one solution. There are other solutions such as an error function solution, which is also used. The choice of the solution is determined by the experimental procedure.

It is worthwhile to examine the interplay of the variables. A one-mil-thick membrane is commonly used in permeability studies (1 mil = 0.00254 cm). The diffusivity constant for N_2 in Oppanol B 200 at 25°C is $D = 4.2 \times 10^{-8}$ cm^2 sec^{-1}.

For this combination,

$$t = 25 \text{ sec.}$$

If the membrane thickness is doubled and the temperature is decreased approximately 20°C, then $D = 4 \times 10^{-9}$ and $t \simeq 1000$ sec or 16 min.

Recall that the membrane thickness has only been increased by one mil and the change in diffusivity corresponds to about a -20°C decrease in temperature and the time change was much greater than an order of magnitude.

B. Permeation Constant

If the diffusion constant and the solubility of the permeant in the membrane are known, then the permeation constant can be readily determined as will be shown in the following section. This relationship can and should be used to validate the experimental determination of the constant of diffusion. Note again that equi-temperature conditions must be observed.

For the permeant-membrane combinations that follow Henry's Law:

$$C = S\ p$$

Now,
$$F = -D \frac{dC}{dx} = P \frac{dp}{dx}$$

$$= -D \frac{d(Sp)}{dx} = P \frac{dp}{dx}$$

$$= -D\ S \frac{dp}{dx} = P \frac{dp}{dx} \qquad (16)$$

hence
$$-D\ S = P \qquad (17)$$

Thus, theoretically, if any two of the constants in Equation (17) are known, the third is determined.

C. Units

The following paragraphs on units are used explicitly to show the lack of uniformity in the field.

The units in each of the constants in Equation (17) are:

(diffusivity) $D - \ell^2\ t^{-1}$

(solubility) $S - \ell^3 \ell^{-3}\ p^{-1} = p^{-1}$

(Permeability) $P - cm^3\ \ell^{-2}\ \ell^{+1}\ t^{-1}\ p^{-1}$

(or $\ell^3\ \ell^{-2}\ \ell^{+1}\ t^{-1}\ p^{-1} = \ell^2\ t^{-1}\ p^{-1}$)

The units used to report the permeability constants in the literature vary as much as the instruments available and the imaginations of the researchers permit.

1) Area can be, and has been, reported as: ft^2, in^2, cm^2, m^2, mm^2 (5 units)

2) Thickness: ft, in, mil, cm, mm (5 units)

3) Time: sec, min, hour, day (4 units)

4) Pressure: psi, psf, in Hg, in of water, cm of Hg, mm of Hg (torr), μb, atm (8 units).

There are 30 units and these are not all that are available. The mind boggles at the number of combinations available and at the number which have been used. In this handbook the permeability constant will be reported in two ways: (a) the primary definition of units for permeability which is:

P = (scc, cm, cm^{-2}, sec^{-1}, Bar^{-1}) where scc is cc (STP) (1 Bar is 10^{+6} dynes/cm^2),

and (b) that used by the investigator. There is an extensive conversion table on pages I-3.3 to I-3.5.

C. Leakage

When the flow rate is different from the 'a priori' prediction, an argument invariably arises that permeation is not occurring, but leakage. If the hole is assumed to be small enough, the flow will be molecular, i.e., the moving molecule will be affected more by collisions with the passageway walls than with the other molecules of its own kind. The flow is obviously concentration-dependent if it can be even considered a leak. Thus, we come to the explanation that when we have a very large number of very small leaks, such as a porous septa, a nonactivated type of diffusion controls the permeation of the fluid. However, for activated diffusion a small hole cannot be considered as part of the diffusion process. The permeant must be soluble in the membrane. If the permeant is not soluble in

the membrane, any flow will not be due to activated diffusion and hence must be due to a real leak.

When leakage and permeation are discussed qualitatively the phenomenon can be more easily understood if the representative equations are presented in a form that points up the variables of interest. The equation for leakage will be presented for molecular flow, since leakage pin-holes or tortuous capillaries have such small dimensions that, except for quite high pressure differentials, the mass transport will be controlled by wall collision rather than viscous drag. The mass flow rate due to leakage is:

$$Q_L = K_1 \ (T/M)^{1/2} \ \frac{\Delta p}{\ell} \tag{18}$$

Where K_1 includes the number of "holes," their average diameter, and their average length.

In the mathematical development the Permeation has been shown to be,

$$F = D \ S \ \frac{dp}{dx}$$

where,

$$D = D_o \ \exp(-K_2/T) \tag{19}$$

The units of the constants can be chosen so that Q and F are in the same terms of mass flow rate, then

$$\begin{aligned} Q_\Sigma &= Q + F \\ &= K_1 \ (T/M)^{1/2} \ \frac{\Delta p}{\ell} + D_o S \ \exp \ (-K_2/T) \ \frac{\Delta p}{\ell} \end{aligned} \tag{20}$$

where

$$\frac{\Delta p}{\ell} = \frac{dp}{dx}$$

At 25°C the diffusivity of N_2 through Oppanal B200 is 4.2×10^{-8} cm^2 - sec^{-1}, and at slightly above zero degrees centigrade the diffusivity is 8.4×10^{-8} cm^2 - sec^{-1}. The solubility of N_2 in Oppanal B200 is also directly proportional to the temperature but the solubility is a weak function of temperature. The change in mass flow due to $\simeq$ 20°C temperature change is about 0.5 to 1 for permeation. For a leak the change is proportional to the square root of the absolute temperature, i.e.,

$$Q = Q_1\sqrt{T_1/T_2} = Q_1\sqrt{\frac{253}{298}} \qquad Q = 0.92Q_1 \qquad (21)$$

If the mass flow rate is carefully determined at a number of temperatures, a plot of Q_Σ vs T can be used to determine whether the mass flow is due to activated diffusion or is actually a "leakage" flow phenomenon. If $Q_\Sigma = F$ then the curve will be an exponential function. If $Q_\Sigma = F + Q_L$ and $Q_L >> F$ then Q_Σ vs T will plot as a parabola.

A few illustrations to compare a hole size that would permit a leakage rate proportional to the permeation through a cm^2 of material are given;

Permeation and Leakage of H_2 at 25°C*

No.	Hole Diam. cm	Q_p ** $\frac{}{\pi\ell}$/sec	Q_L $\frac{}{\pi\ell}$/s	Q_Σ $\frac{}{\pi\ell}$/s
1	6×10^{-5}	7.8×10^{-6}	7.8×10^{-7}	8.6×10^{-6}
2	2.4×10^{-4}	7.8×10^{-6}	7.8×10^{-5}	8.6×10^{-5}

Q_p - flow in absence of pin-hole leak

** $Q_\Sigma = Q_p + Q_L$ ($t - \ell - 5^1$ - torr-liters per second)

*Permeation through natural rubber, 0.1 mm thick, 1 cm^2 Area Δp = 1 atmosphere.

Of considerable significance is the small size of the hole at which leakage swamps the permeation component. Many propulsion bladders have been coated with aluminum in order to be made impermeable to certain liquids. However, a small hole through the aluminum constitutes a large permeation source.

Figure 2 shows the curve obtained for permeation of hydrogen through H-Film and Mylar (see reference 232). Note that for H-Film the experimentally determined points fall on a straight line between 3 and 4.4 (i.e., between 333°K and 228°K). Since the points fall on a straight line on semi-log graph paper, the equation can be represented in the form $Y = ae^{bx}$.

We can transform the general equation if we let $Y = P$, $a = P_o$, $b = \frac{A}{R}$ and $X = \frac{1000}{T}$ where P is the permeation (experimentally determined), A is the activation energy, °K cal/gm Mole of hydrogen with the membrane (H-Film), and R is the gas constant, P_o is the permeation constant for the equation (not the permeability even though it has the same units).

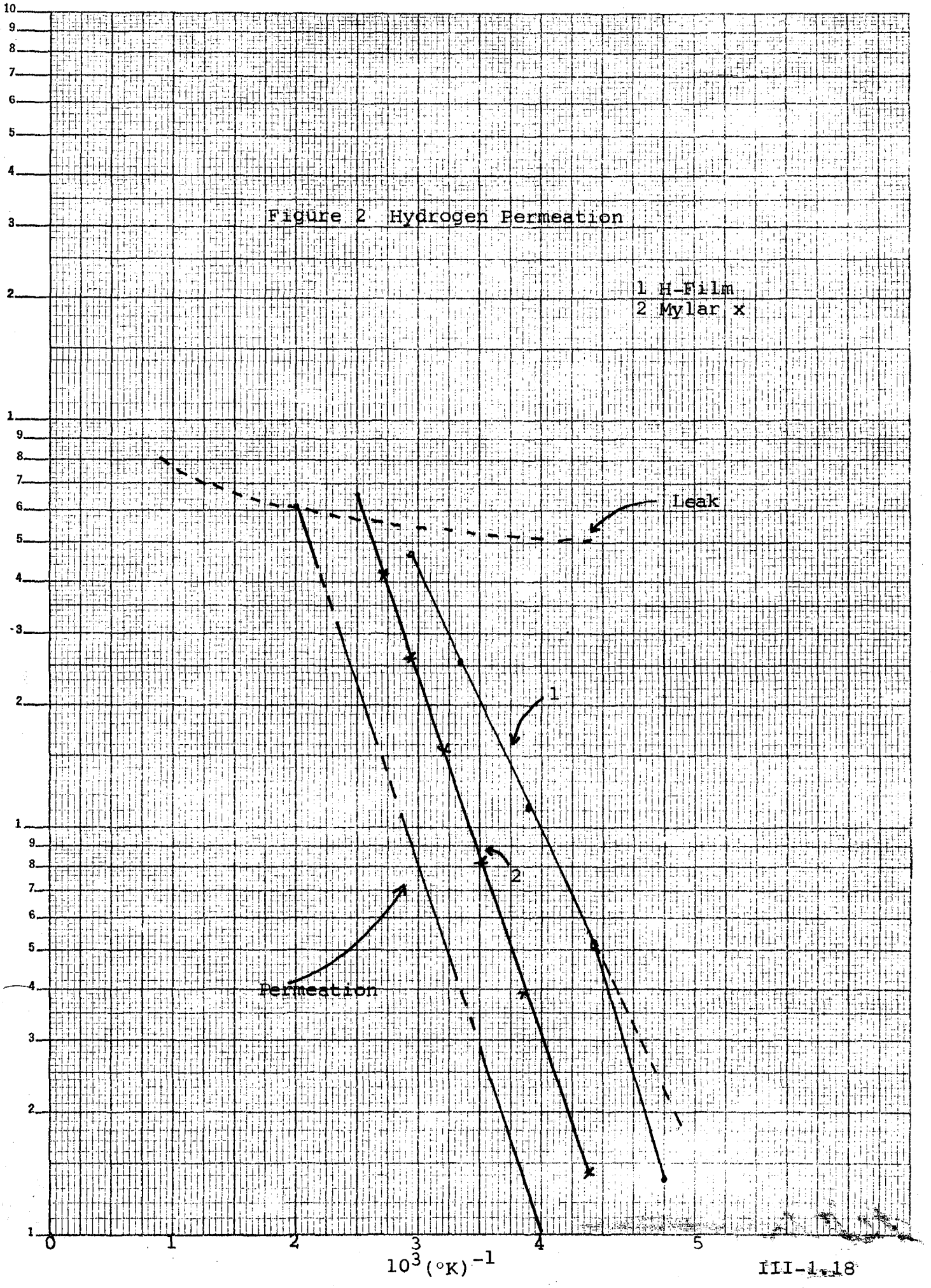
Figure 2 Hydrogen Permeation
1 H-Film
2 Mylar x
Leak
1
2
Permeation
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
$10^3 (°K)^{-1}$

The straightline relationship observed essentially shows that the activation energy remains constant over this temperature. Therefore, if the permeability data available is only over a limited range it is mandatory to determine the effects which might occur at the temperature of interest. Merely extending the curve in order to extrapolate can lead to gross errors. In the figure the straightline was extended; the experimentally determined value is 1.7×10^{-11}; the value obtained by extrapolation is 3.4×10^{-11} sec cm sec^{-1} cm^{-2} $(cm\ Hg)^{-1}$, a two-fold error in 28°K temperature excursion.

In Figure 2, the straightline labeled P is a hypothetical permeation curve; the one labeled L is a hypothetical leak which at that point alone transfers the same mass flow as permeation does. At any other point the flow through the leak would be considerably different from the permeation.

III. REFERENCES

It would be of considerable value to check the references from which each of the permeation data points are abstracted whenever the tabulated values are used. Most of these references have specific analyses incorporated. Among others the following references are of considerable value in the study of diffusion and permeation.

A very important point to note is that specific permeation and diffusion references cannot answer specifically any questions pertaining to a new permeation pair. If the diffusivity,

permeation constant and solubility cannot be found in the literature they must be determined experimentally. However, orders of magnitude type estimates can be made based on purely theoretical considerations. These theoretical models can be found in the literature. Note that a model is built for specific consideration and a model for hydrogen through palladium would not be useful for hydrazine through teflon.

1. Crank, J., The Mathematics of Diffusion, Clarendon Press, Oxford, 1956.

2. Dushman, S. K., "Scientific Foundations of Vacuum Technique," Second Edition, Wiley, New York, 1962.

3. Kinnard, E. H., "Kinetic Theory of Gases," McGraw-Hill Book Company, New York, 1938.

4. Engelhard Industries, Inc., Technical Bulletin (specifically H_2 through Palladium and Palladium base alloys), see Vol. VII, pp. 32, No. 1-2, Sept/June, 1960.

5. Barrer, R. M. J., Chemical Society (1934), 378.

6. Van Amerongen , G. J.,The permeability of different rubbers to gases and its relation to diffusivity and solubility. J. Appl. Phys. 17, 972, 1946.

7. Tuwiner, S. A., "Diffusion and Membrane Technology," Reinhold Publishing Corp., New York, 1962.

The data in this section are for propellants and pressurant gases presently applicable to use in the aerospace industry. These are:

IV - 1 Ammonia

IV - 2 Helium

IV - 3 Hydrogen

IV - 4 Mono Methyl Hydrazine

IV - 5 Mixed Oxides of Nitrogen

IV - 6 Nitrogen

IV - 7 Nitrogen Tetroxide

IV - 8 Oxygen

IV - 9 Unsymmetrical Dimethyl Hydrazine

Permeability is reported in Standard Units x 10^{8}, i.e., Value x 10^{-8} (Standard Units). The Standard Unit is:

$$\frac{\text{scc cm}}{\text{cm}^2 \text{ sec Bar}}$$

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	2067	181000	4	383			

References Reporting: 383

PERMEANT: Ammonia NH_3

MATERIAL: Cellulose Acetate

PERMEANT: Ammonia

MATERIAL: Polyethylene Terephthalate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	NG	22.04	1930	4	383			

References Reporting: 383

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.95g/cc	NG	519.6	45400	4	383			

References Reporting: 383

PERMEANT: Ammonia NH_3

MATERIAL: Polyolefin

PERMEANT: Ammonia NH_3

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
VYHH	1.2				221		1.14×10^{-4}	125 mmHg
VYHH	26.3				221		7.02×10^{-4}	379 mmHg
VYHH	51.2				221		26.5×10^{-4}	203 mmHg
VYHH	51.2				221		55.9×10^{-4}	506 mmHg
VYHH	74.0				221		73.7×10^{-4}	193 mmHg
VYHH	74.0				221		67.8×10^{-4}	173 mmHg

References Reporting: 221

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	4426	590×10^{-9}	1	203 297			
	25	4396	586×10^{-9}	1	206			

References Reporting: 203, 206, 297

PERMEANT: Ammonia NH_3

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1250-1600	3750	5×10^{-10}	11	284			

References Reporting: 294

PERMEANT: Helium He

MATERIAL: Alumina (ceramic)

PERMEANT: Helium He

MATERIAL: Buna S

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	17.3	17.5×10^{-7}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Perbunan 18	25	12.7	12.9×10^{-8}	8	390	.0082	15.5×10^{-6}	
Perbunan 18	50	30.8	31.2×10^{-8}	8	390	.0116	26.6×10^{-6}	
German Perbunan	25	9.20	9.32×10^{-8}	8	390	.0079	11.7×10^{-6}	
German Perbunan	50	23.1	23.4×10^{-8}	8	390	.0101	23×10^{-6}	
Hycar-OR-15	25	5.13	5.20×10^{-8}	8	390	.0065	7.92×10^{-6}	
Hycar-OR-15	50	14.0	14.2×10^{-8}	8	390	.0087	16.2×10^{-6}	
Hycar-OR-25	25	7.40	7.50×10^{-8}	8	390	.0066	11.2×10^{-6}	
Hycar-OR-25	50	19.3	19.6×10^{-8}	8	390	.0088	22.1×10^{-6}	

References Reporting: 390

PERMEANT: Helium He

MATERIAL: Butadiene-Acrylonitrile Copolymer

PERMEANT: Helium He

MATERIAL: Cellulose Acetate Butyrate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kodapak II	0	5.51	0.735×10^{-9}	1	211 219			.001 in. thick
Kodapak II	25	10.7	1.43×10^{-9}	1	211 219			.001 in. thick
Kodapak II	25	10.8	10.9×10^{-7}	6	378			
Kodapak II	50	20.6	2.75×10^{-9}	1	211 219			.001 in. thick
3 parts Plasticizer	0	14.2	1.89×10^{-9}	1	211 219			.0018 in. thick
3 parts Plasticizer	25	21.0	2.80×10^{-9}	1	211 219			.0018 in. thick
3 parts Plasticizer	50	29.3	3.90×10^{-9}	1	211 219			.0018 in. thick

References Reporting: 211, 219, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	5.1	5.2×10^{-7}	6	378			

References Reporting: 378

PERMEANT: Helium He

MATERIAL: Cellulose Nitrate

PERMEANT: Helium He

MATERIAL: Ethyl Cellulose

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	27.8	19.1	2.55×10^{-9}	1	208			Cast from Ethanol
	27.8	19.0	2.53×10^{-9}	1	208			Cast from tetrahydrofuran
	30	23.3	3.1×10^{-9}	1	214			
	NG	26.7	21	5	346			

References Reporting: 208, 214, 346

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	15.8	2.1×10^{-9}	1	214			

References Reporting: 214

PERMEANT: Helium He

MATERIAL: Ethylene-Vinylacetate Copolymer

PERMEANT: Helium He

MATERIAL: Glass

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Fused Silica	25	.75	$.76 \times 10^{-7}$	6	378			
Vycor	25	1.13	1.14×10^{-7}	6	378			
Vycor	400	3.6	4.8×10^{-10}	1	214			
Pyrex	25	.09	$.91 \times 10^{-8}$	6	378			
Soda Line	25	.00056	5.7×10^{-12}	6	378			
X-ray Shield	25	.00000031	3.1×10^{-14}	6	378			

References Reporting: 214, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Hydropol	25				222	.0122		
Hydropol	25	11.8	1.20×10^{-7}	8	225		151×10^{-7}	
Hydropol	25	11.8	12.0×10^{-7}	6	378			

References Reporting: 222, 225, 378

PERMEANT: Helium He

MATERIAL: Hydropol

PERMEANT: Helium He

MATERIAL: Inconel

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1225	4500	6×10^{-10}	11	294			

References Reporting: 294

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	5.9	5.93×10^{-8}	8	390	.0073	8.01×10^{-6}	
	50	15.9	16.1×10^{-8}	8	390	.0106	15.1×10^{-6}	

References Reporting: 390

PERMEANT: Helium He

MATERIAL: Isoprene-Acrylonitrile Copolymer

PERMEANT: Helium He

MATERIAL: Molybdenum

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1150	2250	3×10^{-10}	11	294			.0035 in. disilicide coating
	1500	7500	1×10^{-9}	11	294			.0005 in. disilicide coating

References Reporting: 294

PERMEANT:

MATERIAL:

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Vulcanized	0	1.7	$.0022 \times 10^{-6}$	3	401			
	25	7.5	100×10^{-10}	3	348			
	25	.6	$.6 \times 10^{-7}$	6	266 425			
G	25	3.38	45×10^{-10}	3	212			
G	25	3.38	3.4×10^{-7}	6	378			
Vulcanized	30.4	5.9	$.0078 \times 10^{-6}$	3	401			
Vulcanized	41.5	11.8	$.0157 \times 10^{-6}$	3	401			
Vulcanized	57	26.3	$.035 \times 10^{-6}$	3	401			
Vulcanized	73	36.0	$.048 \times 10^{-6}$	3	401			
Vulcanized	101.3	70.5	$.094 \times 10^{-6}$	3	401			

References Reporting: 212, 266, 348, 378, 401, 425

PERMEANT: Helium He

MATERIAL: Neoprene

PERMEANT: Helium He

MATERIAL: Platinum

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1400	1500	2×10^{-10}	11	288 294			

References Reporting: 288, 294

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
85% Pt	1400	1500	2×10^{-10}	11	294			

References Reporting: 294

PERMEANT: Helium He

MATERIAL: Platinum-Rhodium-Alloy

PERMEANT: Helium He

MATERIAL: Polycarbonate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	50.3	6.7×10^{-9}	1	214			
Lexan	25	.099	1.0×10^{-8}	6	388			
Lexan	50	.19	1.9×10^{-8}	6	388			
Lexan	75	.33	$.3 \times 10^{-8}$	6	388			
Lexan	100	.47	4.8×10^{-8}	6	388			
Lexan	125	.70	7.1×10^{-8}	6	388			

References Reporting: 214, 388

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Trithene B	30	25.5	3.4×10^{-9}	1	214			

References Reporting: 214

PERMEANT: Helium He

MATERIAL: Polycholortrifluoroethylene

PERMEANT: Helium He

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 14	25	3.7	3.75×10^{-7}	6	225 378		68×10^{-7}	
	25				222	.0122		
	27.2	3.15	$.42 \times 10^{-9}$	1	208			Biaxially Orientated
Alathon 15	0	2.89	3.85×10^{-10}	1	223			
Alathon 15	0	2.55	3.4×10^{-10}	1	223			
Alathon 15	0	1.50	2.0×10^{-10}	1	223			Variable pressure test
Alathon 15	0	1.65	2.2×10^{-10}	1	223			Variable volume test
Alathon 15	0	2.63	3.5×10^{-10}	1	209			
Alathon 15	15	5.1	6.8×10^{-10}	1	223			
Alathon 15	30	9.38	1.25×10^{-9}	1	223			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 15	30	6.15	8.2×10^{-10}	1	223			Variable pressure test
Alathon 15	30	7.5	1.0×10^{-9}	1	223			Variable volume test
Alathon 15	30	9.75	1.3×10^{-9}	1	223			
Alathon 15	30	10.5	1.4×10^{-9}	1	209			
Alathon 15	50	22.5	3.0×10^{-9}	1	223			
Alathon 15	50	21.8	2.9×10^{-9}	1	223			Variable volume test
Alathon 15	50	13.5	1.8×10^{-9}	1	223			Variable pressure test
DE 2400	0	1.10	$.147 \times 10^{-9}$	1	211 219			.00156 in. thick
DE 2400	0	1.35	$.180 \times 10^{-9}$	1	211 219			.0013 in. thick
DE 2400	25	3.86	$.515 \times 10^{-9}$	1	211 219			.00156 in. thick

PERMEANT: Helium He

MATERIAL: Polyethylene

PERMEANT: Helium He

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
DE 2400	25	4.61	$.615 \times 10^{-9}$	1	211 219			.0013 in. thick
DE 2400	50	11.0	1.47×10^{-9}	1	211 219			.00156 in. thick
DE 2400	50	13.1	1.74×10^{-9}	1	211 219			.0013 in. thick
DE 2500	0	1.22	$.163 \times 10^{-9}$	1	211 219			.0015 in. thick
DE 2500	25	4.16	$.555 \times 10^{-9}$	1	211 219			.0015 in. thick
DE 2500	50	11.7	1.56×10^{-9}	1	211 219			.0015 in. thick
.964g/cc	25	.86	$.87 \times 10^{-7}$	6	378			

References Reporting: 208, 209, 211, 219, 222, 223, 225, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
DE 2400	0	1.73	$.23 \times 10^{-9}$	1	211 219			.0022 in. thick
DE 2400	0	2.25	$.30 \times 10^{-9}$	1	211 219			.0039 in. thick
DE 2400	25	6.15	$.82 \times 10^{-9}$	1	211 219			.0022 in. thick
DE 2400	25	7.50	1.00×10^{-9}	1	211 219			.0039 in. thick
DE 2400	50	18.4	2.45×10^{-9}	1	211 219			.0022 in. thick
DE 2400	50	21.4	2.85×10^{-9}	1	211 219			.0039 in. thick

References Reporting: 211, 219

PERMEANT: Helium He

MATERIAL: Polyethylene Laminates

PERMEANT: Helium He

MATERIAL: Polyethylene Terephthalate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	25	.75	1.0×10^{-10}	1	214			
Mylar 25-V-200	0	.315	$.042 \times 10^{-9}$	1	211 219			
Mylar 25-V-200	25	.760	$.101 \times 10^{-9}$	1	211 219			
Mylar 25-V-200	50	1.58	$.210 \times 10^{-9}$	1	211 219			
Mylar 50-V-200	25	.863	$.115 \times 10^{-9}$	1	219			
Mylar 50-V-200	50	1.79	0.238×10^{-9}	1	211 219			
Mylar 100-V-200	25	.825	$.110 \times 10^{-9}$	1	211 219			
Mylar 100-V-200	50	1.73	$.230 \times 10^{-9}$	1	211 219			
Mylar 100-V-200	25	.803	$.107 \times 10^{-9}$	1	211 219			
Mylar 200-V-200	50	1.76	$.235 \times 10^{-9}$	1	211 219			

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar 500-V-200	25	.810	.108 x 10^{-9}	1	211 219			
Mylar 500-V-200	50	1.62	.216 x 10^{-9}	1	211 219			
Mylar Coated	25	.503	.067 x 10^{-9}	1	211 219			
Mylar Coated	50	1.35	.180 x 10^{-9}	1	211 219			
Mylar A	25	.73	.74 x 10^{-7}	6	378			

References Reporting: 211, 214, 219, 378

PERMEANT: Helium He

MATERIAL: Polyethylene Terephthalate

PERMEANT: Helium He

MATERIAL: Polypropanol

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Escon	27.2	3.23	0.43×10^{-9}	1	208			Biaxially Orientated
Escon	27.2	7.35	$.98 \times 10^{-9}$	1	208			Monaxially Orientated

References Reporting: 208

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	26.3	3.5×10^{-9}	1	214			
	NG	30.6	24	5	346			

References Reporting: 214, 346

PERMEANT: Helium He

MATERIAL: Polystyrene

PERMEANT: Helium ~~He~~

MATERIAL: Polyvinyl Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	32.3	3.45	0.46×10^{-9}	1	208			.00508 cm thick
16.8% Plasticizer	31.1	5.63	0.75×10^{-9}	1	208			.00788 cm thick
19.3% Plasticizer	31.1	7.58	1.01×10^{-9}	1	208			.00457 cm thick
Plasticized	NG	10.5	1.4×10^{-9}	1	214			

References Reporting: 208, 214

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Plasticized	0	2.29	0.305×10^{-9}	1	211 219			
Plasticized	25	6.90	0.920×10^{-9}	1	211 219			
Plasticized	50	18.4	2.45×10^{-9}	1	211 219			
VYHH	0				221		234×10^{-4}	
VYHH	24.7				221		574×10^{-4}	
VYHH	33				221		706×10^{-4}	
VYHH	55				221		2370×10^{-4}	
VYHH	70.5				221		3150×10^{-4}	
VYHH	90.5				221		5161×10^{-4}	

References Reporting: 211, 219, 221

PERMEANT: Helium He

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

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Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran 517	25	.01	$.011 \times 10^{-7}$	6	378			
Saran	25	.05	6.6×10^{-12}	1	214			
Saran	31.1	.263	$.035 \times 10^{-9}$	1	208			

References Reporting: 208, 214, 378

PERMEANT: Helium He

MATERIAL: Polyvinylidene Chloride

PERMEANT: Helium He

MATERIAL: Polyvinylidene Fluoride-Hexafluoropropylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Viton A	30	12.8	1.7×10^{-9}	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	263	35×10^{-9}	1	203 206 297			

References Reporting: 203, 206, 297

PERMEANT: Helium He

MATERIAL: Rubber, Dimethylsilicone

PERMEANT: Helium He

MATERIAL: Rubber, Methyl

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	10.9	11 x 10^{-7}	6,8	378 390			
	50	26.6	27 x 10^{-7}	8	390			

Type or Trade Name	Temp. °C	Permeability Std. Units ($Value \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	17.25	230×10^{-10}	3	212			
	25	23.4	23.7×10^{-8}	8	390	.011	21.6×10^{-6}	
	25	32.3	430×10^{-10}	3	348			
	25				225		216×10^{-7}	
	25	22.7	23×10^{-7}	6	378			
	25	29.6	3.0×10^{-6}	6	266 425			
	30	27.0	3.6×10^{-9}	1	214			
	34	43.0	43.6×10^{-8}	8	342			
	50	51.6	52.3×10^{-8}	8	390	.014	38.0×10^{-6}	

References Reporting: 212,214,225, 266,342,348, 378,390,425

PERMEANT: Helium He

MATERIAL: Rubber, Natural

PERMEANT: Helium He

MATERIAL: Rubber, Nitrile Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units $_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	59.3	$.79 \times 10^{-8}$	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Thiokol	NG	1050	1.03	10	298			

References Reporting: 298

PERMEANT: Helium He

MATERIAL: Rubber, Nitroso

PERMEANT: Helium He

MATERIAL: Rubber, Phenylene-Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	113	1.5×10^{-8}	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	173	2.3×10^{-8}	1	214			

References Reporting: 214

PERMEANT: Helium He

MATERIAL: Rubber, Silicone

PERMEANT: Helium He

MATERIAL: Rubber, (Sulfur added)

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
2% S	19.5	.085	$.0086 \times 10^{-6}$	6	401			

References Reporting: 401

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Austenitic	800	7.5	1×10^{-12}	11	380			
Austenitic	600	6800	$.9 \times 10^{-9}$	11	381			
Nickel	800	7.5	1×10^{-12}	11	380			
Nickel	600	6800	$.9 \times 10^{-9}$	11	381			
Pearlitic	800	7.5	1×10^{-12}	11	380			

References Reporting: 380, 381

PERMEANT: Helium He

MATERIAL: Steel

PERMEANT: Helium He

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE	NG	58.3	12960	7	271			3.2 mils thick
TFE	NG	61.3	13630	7	271			
TFE	NG	57.9	12870	7	271			
TFE	NG	58.3	12960	7	271			
TFE	NG	61.3	13632	7	271			
TFE	NG	57.9	12865	7	271			
TFE	25	523	530×10^{-7}	6	378			
TFE	30	NC	0.22	24	333			
TFE	30	90.0	12×10^{-9}	1	209			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE	30	90	1.2×10^{-8}	1	209			
TFE	50	128	1.7×10^{-8}	1	209			
FEP	NG	33.1	7360	7	271			3.2 mils thick
FEP	NG	29.6	6583	7	271			2.9 mils thick
FEP	25	30.1	6700	7	334			
FEP	30	46.5	6.2×10^{-9}	1	214			
FEP	50	58.5	13000	7	334			
FEP	75	94.4	21000	7	334			
FEP	100	157	35000	7	334			

References Reporting: 209, 214, 271, 333, 334, 378

PERMEANT: Helium He

MATERIAL: Teflon

PERMEANT: Helium He

MATERIAL: Teflon Laminates

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$) (Value)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE/FEP	NG	86.3	11.5×10^{-9}	1	307			
TFE/FEP	NG	34.4	7648	7	271			6.0 mils thick
TFE/FEP	NG	34.9	7755	7	271			6.5 mils thick
TFE/FEP	NG	35.0	7775	7	271			6.2 mils thick
TFE/FEP	20.1	NC	0.0037	26	332			
FEP/TFE	22	NC	.0086	26	332			6 mils thick
FEP/Al/FEP	NG	NC	$.03 \times 10^{-9}$	25	307			.002/.0005/.002 in's. thick
FEP/Al/FEP	NG	0.225	3×10^{-11}	1	307			.002/.0005/.002 in's. thick
FEP/Al/FEP	NG	0.225	3×10^{-11}	1	307			.002/.002/.002 in's. thick
FEP/TFE/Al	22	NC	.0004	26	332			336 hr. test

References Reporting:

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP/TFE/Al	22	NC	.0008	26	332			162 hr. test
TFE/Al/FEP	20.1		.00039	26	332			1/4 mil Al 336 hr. test
TFE/Al/FEP	20.1		.0077	26	332			1/4 mil Al 162 hr. test
TFE/FEP/-Al/FEP	NG	NC	$.015 \times 10^{-9}$	25	307			
TFE/FEP	22	NC	3.80×10^{-9}	29	264			Joclin Teflon
TFE/FEP	21	NC	2.08	30	261			Joclin Teflon 14 mils thick

References Reporting: 261,264,271, 307,332

PERMEANT: Helium He

MATERIAL: Teflon Laminates

PERMEANT: Helium He

MATERIAL: Vitreosil

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.480	6.4×10^{-11}	1	214			
	400	24.0	3.2×10^{-9}	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	.593	$.079 \times 10^{-9}$	1	211			.00188 in. thick
	0	.653	$.087 \times 10^{-9}$	1	211			.0026 in. thick
	25	2.70	$.360 \times 10^{-9}$	1	211			.00188 in. thick
	25	2.70	$.360 \times 10^{-9}$	1	211			.0026 in. thick
	50	9.90	1.320×10^{-9}	1	211			.00188 in. thick
	50	10.1	1.350×10^{-9}	1	211			.0026 in. thick

References Reporting: 211

PERMEANT: Hydrogen H_2

MATERIAL: Acrylonitrile

PERMEANT: Hydrogen H_2

MATERIAL: Adhesives

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Narmco A	NG	.0274	3.65×10^{-12}	1	268			Average of 8 samples
FM-1000	NG	1.31	1.74×10^{-10}	1	268			Average of 8 samples
Narmco C	NG	2.00	2.66×10^{-10}	1	268			Average of 9 samples
BR-92	NG	.645	8.6×10^{-11}	1	268			Average of 8 samples
X-424	NG	701000.	9.34×10^{-5}	1	268			Average of 4 samples
HT-424	NG	1160000.	1.55×10^{-4}	1	268			Average of 9 samples
HT-424u	NG	7100000.	9.47×10^{-4}	1	268			Average of 8 samples
Aerobond 430	NG	12800000.	1.71×10^{-3}	1	268			Average of 10 samples

References Reporting: 268

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1250-1600	225000	3×10^{-8}	11	294			

References Reporting: 294

PERMEANT: Hydrogen H_2

MATERIAL: Alumina (ceramic)

PERMEANT: Hydrogen H_2

MATERIAL: Aluminum

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	427	.75	1.0×10^{-9}	3	265			
	25	.0000000000-0000306	3.1×10^{-22}	6	266, 425			
	25	NC	7.5×10^{-11}	27	378			

References Reporting: 265,266,378, 425

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	800-900				427		9×10^{-10}	

References Reporting: 427

PERMEANT: Hydrogen H_2

MATERIAL: Beryllium

PERMEANT: Hydrogen H_2

MATERIAL: Buna S

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	30.1	30.5×10^{-7}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Perbunan 18	25	18.9	19.2×10^{-8}	8	378,390	.030	6.43×10^{-6}	
Perbunan 18	50	48.5	49.1×10^{-8}	8	390	.033	14.5×10^{-6}	
German Rubber	0	2.4	$.0032 \times 10^{-6}$	3	401			
German Rubber	20	6.4	$.0085 \times 10^{-6}$	3	401			
German Perbunan	25	11.3	11.5×10^{-8}	8	378			
German Perbunan	25	12.0	12.1×10^{-8}	8	390	.027	4.50×10^{-6}	
German Perbunan	50	33.3	33.7×10^{-8}	8	390	.030	11.1×10^{-6}	
German Rubber	50	23.6	$.0315 \times 10^{-6}$	3	401			
German Rubber	78	56.3	$.075 \times 10^{-6}$	3	401			
Hycar-OR-15	25	5.35	5.42×10^{-8}	8	378,390	.022	5.42×10^{-6}	

PERMEANT: Hydrogen H_2

MATERIAL: Butadiene-Acrylonitrile Copolymer

PERMEANT: Hydrogen H_2

MATERIAL: Butadiene-Acrylonitrile Copolymer

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Hycar-OR-15	50	16.8	17.0×10^{-8}	8	390	.026	6.56×10^{-6}	
Hycar-OR-25	25	8.85	8.97×10^{-8}	8	378 390	.023	3.85×10^{-6}	
Hycar-OR-25	50	26.0	26.3×10^{-8}	8	390	.027	9.60×10^{-6}	
	0				401	.039	$.061 \times 10^{-5}$	
	29				401	.035	$.27 \times 10^{-5}$	

References Reporting: 378, 390, 401

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	17.3	$.023 \times 10^{-6}$	3	401			

References Reporting: 401

PERMEANT: Hydrogen H_2

MATERIAL: Butadiene-Methyl Methacrylate Polymer

PERMEANT: Hydrogen H_2

MATERIAL: Cellulose Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	2.68	$.357 \times 10^{-9}$	1	219			Average of 6 samples
	Room	7.26	$.97 \times 10^{-9}$	1	241			Average of 6 samples
	Room	7.5	1.0×10^{-9}	1	385			Average of 3 samples
	25	6.35	$.846 \times 10^{-9}$	1	219			Average of 6 samples
	50	13.9	1.85×10^{-9}	1	219			Average of 5 samples
CA-43	0	4.09	$.320 \times 10^{-9}$	1	211			.001 in. thick
CA-43	25	9.23	$.800 \times 10^{-9}$	1	211			.001 in. thick
CA-43	50	10.4	1.39×10^{-9}	1	211			.001 in. thick
CA-48	0	1.95	$.260 \times 10^{-9}$	1	211			.001 in. thick
CA-48	25	4.36	$.581 \times 10^{-9}$	1	211			.001 in. thick

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
CA-48	50	12.8	$.170 \times 10^{-8}$	1	211			.001 in. thick
Celanese P903	0	4.09	$.545 \times 10^{-9}$	1	211			.00125 in. thick
Celanese P903	25	9.23	1.23×10^{-9}	1	211			.00125 in. thick
Celanese P903	50	18.8	2.50×10^{-9}	1	211			.00125 in. thick
Celanese P904	0	2.81	$.375 \times 10^{-9}$	1	211			.00125 in. thick
Celanese P904	25	6.00	$.800 \times 10^{-9}$	1	211			.00125 in. thick
Celanese P904	50	11.5	1.53×10^{-9}	1	211			.00125 in. thick
Celanese P911	0	2.54	$.338 \times 10^{-9}$	1	211			.0012 in. thick
Celanese P911	25	6.52	$.87 \times 10^{-9}$	1	211			.0012 in. thick
Celanese P911	50	14.6	1.95×10^{-9}	1	211			.0012 in. thick

PERMEANT: Hydrogen H_2

MATERIAL: Cellulose Acetate

PERMEANT: Hydrogen H_2

MATERIAL: Cellulose Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Celanese P912	0	2.99	$.398 \times 10^{-9}$	1	211			.00125 in. thick
Celanese P912	25	6.60	$.880 \times 10^{-9}$	1	211			.00125 in. thick
Celanese P912	25	6.6	6.7×10^{-7}	6	378			
Celanese P912	50	13.4	1.78×10^{-9}	1	211			.00125 in. thick
Celanese S600	0	2.84	$.379 \times 10^{-9}$	1	211			.00113 in. thick
Celanese C600	25	5.84	$.779 \times 10^{-9}$	1	211			.00113 in. thick
Celanese S600	50	10.7	1.43×10^{-9}	1	211			.00113 in. thick
Kodapak I regular	0	2.78	$.370 \times 10^{-9}$	1	211			.001 in. thick
Kodapak I regular	25	6.68	$.89 \times 10^{-9}$	1	211			.001 in. thick
Kodapak I regular	50	14.1	1.88×10^{-9}	1	211			.001 in. thick

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kodapak I rigid	0	2.85	$.380 \times 10^{-9}$	1	211			.001 in. thick
Kodapak I rigid	25	5.81	$.775 \times 10^{-9}$	1	211			.001 in. thick
Kodapak I rigid	50	10.7	1.42×10^{-9}	1	211			.001 in. thick

References Reporting: 211, 219
241, 378
385

PERMEANT: Hydrogen H_2

MATERIAL: Cellulose Acetate

PERMEANT: Hydrogen H_2

MATERIAL: Cellulose Acetate Butyrate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kodapak II regular	0	9.00	1.2×10^{-9}	1	211			.001 in. thick
Kodapak II regular	25	15.8	2.10×10^{-9}	1	211			.001 in. thick
Kodapak II regular	50	28.9	3.85×10^{-9}	1	211			.001 in. thick

References Reporting: 211

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	32				401	.113	$.33 \times 10^{-5}$	
	50	8.7	$.0116 \times 10^{-6}$	3	401			
	70				401	.082	2.1×10^{-5}	
	74	30.8	$.0411 \times 10^{-6}$	3	401			

References Reporting: 401

PERMEANT: Hydrogen H_2

MATERIAL: Chloroprene Polymer

PERMEANT: Hydrogen H_2

MATERIAL: COHR-Coated Glass Fabric

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
3010	Room	187	25×10^{-9}	1	203			

References Reporting: 203

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
3010	Room	188	25×10^{-9}	1	241			

References Reporting: 241

PERMEANT: Hydrogen H_2

MATERIAL: Cohrlastic

PERMEANT: Hydrogen H_2

MATERIAL: Copper

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	427	12.0	1.6×10^{-8}	3	265			
	25	NC	2.6×10^{-14}	27	378			

References Reporting: 265, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	36.9	29	5	346			
	Room	24.0	3.20×10^{-9}	1	241 385			
	25	25.1	3.34×10^{-9}	1	243			
Ethocel	20	19.5	2.60×10^{-9}	1	243			
Ethocel	30	24.0	3.20×10^{-9}	1	243			
Ethocel	40	30.0	4.00×10^{-9}	1	243			
Ethocel 610	25	22.4	22.7×10^{-7}	6	378			

References Reporting: 241, 243, 346, 378 385

PERMEANT: Hydrogen H_2

MATERIAL: Ethyl Cellulose

PERMEANT: Hydrogen H_2

MATERIAL: Glass

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Fused Silica	25	.00011	1.12×10^{-12}	6	378			
Vycor	25	.00038	3.9×10^{-12}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
B	25	NC	2.7×10^{-13}	27	378			
B	NG	NC	1810	28	403			
N	NG	NC	190	28	403			

References Reporting: 378, 403

PERMEANT: Hydrogen H_2

MATERIAL: Hastelloy

PERMEANT: Hydrogen H_2

MATERIAL: H-film

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	-73	.0128	.17 x 10^{-11}	1	232			
	-46	.128	1.7 x 10^{-11}	1	232			
	-18	.405	5.4 x 10^{-11}	1	232			
	10	1.05	14 x 10^{-11}	1	232			
	38	2.18	29 x 10^{-11}	1	232			
	66	4.35	58 x 10^{-11}	1	232			

References Reporting: 232

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	NC	4.0×10^{-13}	27	378			
	710	18750000	2.5×10^{-6}	11	294			Methane measured
	800	41300000	5.5×10^{-6}	11	294			
	810	15000000	2.0×10^{-6}	11	294			

References Reporting: 294, 378

PERMEANT: Hydrogen H_2

MATERIAL: Inconel

PERMEANT: Hydrogen H_2

MATERIAL: Iron

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	144	28	403			
	25	.049 to .148	5 to 15 $\times 10^{-9}$	6	266 425			
	25	NC	2.6×10^{-8}	27	378			
	245	23.7	8.65×10^{-3}	12	300			Fine grained
	413	174	63.4×10^{-3}	12	300			Fine grained
	621	915	334×10^{-3}	12	300			Fine grained
	797	20000	7300×10^{-3}	12	300			Fine grained
	245	11.8	4.32×10^{-3}	12	300			Single grained
	413	169	61.6×10^{-3}	12	300			Single grained
	621	882	322×10^{-3}	12	300			Single grained

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	797	20200	7370×10^{-3}	12	300			Single grained
	800	1350	1.8×10^{-6}	3	265			
Low carbon	25	.003	3×10^{-10}	6	266			
27 % chrome	25	.00001	1×10^{-12}	6	266			

References Reporting: 265, 266, 300, 378, 403, 425

PERMEANT: Hydrogen H_2

MATERIAL: Iron

PERMENAT: Hydrogen H_2

MATERIAL: Isoprene-Acrylonitrile Copolymer

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	5.59	5.66×10^{-8}	8	390	.023	2.47×10^{-6}	
	50	18.3	18.5×10^{-8}	8	390	.029	6.50×10^{-6}	

References Reporting: 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	10.22	10.36×10^{-8}	8	390	.029	3.55×10^{-6}	
	50	29.6	30.0×10^{-8}	8	390	.034	8.74×10^{-6}	

References Reporting: 390

PERMEANT: Hydrogen H_2

MATERIAL: Isoprene-Methacrylonitrile Copolymer

PERMEANT: Hydrogen H_2

MATERIAL: Kovar

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	NC	4.1×10^{-13}	27	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
MP	25	4.3	4.4×10^{-7}	6	378			

References Reporting: 378

PERMEANT: Hydrogen H_2

MATERIAL: Mipolam MP

PERMEANT: Hydrogen H_2

MATERIAL: Molybdenum

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	950	28	403			
	350	NC	2.55×10^{-8}	27	429			
	1100	225000000	3×10^{-5}	11	294			.0005 in. disilicide
	1150	375000000	5×10^{-5}	11	294			.0035 in. disilicide
	1200	68.5	2.5×10^{-2}	12	331			
	1600	329	1.2×10^{-1}	12	331			

References Reporting: 294, 331, 403, 429

PERMEANT:

MATERIAL:

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	NC	5.9×10^{-11}	27	378			

References Reporting: 378

PERMEANT: Hydrogen H_2

MATERIAL: Monel

PERMEANT: Hydrogen H_2

MATERIAL: Monochlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	.241	$.0321 \times 10^{-9}$	1	211			Average of 2 samples
	25	.732	$.098 \times 10^{-9}$	1	211			Average of 2 samples
	50	1.79	$.239 \times 10^{-9}$	1	211			Average of 2 samples
Plasticized	0	.606	$.081 \times 10^{-9}$	1	211			Average of 2 samples
Plasticized	25	2.60	$.346 \times 10^{-9}$	1	211			Average of 2 samples
Plasticized	50	8.97	1.20×10^{-9}	1	211			Average of 2 samples

References Reporting: 211

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	17.5	6.38	$.0085 \times 10^{-6}$	3	401			
	25	9.9	1.0×10^{-6}	6	266			
	27	9.6	$.0128 \times 10^{-6}$	3	401			
	52	27.8	$.037 \times 10^{-6}$	3	401			
	64	40.1	$.0534 \times 10^{-6}$	3	401			
G	25	10.2	10.3×10^{-7}	6	378			

References Reporting: 266, 378, 401

PERMEANT: Hydrogen H_2

MATERIAL: Neoprene

PERMEANT: Hydrogen H_2

MATERIAL: Nickel

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	1000	14	403			
	25	NC	6.9×10^{-11}	13	378			
	427	750	1.0×10^{-6}	3	265			

References Reporting: 265, 378, 403

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	1040	14	403			
	25	NC	8.7×10^{-5}	13	378			
	950	NC	238	14	274			.094 in. thick
	1010	NC	266	14	274			.094 in. thick
	1065	NC	287	14	274			.094

References Reporting: 274, 378, 403

PERMEANT: Hydrogen H_2

MATERIAL: Niobium

PERMEANT: Hydrogen H_2

MATERIAL: Nylon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
3	0	.218	$.029 \times 10^{-9}$	1	211			.001 in. thick
3	25	.75	$.100 \times 10^{-9}$	1	211			.001 in. thick
3	50	2.21	$.295 \times 10^{-9}$	1	211			.001 in. thick

References Reporting: 211

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	6100	14	403			
	25	NC	1.7×10^{-8}	13	378			
	25	8.15	8.26×10^{-7}	6	246			Coated on polyethylene
	427	6300000	8.4×10^{-3}	3	265			

References Reporting: 246, 265, 378, 403

PERMEANT: Hydrogen H_2

MATERIAL: Palladium

PERMEANT: Hydrogen H_2

MATERIAL: Platinum

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	1840	14	403			
	25	NC	2.1×10^{-14}	13	378			

References Reporting: 378, 403

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	31.6	32×10^{-8}	8	378 390	.033	9.6×10^{-6}	
	50	76.0	77×10^{-8}	8	390	.042	18×10^{-6}	

References Reporting: 378, 390

PERMEANT: Hydrogen H_2

MATERIAL: Polybutadiene

PERMEANT: Hydrogen H_2

MATERIAL: Polycarbonate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lexan	25	9.0	1.2×10^{-8}	3	388	.14	6.4×10^{-7}	
Lexan	50	18.8	2.5×10^{-8}	3	388		1.1×10^{-6}	
Lexan	75	33.8	4.5×10^{-8}	3	388			
Lexan	100	53.3	7.1×10^{-8}	3	388			
Lexan	125	82.5	1.1×10^{-7}	3	388			
Lexan	150	127.5	1.7×10^{-7}	3	388			
Lexan	175	180	2.4×10^{-7}	3	388			

References Reporting: 388

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F	25	.73	$.74 \times 10^{-7}$	6	378			
Kel-F 8105	-18	.072	$.96 \times 10^{-11}$	1	232			
Kel-F 8105	10	.375	5.0×10^{-11}	1	232			
Kel-F 8105	39	1.43	19×10^{-11}	1	232			
Kel-F 8105	66	4.95	66×10^{-11}	1	232			
Kel-F 8105	93	12.8	170×10^{-11}	1	232			
Kel-F 8205	-46	.0098	$.13 \times 10^{-11}$	1	232			
Kel-F 8205	-18	.083	1.1×10^{-11}	1	232			
Kel-F 8205	10	.39	5.2×10^{-11}	1	232			
Kel-F 8205	38	1.43	19×10^{-11}	1	232			

PERMEANT: Hydrogen H_2

MATERIAL: Polychlorotrifluoroethylene

PERMEANT: Hydrogen H_2

MATERIAL: Polychlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F 8205	66	4.58	16×10^{-11}	1	232			
Kel-F 8205	93	12.9	172×10^{-11}	1	232			
Trithene	0	2.45	$.326 \times 10^{-9}$	1	219			
Trithene	25	.73	$.098 \times 10^{-9}$	1	219			
Trithene	50	1.79	$.238 \times 10^{-9}$	1	219			
Trithene-B	0	.606	$.081 \times 10^{-9}$	1	219			
Trithene-B	25	2.60	$.346 \times 10^{-9}$	1	219			
Trithene-B	30	4.43	5.9×10^{-10}	1	223			
Trithene-B	30	4.5	6.0×10^{-10}	1	209			
Trithene-B	50	8.97	1.20×10^{-9}	1	219			

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Trithene-B	60	15.8	2.1×10^{-9}	1	223			
Trithene-B	60	15.0	2.0×10^{-9}	1	209			

References Reporting: 209, 219, 223, 232, 378

PERMEANT: Hydrogen H_2

MATERIAL: Polychlorotrifluoroethylene

PERMEANT: Hydrogen H_2

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 14	25	5.88	5.96×10^{-7}	6	378			
Alathon 15	0	3.9	5.2×10^{-10}	1	209 223			
Alathon 15	15	7.5	1.0×10^{-9}	1	223			
Alathon 15	30	15.0	2.0×10^{-9}	1	209 223			
Alathon 15	50	34.5	4.6×10^{-9}	1	209 223			
DE-2400	0	1.59	$.212 \times 10^{-9}$	1	211			.0013 in. thick
DE-2400	0	1.52	$.202 \times 10^{-9}$	1	211			.00156 in. thick
DE-2400	25	6.4	$.855 \times 10^{-9}$	1	211			.0013 in. thick
DE-2400	25	5.96	$.794 \times 10^{-9}$	1	211			.00156 in. thick
DE-2400	50	20.7	2.76×10^{-9}	1	211			.0013 in. thick

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
DE-2400	50	18.6	2.48×10^{-9}	1	211			.00156 in. thick
DE-2500	0	1.73	$.230 \times 10^{-9}$	1	211			.0015 in. thick
DE-2500	25	6.15	$.82 \times 10^{-9}$	1	211			.0015 in. thick
DE-2500	50	18.5	2.46×10^{-9}	1	211			.0015 in. thick
Mol. Wt. 17-18,000	0	3.0	$.40 \times 10^{-9}$	1	211			.00111 in. thick
Mol. Wt. 17-18,000	25	10.1	1.35×10^{-9}	1	211			.00111 in. thick
Mol. Wt. 17-18,000	50	28.9	3.85×10^{-9}	1	211			.00111 in. thick
Mol. Wt. 20,000	0	1.8	$.24 \times 10^{-9}$	1	211			.00225 in. thick
Mol. Wt. 20,000	0	2.1	$.280 \times 10^{-9}$	1	211			.00082 in. thick
Mol. Wt. 20,000	25	6.38	$.85 \times 10^{-9}$	1	211			.00225 in. thick

PERMEANT: Hydrogen H_2

MATERIAL: Polyethylene

PERMEANT: Hydrogen H_2

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mol. Wt. 20,000	25	7.43	$.99 \times 10^{-9}$	1	211			.00082 in. thick
Mol. Wt. 20,000	50	19.5	2.60×10^{-9}	1	211			.00225 in. thick
Mol. Wt. 20,000	50	22.5	3.00×10^{-9}	1	211			.00082 in. thick
Mol. Wt. 21,000	0	2.1	$.28 \times 10^{-9}$	1	211			.00206 in. thick
Mol. Wt. 21,000	0	2.67	$.3555 \times 10^{-9}$	1	211			.001 in. thick
Mol. Wt. 21,000	0	2.1	$.28 \times 10^{-9}$	1	211			.0015 in. thick
Mol. Wt. 21,000	25	6.98	$.930 \times 10^{-9}$	1	211			.00206 in. thick
Mol. Wt. 21,000	25	8.93	1.19×10^{-9}	1	211			.001 in. thick
Mol. Wt. 21,000	25	7.5	1.00×10^{-9}	1	211			.0015 in. thick
Mol. Wt. 21,000	50	27.4	3.65×10^{-9}	1	211			.00206 in. thick

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mol. Wt. 21,000	50	25.5	3.40×10^{-9}	1	211			.001 in. thick
Mol. Wt. 21,000	50	21.8	2.90×10^{-9}	1	211			.0015 in. thick
Mol. Wt. 23,000	0	1.8	$.340 \times 10^{-9}$	1	211			.00125 in. thick
Mol. Wt. 23,000	25	6.23	1.10×10^{-9}	1	211			.00125 in. thick
Mol. Wt. 23,000	50	18.8	3.10×10^{-9}	1	211			.00125 in. thick
Mol. Wt. 27,000	0	2.55	$.33 \times 10^{-9}$	1	211			.001 in. thick
Mol. Wt. 27,000	25	8.25	1.05×10^{-9}	1	211			.001 in. thick
Mol. Wt. 27,000	50	23.3	3.85×10^{-9}	1	211			.001 in. thick
Mol. Wt. 29-30,000	0	2.48	$.305 \times 10^{-9}$	1	211			.0025 in. thick
Mol. Wt. 29-30,000	25	7.88	1.05×10^{-9}	1	211			.0025 in. thick

PERMEANT: Hydrogen H_2

MATERIAL: Polyethylene

PERMEANT: Hydrogen H_2

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mol. Wt. 29-30,000	50	28.9	3.10×10^{-9}	1	211			.0025 in. thick

References Reporting: 209, 211, 223, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
DE-2400	0	2.4	$.32 \times 10^{-9}$	1	211			.0022 in. thick
DE-2400	0	2.93	$.39 \times 10^{-9}$	1	211			.0039 in. thick
DE-2400	25	9.4	1.25×10^{-9}	1	211			.0022 in. thick
DE-2400	25	10.66	1.421×10^{-9}	1	211			.0039 in. thick
DE-2400	50	30.0	4.00×10^{-9}	1	211			.0022 in. thick
DE-2400	50	33.0	4.40×10^{-9}	1	211			.0039 in. thick

References Reporting: 211

PERMEANT: Hydrogen H_2

MATERIAL: Polyethylene Laminates

PERMEANT: Hydrogen H_2

MATERIAL: Polyethylene Terephthalate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	-46	.0135	0.18×10^{-11}	1	232			
Mylar	-18	.0728	0.97×10^{-11}	1	232			
Mylar	10	.225	3.4×10^{-11}	1	232			
Mylar	38	.705	9.4×10^{-11}	1	232			
Mylar	66	1.73	23×10^{-11}	1	232			
Mylar	93	3.75	50×10^{-11}	1	232			
Mylar A	25	.44	$.445 \times 10^{-7}$	1	378			
Mylar 25-V-200	0	.188	$.025 \times 10^{-9}$	1	211			
Mylar 25-V-200	25	.435	$.058 \times 10^{-9}$	1	211			
Mylar 25-V-200	50	.900	$.120 \times 10^{-9}$	1	211			

References Reporting: 211, 232, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	37.4	37.9×10^{-8}	8	390	.037	10.03×10^{-6}	
	50	87.8	89.0×10^{-8}	8	390			

References Reporting: 390

PERMEANT: Hydrogen H_2

MATERIAL: Polyisoprene

PERMEANT: Hydrogen H_2

MATERIAL: Polymethylpentadiene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	32.0	32.4×10^{-8}	8	390			
	50	81.0	82.1×10^{-8}	8	390			

References Reporting: 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	42.0	33	5	346			
	20	67.5	9.00×10^{-9}	1	243			
	30	68.3	9.1×10^{-9}	1	241 243 385			
	40	69.0	9.2×10^{-9}	1	243			
Dow 0641	25	67.6	68.5×10^{-7}	6	378			

References Reporting: 241, 243, 346, 378, 385

PERMEANT: Hydrogen H_2

MATERIAL: Polystyrene

PERMEANT: Hydrogen H_2

MATERIAL: Polystyrene-Butadiene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	21	.84	$.0112 \times 10^{-6}$	3	401			

References Reporting: 401

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	60.0	8.00×10^{-9}	1	243			
	30	61.9	8.25×10^{-9}	1	243			
	40	63.8	8.50×10^{-9}	1	243			
Plasticized	0	3.6	$.480 \times 10^{-9}$	1	219			
Plasticized	25	9.68	1.290×10^{-9}	1	219			
Plasticized	50	22.5	3.00×10^{-9}	1	219			
Geon-101	25	2.57	2.6×10^{-7}	6	378			

References Reporting: 219, 243, 378

PERMEANT: Hydrogen H_2

MATERIAL: Polyvinyl Chloride

PERMEANT: Hydrogen H_2

MATERIAL: Polyvinyl Chloride-Dioctyl Phthalate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
70-30	0	3.6	$.48 \times 10^{-9}$	1	211			.00175 in. thick
70-30	25	9.68	1.29×10^{-9}	1	211			.00175 in. thick
70-30	50	22.5	3.00×10^{-9}	1	211			.00175 in. thick
101-EP-100	30	2.4	$.32 \times 10^{-9}$	1	243			
101-EP-100	30	2.7	$.36 \times 10^{-9}$	1	243			
101-EP-100	40	3.0	$.40 \times 10^{-9}$	1	243			
101-EP-100 GP-261-5	20	91.5	12.2×10^{-9}	1	243			
101-EP-100 GP-261-5	30	84.8	11.3×10^{-9}	1	243			
101-EP-100 GP-261-5	40	81.0	10.8×10^{-9}	1	243			
101-EP-100 GP-261-20	20	63.8	8.5×10^{-9}	1	243			

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
101-EP-100 GP-261-20	30	64.5	8.6×10^{-9}	1	243			
101-EP-100 GP-261-20	40	66.0	8.8×10^{-9}	1	243			

References Reporting: 211, 243

PERMEANT: Hydrogen H_2

MATERIAL: Polyvinyl Chloride-Dioctyl Phthalate

PERMEANT: Hydrogen H_2

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	2.40	$.320 \times 10^{-9}$	1	219			
	25	7.43	$.99 \times 10^{-9}$	1	219			
	Room	7.50	1.0×10^{-9}	1	241			
	Room	7.5	1.0×10^{-9}	1	385			
VYHH	91				221		1.78	
	50	19.9	2.65×10^{-9}	1	219			
VYHH	4				221		.082	
VYHH	27				221		.227	
VYHH	33				221		.294	
VYHH	66				221		1.16	

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
VYHH	81				221		1.67	

References Reporting: 219, 221, 241, 385

PERMEANT: Hydrogen H_2

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

PERMEANT: Hydrogen H_2

MATERIAL: Polyvinylidene Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran 517	25	.05	.05 x 10^{-7}	6	368			
Saran	31	.120	.016 x 10^{-9}	1	208			.00254 in. thick

References Reporting: 208, 368

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	5.4	5.50×10^{-8}	8	390	.035	1.52×10^{-6}	
	50	17.0	17.2×10^{-8}	8	390	.039	4.38×10^{-6}	
Oppanol-B-200	25	4.8	4.9×10^{-7}	6	378			

References Reporting: 378, 390

PERMEANT: Hydrogen H_2

MATERIAL: Rubber, Butyl

PERMEANT: Hydrogen H_2

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	488	65×10^{-9}	1	203,297			
	25	495	66×10^{-9}		206			

References Reporting: 203, 206, 297

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm	Room	1.2 to 1.7	.16 to .23 x 10^{-9}	1	240 241			
Pliofilm 120-P4	0	.439	.0585 x 10^{-9}	1	211 219			.00125 in. thick
Pliofilm 120-P4	25	1.70	.226 x 10^{-9}	1	211 219			.00125 in. thick
Pliofilm 120-P4	50	5.33	.710 x 10^{-9}	1	211 219			.00125 in. thick
Pliofilm 140-N2	0	.506	.0675 x 10^{-9}	1	211 219			.00125 in. thick
Pliofilm 140-N2	25	1.20	.160 x 10^{-9}	1	211 219 385			.00125 in. thick
Pliofilm 140-N2	25	1.19	1.21 x 10^{-7}	6	370 378			
Pliofilm 140-N2	50	2.51	.335 x 10^{-9}	1	211 219 385			.00125 in. thick

References Reporting: 211, 219, 240, 241, 370, 378, 385

PERMEANT: Hydrogen H_2

MATERIAL: Rubber Hydrochloride

PERMEANT: Hydrogen H_2

MATERIAL: Rubber, Methyl

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	12.8	13×10^{-8}	8	378 390	.033	3.9×10^{-6}	
	50	37.5	38×10^{-8}	8	390	.035	10.5×10^{-6}	

References Reporting: 378, 390

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	36.9	37.4×10^{-8}	8	390	.037	10.2×10^{-6}	
	25	38.5	39×10^{-7}	6	378			
	25	39.5	4.0×10^{-6}	6	266			
	50	89.6	90.8×10^{-8}	8	390	.040	22.2×10^{-6}	

References Reporting: 266, 378, 390

PERMEANT: Hydrogen H_2

MATERIAL: Rubber, Natural

PERMEANT: Hydrogen H_2

MATERIAL: Rubber, Polysulfide

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Thiokol-B	25	1.2	1.2×10^{-7}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
GE SE450	Room	488	65×10^{-9}	1	203 241 385			
Coated on fabric	Room	188	25×10^{-9}	1	385			

References Reporting: 203, 241, 385

PERMEANT: Hydrogen H_2

MATERIAL: Rubber, Silicone

PERMEANT: Hydrogen H_2

MATERIAL: Steel

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
303 Stainless	25	NC	4.6×10^{-13}	13	378			
303 Stainless	1200	NC	2.25×10^{-1}	14	331			
303 Stainless	1200	NC	1.5×10^{-2}	14	331			Oxidized
303 Stainless	1200	NC	2.2×10^{-2}	14	331			Solaramic coating
303 Stainless	1600	NC	4.2×10^{-1}	14	331			Oxidized
303 Stainless	1600	NC	9.0×10^{-2}	14	331			Solaramic coating
303 Stainless	1600	NC	8.1	14	331			
304 Stainless	25	NC	1.3×10^{-13}	13	378			
304 Stainless	NG	.016	2.1×10^{-12}	1	434			
304 Stainless	NG	NC	850	14	403			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
304 Stainless	1200	NC	1.2×10^{-1}	14	331			
304 Stainless	1600	NC	6.3×10^{-1}	14	331			
316-321 Stainless	NG	NC	1526	14	403			
316-321 Stainless	25	NC	2.3×10^{-12}	13	378			
347 Stainless	25	NC	9.2×10^{-13}	13	378			
410 Stainless	25	NC	5.7×10^{-12}	13	378			
430 Stainless	NG	NC	360	14	403			
PH15-7MO Stainless	NG	NC	7800	14	403			
Cold drawn	25	NC	1.8×10^{-8}	13	378			
Low carbon	25	NC	4.2×10^{-10}	13	378			

PERMEANT: Hydrogen H_2

MATERIAL: Steel

PERMEANT: Hydrogen H_2

MATERIAL: Steel

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Low carbon	25	.003	3×10^{-10}	6	425			
EN58B	NG	NC	.463	13	430			
27% Chrome	25	.0000099	1×10^{-12}	6	425			
Haynes-25	NG	NC	327	14	403			
Haynes-25	1200	NC	7.1×10^{-2}	14	331			
Haynes-25	1200	NC	1.5×10^{-2}	14	331			Oxidized
Haynes-25	1200	NC	5.0×10^{-3}	14	331			Aluminized
Haynes-25	1600	NC	5.8×10^{-1}	14	331			
Haynes-25	1600	NC	4.2×10^{-1}	14	331			Oxidized
Haynes-25	1600	NC	2.0×10^{-1}	14	331			Aluminized

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Maraging	250	NC	2.16×10^{-6}	13	417	$\frac{.085 \text{ scc}}{\text{cc atm } 1/2}$	2.55×10^{-6}	

References Reporting: 331, 378, 403, 417, 425, 430, 434

PERMEANT: Hydrogen H_2

MATERIAL: Steel

PERMEANT: Hydrogen H_2

MATERIAL: Tedlar

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	-18	.024	$.32 \times 10^{-11}$	1	232			
	10	.158	2.1×10^{-11}	1	232			
	38	.720	9.6×10^{-11}	1	232			
	66	2.70	36×10^{-11}	1	232			
	93	7.50	100×10^{-11}	1	232			

References Reporting: 232

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP	-74	.0113	$.15 \times 10^{-11}$	1	232			
FEP	-46	.180	2.4×10^{-11}	1	232			
FEP	-18	1.05	14×10^{-11}	1	232			
FEP	10	3.90	52×10^{-11}	1	232			
FEP	25	9.89	2200	7	334			
FEP	38	10.1	135×10^{-11}	1	232			
FEP	50	24.7	5500	7	334			
FEP	66	22.5	300×10^{-11}	1	232			
FEP	75	49.5	11000	7	334			
FEP	100	89.9	20000	7	334			

PERMEANT: Hydrogen H_2

MATERIAL: Teflon

PERMEANT: Hydrogen H_2

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE	25	17.8	18×10^{-7}	6	378			
TFE	30	42.0	5.6×10^{-9}	1	209			
TFE	50	63.8	8.5×10^{-9}	1	209			

References Reporting: 209, 232, 334, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	1840	14	403			
Arc-Cast	1500	NC	.0024	15	432			
Arc-Cast	2000	NC	.021	15	432			
Arc-Cast	2500	NC	.88	15	432			

References Reporting: 403, 432

PERMEANT: Hydrogen H_2

MATERIAL: Tungsten

PERMEANT: Hydrogen H_2

MATERIAL: Vinyl Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	3.71	$.495 \times 10^{-9}$	1	219			
	25	10.2	1.36×10^{-9}	1	219			
	50	24.2	3.22×10^{-9}	1	219			

References Reporting: 219

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Bakelite VB-1300	20	3.17	$.422 \times 10^{-9}$	1	243			
Bakelite VB-1300	30	3.60	$.48 \times 10^{-9}$	1	243			
Bakelite VB-1300	40	3.90	$.52 \times 10^{-9}$	1	243			
Bakelite VB-1920	20	37.4	4.99×10^{-9}	1	243			
Bakelite VB-1920	30	37.5	5.00×10^{-9}	1	243			
Bakelite VB-1920	40	37.9	5.05×10^{-9}	1	243			
Bakelite VB-1925	20	3.45	$.46 \times 10^{-9}$	1	243			
Bakelite VB-1925	30	5.25	$.70 \times 10^{-9}$	1	243			
Bakelite VB-1925	40	7.73	1.03×10^{-9}	1	243			
Bakelite VB-1930	0	2.40	$.320 \times 10^{-9}$	1	211			

PERMEANT: Hydrogen H_2

MATERIAL: Vinyl Chloride-Polyvinyl Acetate

PERMEANT: Hydrogen H_2

MATERIAL: Vinyl Chloride-Polyvinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Bakelite VB-1930	20	5.03	$.67 \times 10^{-9}$	1	243			
Bakelite VB-1930	25	7.43	$.99 \times 10^{-9}$	1	211			
Bakelite VB-1930	25	3.36	3.4×10^{-7}	6	378			
Bakelite VB-1930	30	7.20	$.96 \times 10^{-9}$	1	243			
Bakelite VB-1930	40	10.2	1.36×10^{-9}	1	243			
Bakelite VB-1930	50	19.9	2.65×10^{-9}	1	211			

References Reporting: 211, 243, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	3.71	$.495 \times 10^{-9}$	1	211			.00155 in. thick
	25	10.2	1.36×10^{-9}	1	211			.00155 in. thick
	50	24.2	3.22×10^{-9}	1	211			.00155 in. thick

References Reporting: 211

PERMEANT: Hydrogen H_2

MATERIAL: Vinyl Chloride-Vinyl Maloate

PERMEANT: Hydrogen H_2

MATERIAL: Visqueen

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	6.75	$.90 \times 10^{-9}$	1	243			
	20	6.3	1.84×10^{-9}	1	243			7.5 mils thick
	30	9.98	1.33×10^{-9}	1	243			
	30	9.75	1.30×10^{-9}	1	243			7.5 mils thick
	40	14.5	1.93×10^{-9}	1	243			
	40	22.1	2.95×10^{-9}	1	243			7.5 mils thick

References Reporting: 243

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
A	0	.593	$.079 \times 10^{-9}$	1	219			
A	25	2.7	$.36 \times 10^{-9}$	1	219			
A	50	9.9	1.32×10^{-9}	1	219			
B	0	.653	$.087 \times 10^{-9}$	1	219			
B	25	2.7	$.36 \times 10^{-9}$	1	219			
B	50	10.1	1.35×10^{-9}	1	219			

References Reporting: 219

PERMEANT: Hydrogen H_2

MATERIAL: Visten

PERMEANT: Hydrogen H_2

MATERIAL: Vulcaprene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
A	25	4.72	4.78×10^{-8}	8	390 378	.018	2.60×10^{-6}	
A	50	15.4	15.6×10^{-8}	8	390	.022	7.0×10^{-6}	

References Reporting: 378, 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FM-1000	NG	1.41	1.88×10^{-10}	1	268			.1422 in thick
FM-1000	NG	1.16	1.55×10^{-10}	1	268			.1724 in thick
BR-92	NG	1.32	1.77×10^{-10}	1	268			.1501 in thick
BR-92	NG	1.43	1.91×10^{-10}	1	268			.1396 in thick
Narmco A	NG	.80	1.07×10^{-10}	1	268			.2485 in thick
Narmco A	NG	.56	7.45×10^{-11}	1	268			.3594 in thick
Narmco C	NG	1.06	1.41×10^{-10}	1	268			.1895 in thick
Narmco C	NG	1.32	1.76×10^{-10}	1	268			.1521 in thick
Narmco C	NG	6.65	8.87×10^{-9}	1	268			.0301 in thick

References Reporting: 268

PERMEANT: Liquid Hydrogen

MATERIAL: Adhesives

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
2024-T6	NG	.0000000038	5.0×10^{-19}	1	434			

References Reporting: 434

PERMEANT: MMH (Monomethyl-Hydrazine)

MATERIAL: Aluminum

PERMEANT: MMH (Monomethyl-Hydrazine)

MATERIAL: Steel

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
304 Stainless		.000000011	1.4×10^{-18}	1	434			

References Reporting: 434

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE/FEP	NG	NC	0.12	19	332			.0076 cm ea.
TFE/FEP	NG	NC	.02	22	332			3 mils ea.
Al/TFE/FEP	NG	NC	.002	22	332			3 mils ea.
TFE/FEP/Al	NG	NC	0.012	19	332			

References Reporting: 332

PERMEANT: MMH (Monomethyl-Hydrazine)

MATERIAL: Teflon laminate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
not annealed	NG	.76	2	16	247			1 mil thick
not annealed	NG	.35	.9	16	247			3 mils thick
not annealed	NG	1.2	3	16	247			3 mils thick
annealed 1/2 hr. at 1600F.	NG	5.4	14	16	247			2 mils thick

References Reporting: 247

PERMEANT: MON (Mixed oxides with nitrogen)

MATERIAL: Nickel

PERMEANT: MON (Mixed oxides with nitrogen)

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Cast TFE	NG	3475	9096	16	247			4 mils thick
Sprayed TFE	NG	2235	5850	16	247			10 mils thick
Sprayed TFE	NG	2158	5648	16	247			16 mils thick
Extruded FEP	NG	485	1270	16	247			10 mils thick
Sprayed FEP	NG	409	1070	16	247			10 mils thick
Sprayed CO dispersion of TFE/FEP	NG	1673	4380	16	247			10 mils thick

References Reporting: 247

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Sprayed TFE/TFE	NG	1406	3680	16	247			20 mils 2-10 mil. plys.
Sprayed FEP/FEP	NG	267	700	16	247			20 mils 2-10 mil. plys.
Sprayed TFE-FEP	NG	711	1860	16	247			3 mils ea.
Sprayed TFE/FEP	NG	679	1778	16	247			10 mils TFE 4 mils FEP
TFE/FEP	NG	NC	5.44	19	332			3 mils ea.
Sprayed TFE-FEP Codispersion/FEP (CO_2 quenched)	NG	348	912	16	247			3 mils ea.
FEP/Al/FEP	NG	20	51	16	247			7 mils FEP 1/4 Al 3 mils FEP
Al/TFE/FEP	NG	NC	.46	19	332			3 mils ea.

References Reporting: 247,332

PERMEANT: MON (Mixed oxides with nitrogen)

MATERIAL: Teflon laminates

PERMEANT: MON (Mixed oxides with nitrogen)

MATERIAL: Tin

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	1.2	1	16	247			3 mils thick

References Reporting: 247

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1250	37500	5×10^{-9}	11	294			

References Reporting: 294

PERMEANT: Nitrogen N_2

MATERIAL: Alumina (ceramic)

PERMEANT: Nitrogen N_2

MATERIAL: Beryllium

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1025				427		5×10^{-10}	

References Reporting: 427

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	4.7	4.8×10^{-7}	6	378			
	30	4.76	63.5×10^{-7}	3	325			

References Reporting: 325, 378

PERMEANT: Nitrogen N_2

MATERIAL: Buna S

PERMEANT: Nitrogen N_2

MATERIAL: Butadiene-Acrylonitrile Copolymer

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Hycar-OR-15	25	.177	$.179 \times 10^{-8}$	8	390	.028	$.064 \times 10^{-6}$	
Hycar-OR-15	25	.178	$.18 \times 10^{-7}$	6	378			
Hycar-OR-15	30	.176	2.35×10^{-10}	3	325			
Hycar-OR-15	50	1.07	1.08×10^{-8}	8	390	.032	$.34 \times 10^{-6}$	
Hycar-OR-25	25	.45	$.46 \times 10^{-7}$	6	378			
Hycar-OR-25	25	.45	$.46 \times 10^{-8}$	8	390	.030	$.152 \times 10^{-6}$	
Hycar-OR-25	30	.453	6.04×10^{-10}	3	325			
Hycar-OR-25	50	2.27	2.30×10^{-8}	8	390	.033	$.70 \times 10^{-6}$	
	17				401	.062	$.0066 \times 10^{-5}$	
	60				401	.039	$.088 \times 10^{-5}$	

References Reporting: 325, 378, 390, 401

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Perbunan	30	.795	10.6×10^{-10}	3	325			
Perbunan 18	25	1.89	1.92×10^{-7}	6	378			
Perbunan 18	25	1.89	1.92×10^{-8}	8	390	.037	$.51 \times 10^{-6}$	
Perbunan 18	50	6.9	7.00×10^{-8}	8	390	.044	1.55×10^{-6}	
German Rubber	20	.46	$.00061 \times 10^{-6}$	3	401			
German Perbunan	25	.88	$.89 \times 10^{-7}$	6	378			
German Perbunan	25	.80	$.81 \times 10^{-8}$	8	390	.032	$.25 \times 10^{-6}$	
German Rubber	49	2.2	$.0029 \times 10^{-6}$	3	401			
German Perbunan	50	3.53	3.58×10^{-8}	8	390	.036	$.98 \times 10^{-6}$	
German Rubber	79	13.4	$.0178 \times 10^{-6}$	3	401			

PERMEANT: Nitrogen N_2

MATERIAL: Butadiene Acrylonitrile Copolymer

PERMEANT: Nitrogen N_2

MATERIAL: Butadiene-Methyl Methacrylate Polymer

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	21	2.1	$.0028 \times 10^{-6}$	3	401			
	54	6.5	$.0087 \times 10^{-6}$	3	401			
	77	1.73	$.023 \times 10^{-6}$	3	401			
	78				401	.057	$.29 \times 10^{-5}$	

References Reporting: 401

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	.0026	3.5×10^{-13}	1	275			

References Reporting: 275

PERMEANT: Nitrogen N_2

MATERIAL: Cellophane-Aluminum-Polyvinylidene Chloride Laminate

PERMEANT: Nitrogen N_2

MATERIAL: Cellulose Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Plasticized	30	.21	$.28 \times 10^{-9}$	3	216 240 311			
Lumarith P-912	-25	.021	$.28 \times 10^{-8}$	3	242			
Lumarith P-912	0	.064	$.85 \times 10^{-10}$	3	242			
Lumarith P-912	30	.21	2.8×10^{-10}	3	242 325			
Lumarith P-912	60	.65	8.6×10^{-10}	3	325			

References Reporting: 216, 240, 242, 311, 325

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kodapak II	25	1.1	1.1×10^{-7}	6	378			

References Reporting: 378

PERMEANT: Nitrogen N_2

MATERIAL: Cellulose Acetate Butyrate

PERMEANT: Nitrogen N_2

MATERIAL: Cohrlastic

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
3010	Room	75	10×10^{-9}	1	241			
2804	Room	120	16×10^{-9}	1	241			

References Reporting: 241

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Plasticized	30	6.3	8.4×10^{-9}	3	216			

References Reporting: 216

PERMEANT: Nitrogen N_2

MATERIAL: Ethyl Acetate

PERMEANT: Nitrogen N_2

MATERIAL: Ethyl Cellulose

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	2.47	1.94	5	346			
	25	6.21	$.828 \times 10^{-9}$	1	243			
	Room	6.3	$.84 \times 10^{-9}$	1	241 385			
	30	6.3	84×10^{-10}	3	240 325			
	30	2.1	$.28 \times 10^{-9}$	1	214			
	70	36.3	4.84×10^{-9}	1	393			
Ethocel	20	5.0	$.66 \times 10^{-9}$	1	243			
Ethocel	30	6.3	$.84 \times 10^{-9}$	1	243			
Ethocel	40	7.9	1.05×10^{-9}	1	243 393			
Ethocel 610	25	5.5	5.6×10^{-7}	6	378			

References Reporting: 214, 240, 241, 243, 325, 346, 378, 385, 393

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	2.1	$.28 \times 10^{-9}$	1	214			

References Reporting: 214

PERMEANT: Nitrogen N_2

MATERIAL: Ethylene-Vinylacetate Copolymer

PERMEANT: Nitrogen N_2

MATERIAL: Glass

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Vycor	400	.00047	.063 x 10^{-12}	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.057		
	25	3.0	$.304 \times 10^{-7}$	8	225		7.4×10^{-7}	
	25	3.0	3.0×10^{-7}	6	378			

References Reporting: 222, 225, 378

PERMEANT: Nitrogen N_2

MATERIAL: Hydropol

PERMEANT: Nitrogen N_2

MATERIAL: Inconel

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1225	75000	1×10^{-8}	11	294			

References Reporting: 294

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.0004	4.2×10^{-10}	6	266			
	25	NC	4.3×10^{-19}	13	378			

References Reporting: 266, 378

PERMEANT: Nitrogen N_2

MATERIAL: Iron

PERMEANT: Nitrogen N_2

MATERIAL: Isoprene-Acrylonitrile Copolymer

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.136	$.138 \times 10^{-8}$	8	390	.031	$.045 \times 10^{-6}$	
	50	.98	$.99 \times 10^{-8}$	8	390	.033	$.30 \times 10^{-6}$	

References Reporting: 390

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.449	$.445 \times 10^{-8}$	8	390	.036	$.123 \times 10^{-6}$	
	50	2.40	2.43×10^{-8}	8	390	.042	$.56 \times 10^{-6}$	

References Reporting: 390

PERMEANT: Nitrogen N_2

MATERIAL: Isoprene-Methacrylonitrile Copolymer

PERMEANT: Nitrogen N_2

MATERIAL: Kovar

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	128	.125	10	307			

References Reporting: 307

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
MP	25	.2	$.2 \times 10^{-7}$	6	378			

References Reporting: 378

PERMEANT: Nitrogen N_2

MATERIAL: Mipolam MP

PERMEANT: Nitrogen N_2

MATERIAL: Molybdenum

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	NC	4.4×10^{-33}	13	378			
	1150	75000	1×10^{-8}	11	294			.0035 in. disilicide coating
	1500	225000	3×10^{-8}	11	294			.0005 in. disilicide coating

References Reporting: 294, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	24	2.14	2.87×10^{-11}	2	418			
	25	.01	$.1 \times 10^{-7}$	6	266 425			
	27	1.03	$.00137 \times 10^{-6}$	3	401	.052	$.019 \times 10^{-5}$	
	54	4.35	$.0058 \times 10^{-6}$	3	401			
	85	16.7	$.02222 \times 10^{-6}$	3	401			
	30	.885	11.8×10^{-10}	3	325			
G	25	.88	$.89 \times 10^{-7}$	6	378			

References Reporting: 266, 325, 378, 401, 418, 425

PERMEANT: Nitrogen N_2

MATERIAL: Neoprene

PERMEANT: Nitrogen N_2

MATERIAL: Nylon

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
6	0	.0021	$.028 \times 10^{-10}$	3	242			
6	25	.0063	$.0064 \times 10^{-7}$	6	378			
6	30	.0071	$.095 \times 10^{-10}$	3	242			
6	30	.0075	$.10 \times 10^{-10}$	3	240 311 325			
6	60	.035	$.47 \times 10^{-10}$	3	242			
6	80	.11	1.47×10^{-10}	3	242			
6	90	.22	2.87×10^{-10}	3	242			
Polyamide	30	.015	$.02 \times 10^{-9}$	3	216			

References Reporting: 216, 240, 242, 311, 325, 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1400	30000	4×10^{-9}	11	294			
15% Rhodium 85% PT	1400	22500	3×10^{-9}	11	294			

References Reporting: 294

PERMEANT: Nitrogen . N_2

MATERIAL: Platinum

PERMEANT: Nitrogen N_2

MATERIAL: Polybutadiene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	4.85	4.9×10^{-7}	6	378			
	25	4.85	4.9×10^{-8}	8	390	.044	1.1×10^{-6}	
	Room	4.85	$.645 \times 10^{-9}$	1	241 385			
	30	4.85	64.5×10^{-10}	3	325			
	50	14.3	14.5×10^{-8}	8	390	.049	2.9×10^{-6}	

References Reporting: 241, 325, 378, 385, 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lexan	0	.083	1.1×10^{-10}	3	388			
Lexan	25	.23	3.0×10^{-10}	3	388			
Lexan	30	3.45	1.46×10^{-9}	1	214			
Lexan	50	.503	6.7×10^{-10}	3	388			
Lexan	75	.98	1.3×10^{-9}	3	388			
Lexan	100	1.65	2.2×10^{-9}	3	388			
Lexan	125	2.78	3.7×10^{-9}	3	388		2.0×10^{-7}	
Lexan	150	6.75	9.0×10^{-9}	3	388			
Lexan	175	14.3	1.9×10^{-8}	3	388			

References Reporting: 214, 388

PERMEANT: Nitrogen N_2

MATERIAL: Polycarbonate

PERMEANT: Nitrogen N_2

MATERIAL: Polychlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F-300	25	.004	$.05 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	25	.002	$.03 \times 10^{-10}$	3	311			80% Crystallinity
Kel-F-300	40	.016	$.20 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	40	.007	$.09 \times 10^{-10}$	3	311			80% Crystallinity
Kel-F-300	50	.014	$.18 \times 10^{-10}$	3	311			Extruded 2 mils thick Unplasticized
Kel-F-300	50	.26	$.35 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	50	.09	$.12 \times 10^{-10}$	3	311			80% Crystallinity
Kel-F-300	50	.413	5.5×10^{-10}	3	311			Plasticized
Kel-F-300	75	.065	$.86 \times 10^{-10}$	3	311			Extruded 2 mils thick Unplasticized
Kel-F-300	75	.71	$.94 \times 10^{-10}$	3	311			Extruded 5 mils thick

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F-300	75	.135	1.8×10^{-10}	3	311			30% Crystallinity
Kel-F-300	75	19.3	25.7×10^{-10}	3	311			Plasticized
Kel-F-300	75	.38	$.51 \times 10^{-10}$	3	311			80% Crystallinity
Kel-F	25	.0025	$.0025 \times 10^{-7}$	6	378			
Kel-F	30	.0026	$.0035 \times 10^{-9}$	3	216			
Kel-F	30	.098	1.3×10^{-10}	3	325			
Kel-F	30	.006	$.008 \times 10^{-9}$	3	340 374			30% Crystallinity
Kel-F	30	.003	$.004 \times 10^{-9}$	3	340 374			80% Crystallinity
Trithene B	-25	.0027	$.036 \times 10^{-10}$	3	242			
Trithene	0	.012	$.16 \times 10^{-10}$	3	242			

PERMEANT: Nitrogen N_2

MATERIAL: Polychlorotrifluoroethylene

PERMEANT: Nitrogen N_2

MATERIAL: Polychlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Trithene B	30	.105	1.4×10^{-10}	3	242			
Trithene B	30	.009	$.012 \times 10^{-9}$	1	214			
Trithene B	60	.83	11.0×10^{-10}	3	242			
Trithene B	70	1.65	22.0×10^{-10}	3	242			
Trithene	80	3.00	40×10^{-10}	3	242			

References Reporting: 214, 216, 242.

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.0412		
	30	12	16×10^{-9}	3	374			60% Crystallinity
	30	1.43	1.9×10^{-9}	3	374			69% Crystallinity
	30	.50	$.66 \times 10^{-9}$	3	374			78% Crystallinity
	30	.25	$.33 \times 10^{-9}$	3	374			81% Crystallinity
	30	.20	$.27 \times 10^{-9}$	3	374			83% Crystallinity
Alathon 14	25	.73	$.74 \times 10^{-7}$	6	378			
Alathon 14	25	.73	$.074 \times 10^{-7}$	8	225		3.2×10^{-7}	
Alathon 15	0	.31	4.1×10^{-11}	1	209 223			
Alathon 15	0	.20	2.6×10^{-11}	1	223			Variable Volume test

PERMEANT: Nitrogen N_2

MATERIAL: Polyethylene

PERMEANT: Nitrogen N_2

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 15	50	7.1	9.4×10^{-10}	1	223			2 mils thick
Alathon 15	15	.75	1.0×10^{-10}	1	223			
Alathon 15	30	1.9	2.5×10^{-10}	1	209 223			
Alathon 15	30	2.1	2.8×10^{-10}	1	223			2 mils thick
Alathon 15	30	1.43	1.9×10^{-10}	1	223			Variable volume test
Alathon 15	30	1.2	1.6×10^{-10}	1	223			Variable pressure test
Alathon 15	31	1.7	2.3×10^{-10}	1	209			
Alathon 15	50	6.0	8.0×10^{-10}	1	209 223			
Alathon 15	50	7.1	9.4×10^{-10}	1	223			2 mils thick
Alathon 15	50	4.8	6.4×10^{-10}	1	223			Variable volume test

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 15	50	4.2	5.6×10^{-10}	1	223			Variable pressure test
.922g/cc	30	1.43	19×10^{-10}	3	240			
.922g/cc	30	1.58	2.1×10^{-9}	3	386			
.922g/cc	30	1.65	22×10^{-10}	3	311			
.938g/cc	30	1.50	6.6×10^{-10}	3	311			
.953g/cc	30	.25	3.3×10^{-10}	3	311			
.954g/cc	30	.25	$.33 \times 10^{-9}$	3	386			
.964g/cc	30	.11	$.11 \times 10^{-7}$	6	378			
Grex	25				237	.012		

References Reporting: 209, 222, 223, 225, 237, 240, 311, 374, 378, 386

PERMEANT: Nitrogen N_2

MATERIAL: Polyethylene

PERMEANT: Nitrogen N_2

MATERIAL: Polyethylene Terephthalate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	25	.0045	.006 x 10^{-10}	1	214			
Mylar A	-25	.00034	.0045 x 10^{-10}	3	242			
Mylar A	0	.0017	.022 x 10^{-10}	3	242			
Mylar A	25	.0031	.0031 x 10^{-7}	6	378			
Mylar A	30	.0038	.005 x 10^{-9}	3	216,225 240,311			
Mylar A	30	.0083	.11 x 10^{-10}	3	242			
Mylar A	60	.014	.18 x 10^{-10}	3	242			
Mylar A	70	.018	.24 x 10^{-10}	3	242			
Mylar A	80	.028	.37 x 10^{-10}	3	242			
					224	.043		

References Reporting: 214,216,224, 225,240,242, 311,378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	5.3	5.37×10^{-8}	8	390	.056	$.94 \times 10^{-6}$	
	50	16.8	17.0×10^{-8}	8	390	.066	2.53×10^{-6}	

References Reporting: 390

PERMEANT: Nitrogen N_2

MATERIAL: Polyisoprene

PERMEANT: Nitrogen N_2

MATERIAL: Polymethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.11	.15 x 10^{-9}	3	374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	2.06	2.09×10^{-8}	8	390	.069	$.30 \times 10^{-6}$	
	50	8.92	9.04×10^{-8}	8	390	.070	1.28×10^{-6}	

References Reporting: 390

PERMEANT: Nitrogen N_2

MATERIAL: Polymethylpentadiene

PERMEANT: Nitrogen N_2

MATERIAL: Polypropylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.32	$.42 \times 10^{-9}$	3	374			
.907g/cc	30	.33	$.44 \times 10^{-9}$	3	216 386			

References Reporting: 216, 374, 386

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	1.9	1.5	5	346			
	20	5.9	$.78 \times 10^{-9}$	1	243			
	Room	5.9	$.78 \times 10^{-9}$	1	385			
	30	1.7	$.22 \times 10^{-9}$	1	214			
	30	5.9	$.78 \times 10^{-9}$	1	241 243			
	40	5.8	$.77 \times 10^{-9}$	1	243 393			
DOW 0641	25	5.8	5.92×10^{-7}	6	378			

References Reporting: 214, 240, 241, 243, 311, 346, 378, 385, 393

PERMEANT: Nitrogen N_2

MATERIAL: Polystyrene

PERMEANT: Nitrogen N_2

MATERIAL: Polystyrene-Butadiene

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	2.2	.0029 x 10^{-6}	3	401			
	50	7.7	.0102 x 10^{-6}	3	401			

References Reporting: 401

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	40	.38	5×10^{-11}	1	393			

References Reporting: 393

PERMEANT: Nitrogen N_2

MATERIAL: Polyvinyl Acetate

PERMEANT: Nitrogen N_2

MATERIAL: Polyvinyl Butyral

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.19	2.5×10^{-10}	3	325			

References Reporting: 325

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.003	$.40 \times 10^{-10}$	3	240 311			

References Reporting: 240, 311

PERMEANT: Nitrogen N_2

MATERIAL: Polyvinyl Chloride

PERMEANT: Nitrogen N_2

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	.0735	.0098 x 10^{-9}	1	219			
	Room	.053	.007 x 10^{-9}	1	241 385			
	25	.488	.065 x 10^{-9}	1	219			
	50	2.55	.34 x 10^{-9}	1	219			

References Reporting: 219, 241, 385

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.0135	1.8×10^{-12}	1	209			
	30	.014	$.019 \times 10^{-10}$	1	214			
	50	.05	6.7×10^{-12}	1	209			

References Reporting: 209, 214

PERMEANT: Nitrogen N_2

MATERIAL: Polyvinyl Fluoride

PERMEANT: Nitrogen N_2

MATERIAL: Polyvinylidene Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran	NG	.00049	.11	7	389			
Saran	25	.00014	$.018 \times 10^{-12}$	1	214			
Saran	30	.0008 to .0011	.001 to .0015 $\times 10^{-9}$	3	216			
Saran 517	0	.0007	$.0094 \times 10^{-10}$	3	240,242 311,325			
Saran 517	60	.001	$.15 \times 10^{-10}$	3	240,242 311,325			
Saran 517	80	.041	$.54 \times 10^{-9}$	3	240,242 311,325			
Saran 517	90	.059	$.79 \times 10^{-10}$	3	240,242 311,325			

References Reporting: 214, 216, 240, 242, 311, 325, 389

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Viton A	30	.203	2.7×10^{-11}	1	209			
Viton A	30	.233	$.031 \times 10^{-9}$	1	214			
Viton A	50	.975	1.3×10^{-10}	1	209			

References Reporting: 209, 214

PERMEANT: Nitrogen N_2

MATERIAL: Polyvinylidene Fluoride-Hexafluoropropylene

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Butyl

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.244	$.24 \times 10^{-8}$	8	390	.054	$.045 \times 10^{-6}$	
	30	.234	3.12×10^{-10}	3	240 311 325			
	50	1.25	1.27×10^{-8}	8	390	.056	$.22 \times 10^{-6}$	
Oppanol B-200	25	.22	$.22 \times 10^{-7}$	6	378			

References Reporting: 240, 311, 325, 378, 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	210	28×10^{-9}	1	297			

References Reporting: 297

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Dimethylsilicone

PERMEANT: Nitrogen N_2

MATERIAL: Rubber Hydrochloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm FM-1	-25	.0037	$.049 \times 10^{-10}$	3	242			
Pliofilm FM-1	0	.033	$.44 \times 10^{-10}$	3	242			
Pliofilm FM-1	25	.109	$.11 \times 10^{-7}$	6	378			
Pliofilm FM-1	30	.113	1.5×10^{-10}	3	242			
Pliofilm FM-1	60	.555	7.4×10^{-10}	3	242			
Pliofilm FM	30	.105	1.4×10^{-10}	3	325			
Pliofilm NO	30	.006	$.08 \times 10^{-10}$	3	216,240 311,325			
Pliofilm P4	30	.47	6.2×10^{-10}	3	240 311 325			

References Reporting: 216, 240, 242, 311, 325, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.36	$.36 \times 10^{-7}$	6	378			
	25	.36	$.36 \times 10^{-8}$	8	390	.044	$.079 \times 10^{-6}$	
	30	.36	4.8×10^{-10}	3	325			
	50	2.2	2.2×10^{-8}	8	390	.052	$.41 \times 10^{-6}$	

References Reporting: 325, 378, 390

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Methyl

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Natural

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	6.1	$.81 \times 10^{-9}$	1	241 385			
	25				222	.07		
	25	7.1	$.72 \times 10^{-7}$	8	225		11.7×10^{-7}	
	25	9.9	1.0×10^{-6}	6	266 425			
	25	6.5	6.6×10^{-7}	6	378			
	25	6.04	6.12×10^{-8}	8	390	.052	1.10×10^{-6}	
	30	7.9	1.05×10^{-9}	1	214			
	30	6.06	80.8×10^{-10}	3	240 325			
	50	19.1	19.4×10^{-8}	8	390	.053	3.42×10^{-6}	

References Reporting: 214, 222, 225, 240, 241, 266, 325, 378, 385, 390, 425

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.16	.21 x 10^{-8}	1	214			

References Reporting: 214

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Nitrilesilicone

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Nitroso

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Thiokol	NG	108	.106	10	298			73 hr. test

References Reporting: 298

Type or Trade Name	Temp. °C	Permeability Std. Units ($Value \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.3	$.40 \times 10^{-8}$	1	214			

References Reporting: 214

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Phenylenesilicone

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	164	2.19×10^{-8}	1	223			
	30	113	1.5×10^{-8}	1	214			
	30	188	2.5×10^{-8}	1	209			
	50	240	3.2×10^{-8}	1	209			
Coated-on fabric	Room	750 to 1200	10 to 16 $\times 10^{-9}$	1	385			
RTV-11	29	185	24.6×10^{-9}	1	409			
RTV-11	33	191	25.5×10^{-9}	1	409			
RTV-11	44	218	29×10^{-9}	1	409			
RTV-20	29	141	18.8×10^{-9}	1	409			
RTV-20	33	149	19.8×10^{-9}	1	409			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
RTV-20	43	189	25.2×10^{-9}	1	409			
RTV-40	24	161	21.4×10^{-9}	1	409			
RTV-40	34	175	23.3×10^{-9}	1	409			
RTV-40	43	181	24.1×10^{-9}	1	409			
RTV-501	6	141	18.8×10^{-9}	1	409			
RTV-501	23	194	25.8×10^{-9}	1	409			
RTV-501	33	219	29.2×10^{-9}	1	409			
RTV-501	43	251	33.4×10^{-9}	1	409			
RTV-502	11	155	20.7×10^{-9}	1	409			
RTV-502	20	197	26.3×10^{-9}	1	409			

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Silicone

PERMEANT: Nitrogen N_2

MATERIAL: Rubber, Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
RTV-502	33	224	29.9×10^{-9}	1	409			
RTV-502	43	256	34.1×10^{-9}	1	409			
RTV-601	33	338	45.0×10^{-9}	1	409			
RTV-601	43	356	47.5×10^{-9}	1	409			
Eccosil 47-12	21	98	13.0×10^{-9}	1	409			
Eccosil 47-12	32	114	15.2×10^{-9}	1	409			
Eccosil 47-12	44	131	17.4×10^{-9}	1	409			
Sylgard 182	21	136	18.1×10^{-9}	1	409			
Sylgard 182	34	163	21.7×10^{-9}	1	409			
Sylgard 182	44	187	24.9×10^{-9}	1	409			

References Reporting: 209, 214, 223, 385, 409

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Stainless 304	NG	.000014	1.9×10^{-15}	1	434			

References Reporting: 434

PERMEANT: Nitrogen N_2

MATERIAL: Steel

PERMEANT: Nitrogen N_2

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units ($_8$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE	NG	7.4	1650	7	247			
TFE	NG	.013	1.32×10^{-10}	8	434			
TFE	25	2.4	2.4×10^{-7}	6	378			
TFE	29				292	.092	2.5×10^{-7}	
TFE	30	NC	.11		333			
TFE	30	3.9	5.2×10^{-10}	1	209			
TFE	50	7.5	1.0×10^{-9}	1	209			
FEP	NG	.7	156	7	247			
FEP	23	NC	.18		333			
FEP	25	1.44	320	7	334			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP	29				292	.092	1×10^{-7}	
FEP	30	1.9	$.25 \times 10^{-9}$	1	214			
FEP	50	4.4	975	7	334			
FEP	75	9.2	2050	7	334			
FEP	93				292	.065	1.5×10^{-6}	
FEP	100	18.5	4100	7	334			
FEP	21	NC	.75	30	261			10 mils thick

References Reporting: 209,214,247, 261,292,333, 334,378,434

PERMEANT: Nitrogen N_2

MATERIAL: Teflon

PERMEANT: Nitrogen N_2

MATERIAL: Teflon Laminates

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE/FEP	NG	NC	0.13	25	307			.005 in. thick
TFE/FEP/Al	NG	NC	.06	26	332			1/4 mil Al
TFE/FEP	21	NC	.60	30	261			Joclin Mfg. 14 mils thick
TFE/Al/FEP	21	NC	.38	30	261			10 mils thick
TFE/FEP	22	NC	1.50×10^{-9}	29	264			Joclin Mfg.
TFE/Al/FEP	22	NC	$.84 \times 10^{-9}$	29	264			Dielectrix Mfg.

References Reporting: 261,264, 307,332

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
F218	NG	.0038	.084	7	389			
F220	NG	.0019	.422	7	389			

References Reporting: 389

PERMEANT: Nitrogen N_2

MATERIAL: Vinylidene Chloride-Acrylonitrile

PERMEANT: Nitrogen N_2

MATERIAL: Vinylidene Fluoride-Chlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
X-500	25	.0083	.11 x 10^{-10}	3	311			3% VF
X-500	50	.039	.52 x 10^{-10}	3	311			3% VF
X-500	75	.22	2.92 x 10^{-10}	3	311			3% VF
X-800	0	.0022	.029 x 10^{-10}	3	311			25% VF
X-800	25	.023	.30 x 10^{-10}	3	311			25% VF
X-800	50	.176	2.34 x 10^{-10}	3	311			25% VF
X-800	75	.983	13.1 x 10^{-10}	3	311			25% VF
X-3700	0	.019	.25 x 10^{-10}	3	311			70% VF
X-3700	25	.122	1.62 x 10^{-10}	3	311			70% VF
X-3700	50	.953	12.7 x 10^{-10}	3	311			70% VF

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
X-3700	75	4.22	56.2×10^{-10}	3	311			

References Reporting: 311

PERMEANT: Nitrogen N_2

MATERIAL: Vinylidene Fluoride-Chlorotrifluoroethylene

PERMEANT: Nitrogen N_2

MATERIAL: Visqueen

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	.83	$.110 \times 10^{-9}$	1	243			
	30	1.35	$.18 \times 10^{-9}$	1	243			
	40	2.40	$.32 \times 10^{-9}$	1	243			

References Reporting: 243

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.37	4.9×10^{-10}	3	325			
A	25	.37	$.37 \times 10^{-7}$	6	378			
A	25	.368	$.373 \times 10^{-8}$	8	390	.026	$.145 \times 10^{-6}$	
A	50	1.81	1.83×10^{-8}	8	390	.027	$.67 \times 10^{-6}$	

References Reporting: 325, 378, 390

PERMEANT: Nitrogen N_2

MATERIAL: Vulcaprene

PERMEANT: Liquid Nitrogen LN_2

MATERIAL: Adhesives

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Aerobond 430	NG	503000000.	6.7×10^{-2}	1	268			.652 in thick
Aerobond 430	NG	900000000.	1.2×10^{-1}	1	268			.647 in thick
HT-424	NG	90000000.	1.2×10^{-2}	1	268			.892 in thick
HT-424	NG	30800000.	4.1×10^{-3}	1	268			.904 in thick

References Reporting: 268

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	.000000025	3.3×10^{-18}	1	434			

References Reporting: 434

PERMEANT: N_2O_4 Nitrogen Tetroxide

MATERIAL: Aluminum

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Polyvinylidene Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kynar	NG	NC	95	17	413			48 hr. test
Kynar	NC	NC	100	17	413			100 hr. test
Kynar	NG	NC	160	17	413			21 hr. test

References Reporting: 413

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	227	21	204			1 hr. test
	NG	NC	90.6	21	204			4 hr. test
	NG	NC	17.1	21	204			24 hr. test
	NG	NC	12.6	21	204			48 hr. test
glass cloth reinforced	NG	NC	263	21	204			1 hr. test
glass cloth reinforced	NG	NC	104	21	204			4 hr. test
glass cloth reinforced	NG	NC	117.6	21	204			30 hr. test
Al laminate welded on	NG	NC	0	21	204			48 hr. test
Au laminate welded on	NG	NC	0	21	204			96 hr. test

References Reporting: 204

PERMEANT: N_2O_4 Nitrogen Tetroxide

MATERIAL: Rubber, Nitroso

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Steel

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
304 Stainless	NG	.000000015	2.1×10^{-18}	1	434			

References Reporting: 434

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE	NG	NC	10.	18	422			
TFE	NG	NC	.67	18	338			Vacuum Sintered
TFE	NG	NC	.41	18	338			Air Sintered
TFE	NG	.13	53100.	20	271			.0076 cm thick
TFE	NG	.10	41729.	20	271			.0084 cm thick
TFE	NG	.065	26937.	20	271			.018 cm thick
TFE Sprayed Dispersion	NG	NC	2.49	22	428			Average of 7 24 hr. tests
TFE Sample #1	25	NC	.66	19	200			144 hr. test
TFE Sample #2	25	NC	1.96	19	200			50 hr. test
TFE Sample #2	25	NC	2.31	19	200			92 hr. test

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE Sample #3	25	NC	.29	19	200			41 hr. test
TFE Sample #3	25	NC	.53	19	200			144 hr. test
TFE Sample #5	25	NC	1.38	19	200			49 hr. test
TFE Sample #7	25	NC	2.10	19	200			49 hr. test
TFE	25	.099	40920.	20	271			3.1 mils thick
TFE	25	.077	31930.	20	271			3.1 mils thick
TFE	25	.080	33330.	20	271			3.3 mils thick
TFE	25	.053	21900.	20	271			6.1 mils thick
TFE	25	.050	20800.	20	271			6.5 mils thick
TFE	25	.128	53100.	20	271			3.0 mils thick

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE	25	1.00	41729.	20	271			3.3 mils thick
TFE	25	.065	26937.	20	271			7.1 mils thick
TFE	27				357	3.25*		
TFE Sample #7	28	12.4	2759.	7	416			10 mils thick
TFE	74				357	.625*		
TFE	99				357	.257*		
FEP extruded Type A	NG	NC	.583	22	428			Average of 5 24 hr. tests
FEP extruded Type 506	NG	NC	.418	22	428			Average of 8 24 hr. tests
FEP	NG	NC	1.90	21	204			24 hr. test
FEP	NG	NC	1.60	21	204			48 hr. test

*mg cm^{-2} atm^{-1}

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP	NG	NC	95.	17	413			21 hr. test
FEP	NG	.00022	2.89×10^{-14}	1	434			55 psia pres.
FEP	NG	.00029	3.87×10^{-14}	1	434			75 psia pres.
FEP	NG	NC	4.93	21	204			4 hr. test
FEP	28	3.9	867.	7	416			
FEP	28	NC	17.	22	218			Sample #1
FEP	28	NC	26.	22	218			Sample #2
FEP	28	NC	26.	22	218			Sample #3
FEP	28	NC	47.	22	218			Sample #4
FEP	28	NC	14.	22	218			Sample #5

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP	30				357	2.16*		
FEP	74	NC	6.7×10^{-5}	30	261			10 mils thick Standard Test screen-backed
FEP	74	NC	6.1×10^{-5}	30	261			10 mils thick Standard Test disk-backed
FEP	74	NC	13.7×10^{-5}	30	261			Zero delta P init. 110psi N_2 10 mils thick
FEP	74	NC	13.6×10^{-5}	30	261			Zero delta P init. 280psi N_2 10 mils thick
FEP	77				357	1.733*		
FEP	93				357	.345*		
TFE/Al/FEP Codispersion	22	NC	$.92 \times 10^{-7}$	29	264			Dielectrix Mfg.
TFE/FEP Codispersion	NG	NC	.963	22	428			Average of 4 24 hr. tests
	NG	NC	3.34	22	299			Sample #1

*mg cm^{-2} atm^{-1}

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	NC	3.23	22	299			Sample #2

References Reporting: 200,204,218, 261,264,271, 299,338,257, 413,416,422, 428,434

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE/FEP	NG	NC	5.	19	332			5 mils thick
TFE/FEP	NG	NC	25.	18	332			
TFE/FEP	NG	.020	8430.	20	271			Average of 5 samples
TFE/FEP	25	.019	7891.	20	271			6.5 mils thick
TFE/FEP	25	.020	8221.	20	271			6.7 mils thick
TFE/FEP	25	.019	7930.	20	271			6.4 mils thick
TFE/FEP	25	.022	9074.	20	271			6.9 mils thick
TFE/FEP	25	.022	9062.	20	271			6.4 mils thick
TFE/FEP RB-o130-010	74	NC	4.62×10^{-5}	30	261			14 mils thick Standard Test screen-backed
TFE/FEP RB-0130-010	74	NC	5.37×10^{-5}	30	261			14 mils thick Standard Test disk-backed

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon Laminates

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon Laminates

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE/FEP RB-0130-010	74	NC	11.7×10^{-5}	30	261			14 mils thick Zero delta P init. 110psi N_2
TFE/FEP RB-0130-010	74	NC	15.2×10^{-5}	30	261			14 mils thick Zero delta P init. 280psi N_2
TFE/FEP RB-0130-010	74	NC	8.7×10^{-5}	30	261			14 mils thick Zero delta P init. 280psi He
TFE/FEP RB-0130-010	74	NC	1.7×10^{-5}	30	261			14 mils thick Standard Test disk-backed
TFE/FEP RB-0130-010	74	NC	1.4×10^{-5}	30	261			14 mils thick Zero delta P init. 52psi N_2
FEP/Al	22	NC	$.3 \times 10^{-7}$	29	364			Schjeldahl Mfg.
TFE/FEP/Al	NG	NC	Negligible	19	332			4.5 mils thick
TFE/Al/FEP	74	NC	8.1×10^{-5}	30	261			10 mils thick Standard Test screen-backed
TFE/Al/FEP	74	NC	4.0×10^{-5}	30	261			10 mils thick Standard Test disk-backed
TFE/Pb	NG	NC	.003	18	422			Teflon in contact with N_2O_4

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE/Pb	NG	NC	.03	18	332			Lead in contact with N_2O_4
Teflon/Al Heat-bonded	NG	NC	.002	22	428			Avg. of 2 smpls. .01 Tfln.-.001Al 96 hr. test
Teflon/Ta Heat-bonded	NG	NC	.000	22	428			Avg. of 2 smpls. .002 Tfln.-.003 Ta, 24 hr. test

References Reporting: 261, 271, 332
364, 422, 428 PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon Laminates

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon Metal-Plated

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE with Ni on both sides	NG	NC	1.050	22	428			Ni 100% rmvd. from N_2O_4 side .0001 in. Ni
TFE with Ni on both sides	NG	NC	1.720	22	428			Ni 100% rmvd. from both sides .0001 in. Ni
TFE with Ni on both sides	NG	NC	0.050	22	428			Ni 20% rmvd. .0002 in. Ni
TFE with Ni on both sides	NG	NC	0.005	22	428			Avg. of 2 smpls. .0005 in. Ni
TFE with Au on Ni on both sides	NG	NC	0.043	22	428			Avg. of 3 smpls. .0002 in. Ni and Au
TFE with Au on both sides	NG	NC	1.500	22	428			Avg. of 2 smpls. .0001 in. Au
TFE with Al on one side	NG	NC	1.685	22	428			Avg. of 4 smpls.
TFE with Al on both sides	NG	NC	1.240	22	428			
TFE with Au, Ni and Al on both sides	NG	NC	.205	22	428			Avg. of 3 smpls .00015 in. plating
TFE with Ni and Al on both sides	NG	NC	.064	428				.0002 in. plating

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE with Au and Al on both sides	NG	NV	1.650	22	428			.00001 in. plating
TFE with Au and Al on both sides	NG	NC	1.310	22	428			.0001 in. plating
FEP-Stainless steel composite	NG	NC	.960	22	428			
FEP-Al Composite	NG	NC	.340	22	428			6 layers
FEP-Al Composite	NG	NC	.250	22	428			6 layers
FEP-Al Cpmposite	NG	NC	.280	22	428			4 layers

References Reporting: 428

PERMEANT: Nitrogen Tetroxide N_2O_4

MATERIAL: Teflon, Metal-Plated

Note:

Some N_2O_4 storage tests, which do not result in a permeability value, but may still be of benefit, were reported by Reference #291. The data are given below:

Material	Thickness (inches)	°C	Weight Loss (%) Days Exposed 1	2	3	7	14	28
Teflon FEP	0.005	16	.4	.4		58		
Teflon FEP/TFE		Room	2		4	Ruptured		
Kynar-Teflon fabric	0.020	21	5		21			
EPR 132/Teflon fabric	0.013	16	10	21				
Butyl 112/Teflon fabric	0.013	16	15	32				
Butyl 112	0.085	16	1	5		92		
Teflon/Al foil, layered	0.008	16	.4	4	5	13	14	
Al/Teflon	0.008	16					0	
Al/Butyl 112		Room						0
Au/Butyl 112		Room						0

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	12.8	13×10^{-7}	6	378			

References Reporting: 378

PERMEANT: Oxygen O_2

MATERIAL: Buna S

PERMEANT: Oxygen O_2

MATERIAL: Butadiene-Acrylonitrile Copolymer

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Perbunan 18	25	6.1	6.2×10^{-7}	6	378			
Perbunan 18	25	6.15	6.23×10^{-8}	8	390	.077	$.79 \times 10^{-6}$	
Perbunan 18	50	18.9	19.1×10^{-8}	8	390	.083	2.30×10^{-6}	
German Perbunan	25	3.2	3.2×10^{-7}	6	378			
German Perbunan	25	2.90	2.94×10^{-8}	8	390	.067	$.43 \times 10^{-6}$	
German Perbunan	50	10.4	10.5×10^{-8}	8	390	.072	1.44×10^{-6}	
Hycar-OR-15	25	.72	$.73 \times 10^{-7}$	6	378			
Hycar-OR-15	25	.72	$.73 \times 10^{-8}$	8	390	.053	$.136 \times 10^{-6}$	
Hycar-OR-15	30	.72	9.6×10^{-10}	3	325			
Hycar-OR-15	50	3.45	3.50×10^{-8}	8	390	.061	$.565 \times 10^{-6}$	

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Hycar-OR-25	25	1.76	1.78×10^{-7}	8	378			
Hycar-OR-25	25	1.76	1.78×10^{-8}	6	390	.063	$.28 \times 10^{-6}$	
Hycar-OR-25	50	6.99	7.08×10^{-8}	8	390	.065	1.08×10^{-6}	

References Reporting: 325, 378, 390

PERMEANT: Oxygen O_2

MATERIAL: Butadiene-Acrylontrile Copolymer

PERMEANT: Oxygen O_2

MATERIAL: Cellophane-Aluminum-Saran Laminate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	.0008	11×10^{-13}	3	275			

References Reporting: 275

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	.6	$.08 \times 10^{-9}$	1	203			
	20-30	.3 to .59	$.4$ to $.78 \times 10^{-9}$	3	210			
	23	.102	$.0136 \times 10^{-9}$	1	207			.001 in. thick
	30	.53	7.0×10^{-10}	3	311			
Lumarith P-912	-25	.17	2.30×10^{-10}	3	242			
Lumarith P-912	0	.405	5.40×10^{-10}	3	242			
Lumarith P-912	30	.59	7.8×10^{-10}	3	240 325			
Lumarith P-912	60	2.07	27.6×10^{-10}	3	242			
Celanese P-912	25	.81	$.82 \times 10^{-7}$	6	378			

References Reporting: 203, 207, 210, 240, 242, 311, 325, 378

PERMEANT: Oxygen O_2

MATERIAL: Cellulose Acetate

PERMEANT: Oxygen O_2

MATERIAL: Cellulose Acetate Butyrate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	29	4.2	$.56 \times 10^{-9}$	1	208			.0026 cm thick
Kodapak II	25	2.8	2.8×10^{-7}	6	378			

References Reporting: 208, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1.48	1.5×10^{-7}	6	378			

References Reporting: 378

PERMEANT: Oxygen O_2

MATERIAL: Cellulose Nitrate

PERMEANT: Oxygen O_2

MATERIAL: Chlorinated Polyether

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Penton	24	.054	$.0072 \times 10^{-9}$	1	208			.00183 cm thick

References Reporting: 208

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
2804	Room	360	48×10^{-9}	1	203 206 241			
3010	Room	158	21×10^{-9}	1	203 206 241			

References Reporting: 203, 206, 241

PERMEANT: Oxygen O_2

MATERIAL: COHR-Coated Glass Fabric

PERMEANT: Oxygen O_2

MATERIAL: Delrin (acetal)

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.29	$.038 \times 10^{-9}$	1	208			.024 cm thick

References Reporting: 208

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	.04 to 1.2	.049 to 1.6 $\times 10^{-9}$	3	210			
Epon-1001	29	.04	.0049 $\times 10^{-9}$	1	208			.0022 cm thick
Hysol	31	1.2	.16 $\times 10^{-9}$	1	208			.026 cm thick

References Reporting: 208, 210

PERMEANT: Oxygen O_2

MATERIAL: Epoxy

PERMEANT: Oxygen O_2

MATERIAL: Ethyl Cellulose

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	8.4	6.6	5	346			
	20-30	19.9	26.5×10^{-9}	3,1	210 241 385			
	Room	15.8	2.1×10^{-9}	1	203 206			
	25	13.8	1.84×10^{-9}	1	243			Average of 4 samples
Plasticized	30	19.9	265×10^{-10}	3	240 325			
Ethocel	20	16.1	2.15×10^{-9}	1	243			
Ethocel	30	19.9	2.65×10^{-9}	1	243			
Ethocel	40	25.5	3.40×10^{-9}	1	243			
Ethocel 610	25	17.9	18.1×10^{-7}	6	378			
Ethanol-cast	28	6.0	$.80 \times 10^{-9}$	1	208			.00241 cm thick

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
THF-cast	28	6.5	$.87 \times 10^{-9}$	1	208			.00254 cm thick

References Reporting: 203, 206, 208, 210, 240, 241, 243, 325, 346, 378, 385

PERMEANT: Oxygen O_2

MATERIAL: Ethyl Cellulose

PERMEANT: Oxygen O_2

MATERIAL: Ethylene-Propylene (florinated)

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	4.4	5.9×10^{-9}	3	210			

References Reporting: 210

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	8.5	$.86 \times 10^{-7}$	8,6	225 378		12.0×10^{-7}	
	25				222	.102		

References Reporting: 222, 225, 378

PERMEANT: Oxygen O_2

MATERIAL: Hydropol

PERMEANT: Oxygen O_2

MATERIAL: Isoprene-Acrylonitrile Copolymer

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.64	$.65 \times 10^{-8}$	8	390	.070	$.092 \times 10^{-6}$	
	50	3.39	3.43×10^{-8}	8	390	.075	$.45 \times 10^{-6}$	

References Reporting: 390

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1.77	1.79×10^{-8}	8	390	.074	$.24 \times 10^{-6}$	
	50	7.42	7.52×10^{-8}	8	390	.090	$.83 \times 10^{-6}$	

References Reporting: 390

PERMEANT: Oxygen O_2

MATERIAL: Isoprene-Methacrylonitrile Copolymer

PERMEANT: Oxygen O_2

MATERIAL: Methyl Cellulose

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	23	.379	$.0505 \times 10^{-9}$	1	207			.00254 cm thick
	Room	.525	$.07 \times 10^{-9}$	1	203 206			

References Reporting: 203, 206, 207

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.69	$.70 \times 10^{-7}$	6	378			

References Reporting: 378

PERMEANTL Oxygen O_2

MATERIAL: Mipolam MP

PERMEANT: Oxygen O_2

MATERIAL: Neoprene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	23	3.1	4.12×10^{-11}	2	418			
G	25	3.0	3.0×10^{-7}	6	266 378 425			

References Reporting: 266, 378, 418, 425

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
6	0	.0071	$.095 \times 10^{-10}$	3	242			
6	25	.023	$.023 \times 10^{-7}$	6	378			
6	26	.03	$.004 \times 10^{-9}$	1	208			
6	30	.029	$.38 \times 10^{-10}$	3	210,240 311,325			
6	60	.147	1.96×10^{-10}	3	210,240 311,325			
6	80	.411	5.48×10^{-10}	3	210,240 311,325			
6	90	.637	8.49×10^{-10}	3	210,240 311,325			

References Reporting: 208, 210, 240, 242, 311, 325, 378

PERMEANT: Oxygen O_2

MATERIAL: Nylon

PERMEANT: Oxygen O_2

MATERIAL: Polybutadiene

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{-8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	14.3	19.1×10^{-9}	3	210			
	Room	14.3	1.9×10^{-9}	1	241 385			
	25	14.3	14.5×10^{-7}	6	378			
	25	14.3	14.5×10^{-8}	8	390	.096	1.5×10^{-6}	
	30	14.3	191×10^{-10}	3	325			
	50	35.5	36×10^{-8}	8	390	.096	3.7×10^{-6}	

References Reporting: 210, 241, 325, 378, 385, 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	.72 to 6.2	.96 to 8.2 $\times 10^{-9}$	3	210			

References Reporting: 210

PERMEANT: Oxygen O_2

MATERIAL: Polybutadiene-Acrylonitrile

PERMEANT: Oxygen O_2

MATERIAL: Polybutadiene-Styrene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	12.9	17.2×10^{-9}	3	210			

References Reporting: 210

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	1.5	2.0×10^{-9}	3	210		6.7×10^{-9}	
Lexan	0	.50	6.7×10^{-10}	3	388			
Lexan	25	1.1	1.4×10^{-9}	3	388	.50	2.1×10^{-8}	
Lexan	28	1.5	$.20 \times 10^{-9}$	1	208			
Lexan	50	1.95	2.6×10^{-9}	3	388		5.4×10^{-8}	
Lexan	75	3.4	4.5×10^{-9}	3	388		1.3×10^{-7}	
Lexan	100	5.1	6.8×10^{-9}	3	388		2.4×10^{-7}	
Lexan	125	7.5	1.0×10^{-8}	3	388			
Lexan	150	13.5	1.8×10^{-8}	3	388			
Lexan	175	22.5	3.0×10^{-8}	3	388			

PERMEANT: Oxygen O_2

MATERIAL: Polycarbonate

PERMEANT: Oxygen O_2

MATERIAL: Polycarbonate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
BPA	Room	1.2	$.16 \times 10^{-9}$	1	203 206			
Mobay	31	2.0	$.26 \times 10^{-9}$	1	208			.0042 cm thick

References Reporting: 203, 206, 208, 210, 388

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	.0075	$.10 \times 10^{-10}$	3	240			
Kel-F	25	.0075	$.001 \times 10^{-9}$	1	208			Unplasticized
Kel-F	25	.028	$.028 \times 10^{-7}$	6	378			
Kel-F	30	.038	$.05 \times 10^{-9}$	3	340 374			30% Crystallinity
Kel-F	30	.0098	$.013 \times 10^{-9}$	3	340 374			80% Crystallinity
Kel-F-300	0	.0053	$.07 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	0	.082	1.1×10^{-10}	3	311			Plasticized
Kel-F-300	0	.003	$.04 \times 10^{-10}$	3	311			Unplasticized
Kel-F-300	25	.03	$.40 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	30	.039	$.52 \times 10^{-10}$	3	311			Unplasticized

PERMEANT: Oxygen O_2

MATERIAL: Polychlorotrifluoroethylene

PERMEANT: Oxygen O_2

MATERIAL: Polychlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F-300	30	.42	5.6×10^{-10}	3	311 325			Plasticized
Kel-F-300	40	.069	$.92 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	40	.019	$.25 \times 10^{-10}$	3	311			80% Crystallinity
Kel-F-300	50	.032	$.43 \times 10^{-10}$	3	311			80% Crystallinity
Kel-F-300	50	.108	1.44×10^{-10}	3	311			30% Crystallinity
Kel-F-300	60	.051	$.68 \times 10^{-10}$	3	311			80% Crystallinity
Kel-F-300	60	.218	2.90×10^{-10}	3	311			Unplasticized
Kel-F-300	60	2.1	28×10^{-10}	3	311 325			Plasticized
Kel-F-300	75	.431	5.74×10^{-10}	3	311			30% Crystallinity
Kel-F-300	80	.139	1.85×10^{-10}	3	311			80% Crystallinity

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Trithene B	-25	.015	$.20 \times 10^{-10}$	3	242			
Trithene B	0	.83	1.1×10^{-10}	3	242			
Trithene B	30	.42	5.6×10^{-10}	3	242			
Trithene B	60	2.1	28.0×10^{-10}	3	242			
Trithene	23	.0038	13	23	399			Concentration varying test
Trithene	23	.0052	18	23	399			Volume varying test
Trithene	23	.0067	23	23	399			Pressure varying test

References Reporting: 208,240,242, 311,325,340, 374,378,399

PERMEANT: Oxygen O_2

MATERIAL: Polychlorotrifluororthylene

PERMEANT: Oxygen O_2

MATERIAL: Polydimethyl-Butadiene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	1.6	2.1×10^{-9}	3	210			

References Reporting: 210

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 14	25	1.65	2.20×10^{-7}	6	378			
Alathon 14	25	1.65	$.220 \times 10^{-7}$	8	225		4.6×10^{-7}	
Alathon 15	0	1.2	1.6×10^{-10}	1	209 223			
Alathon 15	0	.75	1.0×10^{-10}	1	223			Variable volume test
Alathon 15	0	.50	6.7×10^{-11}	1	223			Variable pressure test
Alathon 15	15	2.85	3.8×10^{-10}	1	223			
Alathon 15	30	6.75	9.0×10^{-10}	1	209 223			
Alathon 15	30	4.5	6.0×10^{-10}	1	223			Variable volume test
Alathon 15	30	3.6	4.8×10^{-10}	1	223			Variable pressure test
Alathon 15	50	15.0	2.0×10^{-9}	1	209 223			

PERMEANT: Oxygen O_2

MATERIAL: Polyethylene

PERMEANT: Oxygen O_2

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 15	50	12.4	1.65×10^{-9}	1	223			Variable volume test
Alathon 15	50	10.9	1.45×10^{-9}	1	223			Variable volume test
	25				222	.0769		
	30	4.1	5.5×10^{-9}	3	374			60% Crystallinity
	30	1.6	2.1×10^{-9}	3	374			69% Crystallinity
	30	.83	1.1×10^{-9}	3	374			78% Crystallinity
	30	.795	1.06×10^{-9}	3	374			81% Crystallinity
	30	.38	$.5 \times 10^{-9}$	3	374			83% Crystallinity
Hypalon	20-30	2.1	2.8×10^{-9}	3	210			
Hypalon	30	2.5	$.33 \times 10^{-9}$	1	208			.0069 cm thick

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
L-film	26	3.5	$.47 \times 10^{-9}$	1	208			.0024 cm thick
Monaxially Orientated	32	3.5	$.46 \times 10^{-9}$	1	208			.00483 cm thick
Biaxially Orientated	27	1.8	$.24 \times 10^{-9}$	1	208			.00254 cm thick
DE 2400	0	.581	$.0774 \times 10^{-9}$	1	211			.0013 in. thick
DE 2400	0	.431	$.0575 \times 10^{-9}$	1	211			.00156 in. thick
DE 2400	25	2.63	$.350 \times 10^{-9}$	1	211			.0013 in. thick
DE 2400	25	2.09	$.278 \times 10^{-9}$	1	211			.00156 in. thick
DE 2400	50	9.45	1.26×10^{-9}	1	211			.0013 in. thick
DE 2400	50	7.95	1.06×10^{-9}	1	211			.00156 in. thick
DE 2500	0	.521	$.0695 \times 10^{-9}$	1	211			.0015 in. thick

PERMEANT: Oxygen O_2

MATERIAL: Polyethylene

PERMEANT: Oxygen O_2

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
DE 2500	25	2.30	$.306 \times 10^{-9}$	1	211			.0015 in. thick
DE 2500	50	8.03	1.07×10^{-9}	1	211			.0015 in. thick
.917g/cc	23	.7839	$.1045 \times 10^{-9}$	1	207			.00254 cm thick
.922g/cc	30	4.13	55×10^{-10}	3	240			
.922g/cc	30	5.2	69×10^{-10}	3	311			
.929g/cc	32	.83	$.11 \times 10^{-9}$	1	208			.0023 cm thick
.938g/cc	30	1.6	21×10^{-10}	3	311			
.950g/cc	23	.50	$.066 \times 10^{-10}$	1	207			.00254 cm thick
.953g/cc	30	.83	11×10^{-10}	3	311			
.960g/cc	30	.47	$.062 \times 10^{-9}$	1	207			

PERMEANT:

MATERIAL:

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.961g/cc	27	2.2	$.29 \times 10^{-9}$	1	208			.0018 cm thick
.964g/cc	25	.31	$.31 \times 10^{-7}$	6	378			
.960g/cc	30	.80	10.6×10^{-10}	3	240			
Alathon 14	25				237	.0395		
Alathon 34	25				237	.031		
Grex	25				237	.022		

References Reporting: 207,208,209, 210,211,222, 223,225,237, 240,311,374, 378

PERMEANT: Oxygen O_2

MATERIAL: Polyethylene

PERMEANT: Oxygen O_2

MATERIAL: Polyethylene Terephthalate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	.023	$.03 \times 10^{-9}$	3	210			
	23	.014	$.0019 \times 10^{-9}$	1	203, 207			.001 in. thick
	NG	.023	$.30 \times 10^{-10}$	3	275			Average of 3 samples
Mylar A	-25	.0035	$.046 \times 10^{-10}$	3	242			
Mylar A	0	.0098	$.13 \times 10^{-10}$	3	242			
Mylar A	23	.017	59	23	399			Concentration varying test
Mylar A	23	.017	59	23	399			Volume varying test
Mylar A	23	.014	48	23	399			
Mylar A	25	.019	$.019 \times 10^{-7}$	6	378			
Mylar A	30	.034	$.45 \times 10^{-10}$	3	242			

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar A	30	.017	$.22 \times 10^{-10}$	3	240 311 325			
Mylar A	60	.083	1.1×10^{-10}	3	242			
Mylar 25-V-200	50	Very low			211			
	25				224	.075		

References Reporting: 203,207,210
211,224,240
242,275,311
325,378,399

PERMEANT: Oxygen O_2

MATERIAL: Polyethylene Terephthalate

PERMEANT: Oxygen O_2

MATERIAL: Polyformaldehyde (acetal)

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	.029	$.038 \times 10^{-9}$	3	210			

References Reporting: 210

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	.98	1.3×10^{-9}	3	210			

References Reporting: 210

PERMEANT: Oxygen O_2

MATERIAL: Polyisobutylene-Isoprene

PERMEANT: Oxygen O_2

MATERIAL: Polymethylpentadiene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	7.52	7.62×10^{-8}	8	390	.136	$.55 \times 10^{-6}$	
	50	25.6	25.9×10^{-8}	8	390	.129	1.98×10^{-6}	

References Reporting: 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	1.7	2.3×10^{-9}	3	210			
	23	.702	2420	23	399			Volume varying test
	23	.720	2483	23	399			Concentration test
	23	.673	2320	23	399			Pressure varying test
	25	1.2	1.2×10^{-7}	6	378			
	30	1.6	2.1×10^{-9}	3	374			
Profax	28	1.05	$.14 \times 10^{-9}$	1	208			.0015 cm thick
Cryovac	30	.83	$.11 \times 10^{-9}$	1	208			.0015 cm thick
Escon	27	1.05	$.14 \times 10^{-9}$	1	208			Monaxial
Escon	27	.58	$.077 \times 10^{-9}$	1	208			Biaxial

PERMEANT: Oxygen O_2

MATERIAL: Polypropylene

PERMEANT: Oxygen O_2

MATERIAL: Polypropylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.907g/cc	30	1.72	2.29×10^{-9}	3	385			

References Reporting: 208,210,374, 378,385,399

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	5.6	4.4	5	346			
	Room	18	2.40×10^{-9}	1	241 385			
	Room	.9	$.12 \times 10^{-9}$	1	203			
	20	1.3	$.174 \times 10^{-9}$	1	207			.001 in. thick
	20	18.2	2.42×10^{-9}	1	243			
	20-30	1.13 to 18.8	1.5 to 25 x 10^{-9}	3	210			
	23	.213	745	23	399			Concentration varying test
	23	.294	1015	23	399			Volume varying test
	23	.272	937	23	399			Pressure varying test
	30	.83	11×10^{-10}	3	240 311			

PERMEANT: Oxygen O_2

MATERIAL: Polystyrene

PERMEANT: Oxygen O_2

MATERIAL: Polystyrene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	18.0	2.40×10^{-9}	1	243			
	40	17.6	2.35×10^{-9}	1	243			
Polyflex	25	1.6	$.21 \times 10^{-9}$	1	208			.00303 cm thick
DOW 0641	25	18.3	18.5×10^{-7}	6	378			

References Reporting: 203, 207, 208, 210, 240, 241, 243, 311, 346, 378, 385, 399

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	.26	$.34 \times 10^{-9}$	3	210			

References Reporting: 210

PERMEANT: Oxygen O_2

MATERIAL: Polystyrene-Acrylonitrile

PERMEANT: Oxygen O_2

MATERIAL: Polystyrene-Methacrylonitrile

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	.12	.16 x 10^{-9}	3	210			

References Reporting: 210

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	1.14 to 3.6	1.52 to 4.8 x 10^{-9}	3	210			
Estane	32	1.3	.17 x 10^{-9}	1	208			.0025 cm thick
Adiprene	29	3.6	.48 x 10^{-9}	1	208			.0021 cm thick
PC-6	30	1.6	.21 x 10^{-9}	1	208			.010 cm thick

References Reporting: 208, 210

PERMEANT: Oxygen O_2

MATERIAL: Polyurethane

PERMEANT: Oxygen O_2

MATERIAL: Polyvinyl Butyral

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Butbar B76	27	18.2	2.42×10^{-9}	1	208			.00094 cm thick

References Reporting: 208

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	.105	$.014 \times 10^{-9}$	1	203			
	28	1.88	$.25 \times 10^{-9}$	1	208			
	20-30	.09 to 4.5	.12 to .6 $\times 10^{-9}$	3	210			
	30	.09	1.2×10^{-10}	3	240 311			
Plasticized	23	.066	226	23	399			Concentration varying test
Plasticized	23	.064	219	23	399			Volume varying test
Plasticized	23	.062	212	23	399			Pressure varying test
Plasticized	23	.056 to .9	.0074 to .120 $\times 10^{-9}$	1	207			
Rigid	23	.035	$.0047 \times 10^{-9}$	1	207			
THF Cast Unplasticized	32	.26	$.034 \times 10^{-9}$	1	208			.00508 cm thick

PERMEANT: Oxygen O_2

MATERIAL: Polyvinyl Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
THF Cast 16.8% Plasticized	31	.75	$.10 \times 10^{-9}$	1	208			.00788 cm thick
THF Cast 19.3% Plasticized	31	1.35	$.18 \times 10^{-9}$	1	208			.00457 cm thick

References Reporting: 203, 207, 208, 210, 240, 311, 399

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Fluorinax	28	6.98	$.93 \times 10^{-9}$	1	208			.00256 thick

References Reporting: 208

PERMEANT: Oxygen O_2

MATERIAL: Polyvinyl Chloride (fluorinated)

PERMEANT: Oxygen O_2

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	.46	$.061 \times 10^{-9}$	1	211 219			
VYHH	2				221		1.74×10^{-4}	
VYHH	11				221		6.12×10^{-4}	
VYHH	14				221		9.50×10^{-4}	
	23	.96	3300	23	399			Concentration varying test
	23	.43	1470	23	399			Volume varying test
	23	.46	1590	23	399			Pressure varying test
	Room	2.3	$.3 \times 10^{-9}$	1	241 385			
VYHH	24				221		12.6×10^{-4}	
	25	2.0	$.27 \times 10^{-9}$	1	211 219			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	50	7.1	$.95 \times 10^{-9}$	1	221			
VYHH	54				221		75.5×10^{-4}	
VYHH	66						129.5×10^{-4}	
VYHH	88				221		291.8×10^{-4}	

References Reporting: 211,219,221, 241,385,399

PERMEANT: Oxygen O_2

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

PERMEANT: Oxygen O_2

MATERIAL: Polyvinyl Fluoride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	23	.013	44	23	399			Concentration varying test
	23	.014	47	23	399			Volume varying test
	23	.015	52	23	399			Pressure varying test
	20-30	.015	$.02 \times 10^{-9}$	3	210			

References Reporting: 210, 399

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	.023	$.003 \times 10^{-9}$	1	203			
	20-30	.004	$.005 \times 10^{-9}$	3	210			
	30	.004	$.053 \times 10^{-10}$	3	240 311 325			
Saran	NG	.0025	.56	7	389			
Saran	23	.0045	$.0006 \times 10^{-9}$	1	207			.001 in. thick
Saran	31	.0083	$.0011 \times 10^{-9}$	1	208			.001 in. thick
Saran 517	0	.0012	$.016 \times 10^{-10}$	3	242			
Saran 517	25	.0018	$.0018 \times 10^{-7}$	6	378			
Saran 517	30	.004	$.051 \times 10^{-10}$	3	242			
Saran 517	60	.49	$.65 \times 10^{-10}$	3	242			

PERMEANT: Oxygen O_2

MATERIAL: Polyvinylidene Chloride

PERMEANT: Oxygen O_2

MATERIAL: Polyvinylidene Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran 517	90	.30	4.0×10^{-10}	3	242			

References Reporting: 203, 207, 208, 240, 242, 311, 325, 378, 389

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	1.1	1.5×10^{-9}	3	210			
Viton A	26	1.7	$.22 \times 10^{-9}$	1	208			.02 cm thick

References Reporting: 208, 210

PERMEANT: Oxygen O_2

MATERIAL: Polyvinylidene Fluoride-Hexafluoropropylene

PERMEANT: Oxygen O_2

MATERIAL: Polyvinyl Toluene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	23	1.66	$.221 \times 10^{-9}$	1	207			.00254 cm thick

References Reporting: 207

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	1.05	$.14 \times 10^{-9}$	1	203			
	25	.977	$.99 \times 10^{-8}$	8	390	.121	$.081 \times 10^{-6}$	
	26	4.2	$.56 \times 10^{-9}$	1	208			.034 cm thick
	30	.98	13.0×10^{-10}	3	240 311 325			
	50	3.98	4.03×10^{-8}	8	390	.104	$.384 \times 10^{-6}$	
Oppanol B-200	25	.89	$.90 \times 10^{-7}$	6	378			

References Reporting: 203,208,240, 311,325,378, 390

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Butyl

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	450	60×10^{-9}	1	203 206 297			

References Reporting: 203, 206, 297

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	82.5	11×10^{-9}	1	203 206			

References Reporting: 203, 206

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Fluorosilicone

PERMEANT: Oxygen O_2

MATERIAL: Rubber Hydrochloride

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm	27	1.9	$.25 \times 10^{-9}$	1	208			.0183 cm thick
Pliofilm FM-1	-25	.026	$.34 \times 10^{-10}$	3	242			
Pliofilm FM-1	0	.16	2.1×10^{-10}	3	242			
Pliofilm FM-1	25	.40	$.40 \times 10^{-7}$	6	378			
Pliofilm FM-1	30	.41	5.4×10^{-10}	3	242			
Pliofilm FM-1	60	1.9	25.0×10^{-10}	3	242			
Pliofilm FM	30	.41	5.4×10^{-10}	3	325			
	23	.113	$.0151 \times 10^{-9}$	1	207			.001 in. thick
	20-30	.019 to .41	.025 to $.54 \times 10^{-9}$	3	210			
Pliofilm NO	30	.023	$.30 \times 10^{-10}$	3	240			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm P4	30	1.8	24×10^{-10}	3	311			

References Reporting: 207, 208, 210, 240, 242, 311, 325, 378

PERMEANT: Oxygen O_2

MATERIAL: Rubber Hydrochloride

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Methyl

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1.6	1.6×10^{-7}	6	378			
	25	1.6	1.6×10^{-8}	8	390	.113	$.14 \times 10^{-6}$	
	30	1.58	21.1×10^{-10}	3	325			
	50	7.0	7.1×10^{-8}	8	390	.115	$.61 \times 10^{-6}$	

References Reporting: 325, 378, 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	17.3	2.3×10^{-9}	1	241 385			
	Room	18.0	2.4×10^{-9}	1	203 206			
	20-30	17.3	23.0×10^{-9}	3	210			
	25	17.8	1.8×10^{-6}	6	266 378 425			
	25	17.57	1.78×10^{-7}	8	225		17.3×10^{-7}	
	25				222	.10		
	25	17.5	17.7×10^{-8}	8	390	.111	1.58×10^{-6}	
	30	17.48	233×10^{-10}	3	240 325			
	50	46.4	47.0×10^{-8}	8	390	.099	4.70×10^{-6}	

References Reporting: 203, 206, 210, 222, 225, 240, 241, 266, 325, 378, 385, 390, 425

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Natural

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Nitrile Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	63.8	8.5×10^{-9}	1	203 206			
	31	218	29×10^{-9}	1	208			Cured 16 hr
	31	225	30×10^{-9}	1	208			Cured 1 hr

References Reporting: 203, 206, 208

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Thiokol ZR-300	23	5.78	$.77 \times 10^{-9}$	1	208			.2 cm thick
Thiokol B	25	.22	$.22 \times 10^{-7}$	6	378			

References Reporting: 208, 378

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Polysulfide

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	269	3.59×10^{-8}	1	223			
	Room	195	26×10^{-9}	1	385			
	20-30	75 to 450	100 to 600×10^{-9}	3	210			
Coated on fabric	Room	158 to 360	21 to 48×10^{-9}	1	385			
RTV-11	29	380	50.6×10^{-9}	1	409			
RTV-11	33	386	51.4×10^{-9}	1	409			
RTV-11	44	428	57.1×10^{-9}	1	409			
RTV-20	29	299	39.9×10^{-9}	1	409			
RTV-20	33	308	41.0×10^{-9}	1	409			
RTV-20	43	342	45.6×10^{-9}	1	409			

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
RTV-40	24	320	42.6×10^{-9}	1	409			
RTV-40	34	344	45.8×10^{-9}	1	409			
RTV-40	43	351	46.8×10^{-9}	1	409			
RTV-90	23	398	53×10^{-9}	1	208			.031 cm in.
RTV-501	23	404	53.8×10^{-9}	1	409			
RTV-501	33	445	59.3×10^{-9}	1	409			
RTV-501	43	493	65.7×10^{-9}	1	409			
RTV-501	6	319	42.5×10^{-9}	1	409			
RTV-502	11	344	45.9×10^{-9}	1	409			
RTV-502	24	270	36×10^{-9}	1	208			.0141 cm thick

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Silicone

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
RTV-502	23	415	55.3×10^{-9}	1	409			
RTV-502	33	453	60.4×10^{-9}	1	409			
RTV-502	43	497	66.3×10^{-9}	1	409			
RTV-601	33	567	75.6×10^{-9}	1	409			
RTV-601	43	583	77.7×10^{-9}	1	409			
Eccosil 4712	21	210	28.0×10^{-9}	1	409			
Eccosil 4712	32	234	31.2×10^{-9}	1	409			
Eccosil 4712	44	257	34.3×10^{-9}	1	409			
Sylgard 182	21	300	40.0×10^{-9}	1	409			
Sylgard 182	34	346	46.1×10^{-9}	1	409			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Sylgard 182	44	384	51.2×10^{-9}	1	409			
G.E. SE450	Room	443	59×10^{-9}	1	203 206			
Silastic-50	Room	195	26×10^{-9}	1	203 206 241			
Silastic	25	443	59×10^{-9}	1	208			.0136 cm thick
Silastic LS-63	26	78	10.4×10^{-9}	1	208			.23 cm thick

References Reporting: 203, 206, 208, 210, 223, 241, 385, 409

PERMEANT: Oxygen O_2

MATERIAL: Rubber, Silicone

PERMEANT: Oxygen O_2

MATERIAL: Silver

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	NC	1.5×10^{-17}	13	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	23	.262	$.0349 \times 10^{-9}$	1	207			.00254 cm

References Reporting: 207

PERMEANT: Oxygen O_2

MATERIAL: Styrene-Acrylonitrile

PERMEANT: Oxygen O_2

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	.003	$.0004 \times 10^{-9}$	1	203 206			
TFE	25	7.5	7.6×10^{-7}	6	378			
FEP	23	NC	.39	24	333			
FEP	25	3.37	750	7	334			
FEP	50	9.22	2050	7	334			
FEP	75	17.99	4000	7	334			
FEP	100	31.48	7000	7	334			

References Reporting: 203,206,333, 334,378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Arc-cast	2100	NC	.10	15	432			
Arc-cast	2200	NC	.15	15	432			
Arc-cast	2300	NC	.14	15	432			
Arc-cast	2600	NC	.12	15	432			

References Reporting: 432

PERMEANT: Oxygen O_2

MATERIAL: Tungsten

PERMEANT: Oxygen O_2

MATERIAL: Vinylidene-Acrylonitrile

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
F218	NG	.0032	.710	7	389			
F220	NG	.0154	3.42	7	389			

References Reporting: 389

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	.0038	$.0005 \times 10^{-9}$	1	203 206			

References Reporting: 203, 206

PERMEANT: Oxygen O_2

MATERIAL: Vinylidene Chliride-Vinylchloride

PERMEANT: Oxygen O_2

MATERIAL: Vinylidene Fluoride-Chlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
X-500	25	.015	$.20 \times 10^{-10}$	3	311			
X-500	40	.089	1.18×10^{-10}	3	311			
X-500	50	.154	2.05×10^{-10}	3	311			
X-500	75	.580	7.73×10^{-10}	3	311			
X-5500	0	.083	1.11×10^{-10}	3	311			
X-5500	13	.281	3.74×10^{-10}	3	311			
X-5500	25	.701	9.34×10^{-10}	3	311			
X-5500	50	3.79	50.5×10^{-10}	3	311			
X-3700	0	.047	$.62 \times 10^{-10}$	3	311			
X-3700	25	.410	5.46×10^{-10}	3	311			

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
X-3700	50	2.56	34.1×10^{-10}	3	311			
X-3700	75	8.33	111×10^{-10}	3	311			

References Reporting: 311

PERMEANT: Oxygen O_2

MATERIAL: Vinylidene Fluoride-Chlorotrifluoroethylene

PERMEANT: Oxygen O_2

MATERIAL: Visqueen

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	2.44	$.325 \times 10^{-9}$	1	243			
	30	4.13	$.55 \times 10^{-9}$	1	243			
	40	6.9	$.92 \times 10^{-9}$	1	243			

References Reporting: 243

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	1.13	15.1×10^{-10}	3	325			
A	25	1.13	1.15×10^{-7}	6	378			
A	25	1.13	1.15×10^{-8}	8	390	.047	$.24 \times 10^{-6}$	
A	50	4.73	4.79×10^{-8}	8	390	.051	$.92 \times 10^{-6}$	

References Reporting: 325,378,390

PERMEANT: Oxygen O_2

MATERIAL: Vulcaprene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	.526	117	7	247			

References Reporting: 247

PERMEANT: Unsymmetrical Dimethyl Hydrazine

MATERIAL: Nickel

PERMEANT: Unsymmetrical Dimethyl Hydrazine

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Sprayed TFE	NG	1.26	280	7	247			10 mils thick
Sprayed co-dispersion of TFE and FEP	NG	1.21	270	7	247			10 mils thick
Sprayed High Density TFE	NG	.620	137.8	7	247			16 mils thick
Sprayed FEP	NG	.270	60	7	247			10 mils thick
	NG	NC	.028	22	299			Sample #1
	NG	NC	.003	22	299			Sample #2

References Reporting: 247, 299

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP/Al/FEP Laminate	NG	.031	7	7	247			7-1/4-3 mils thick
Sprayed TFE/FEP Laminate	NG	.755	168	7	247			3 mils each

References Reporting: 247

PERMEANT: Unsymmetrical Dimethyl Hydrazine

MATERIAL: Teflon Laminates

PERMEANT: Unsymmetrical Dimethyl Hydrazine

MATERIAL: Tin

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	.153	34	7	247			

References Reporting: 247

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	4390	586×10^{-9}	1	203			
	25	14850	1980×10^{-9}	1	206			

V-1.1

References Reporting: 203, 206

PERMEANT: Acetone ($CH_3\ COH_3$)

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
German Perbunan	25	18.7	18.9×10^{-8}	8	390			
German Perbunan	50	67.4	68.3×10^{-8}	8	390			

References Reporting: 390

PERMEANT: Acetylene (C_2H_2)

MATERIAL: Butadiene Acrylonitrile

PERMEANT: Acetylene (C_2H_2)

MATERIAL: Polystyrene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	3.8	3.0	5	346			

References Reporting: 346

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1.26	1.28×10^{-8}	8	390			
	50	5.74	5.82×10^{-8}	8	390			

References Reporting: 390

PERMEANT: Acetylene (C_2H_2)

MATERIAL: Rubber, Butyl

PERMEANT: Acetylene (C_2H_2)

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	19800	2640×10^{-9}	1	203			

References Reporting: 203

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	74.5	75.5×10^{-8}	8	390			
	50	192	195×10^{-8}	8	390			

References Reporting: 390

PERMEANT: Acetylene (C_2H_2)

MATERIAL: Rubber, Natural

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1250	.75	1×10^{-11}	11	290 294			

References Reporting: 290, 294

PERMEANT: Argon A

MATERIAL: Alumina (ceramic)

PERMEANT: Argon A

MATERIAL: Butadiene-Methyl Methacrylate Polymer

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	.58	$.0059 \times 10^{-6}$	3	401			
	52	2.7	$.027 \times 10^{-6}$	3	401			

References Reporting: 401

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	5.7	4.5	5	346			

References Reporting: 346

PERMEANT: Argon A

MATERIAL: Ethyl Cellulose

PERMEANT: Argon A

MATERIAL: Hydropol

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.142		
	25	8.3	$.84 \times 10^{-7}$	8	225		9.6×10^{-7}	

References Reporting: 222, 225

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	36	.67	.0068 x 10^{-6}	3	401	.153	.033 x 10^{-5}	
	52	1.42	.0144 x 10^{-6}	3	401			
	86	6.46	.0655 x 10^{-6}	3	401			

References Reporting: 401

PERMEANT: Argon

MATERIAL: Neoprene

PERMEANT: Argon A

MATERIAL: Polycarbonate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lexan	0	.32	4.3×10^{-10}	3	388			
Lexan	25	.60	8.0×10^{-10}	3	388			
Lexan	50	1.24	1.65×10^{-9}	3	388			
Lexan	75	2.4	3.2×10^{-9}	3	388			
Lexan	100	3.8	5.0×10^{-9}	3	388			
Lexan	125	6.0	8.0×10^{-9}	3	388			
Lexan	150	13.5	1.8×10^{-8}	3	388			
Lexan	175	32.3	4.3×10^{-8}	3	388			

References Reporting: 388

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 14	25	2.05	$.208 \times 10^{-7}$	8	225		3.6×10^{-7}	
	25				222	.102		
Grex	25	.104	1.05×10^{-8}	6	387			

References Reporting: 222,225,387

PERMEANT: Argon A

MATERIAL: Polyethylene

PERMEANT: Argon A

MATERIAL: Polyethylene Terephthalate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				224	.0076		

References Reporting: 224

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	4.1	3.2	5	346			

References Reporting: 346

PERMEANT: Argon A

MATERIAL: Polystyrene

PERMEANT: Argon A

MATERIAL: Polystyrene-Butadiene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	1.08	.0109 x 10^{-6}	3	401			
	51	4.0	.041 x 10^{-6}	3	401			
	65	7.3	.074 x 10^{-6}	3	401			

References Reporting: 401

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	450	60×10^{-9}	1	203 297			

References Reporting: 203, 297

PERMEANT: Argon A

MATERIAL: Rubber, Dimethylsilicone

PERMEANT: Argon A

MATERIAL: Rubber, Natural

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.13		
	25	17.2	1.74×10^{-7}	8	225		13.6×10^{-7}	
	35	21.7	22×10^{-8}	8	342			

References Reporting: 222, 225, 342

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	8100	1080×10^{-9}	1	203			
	25	14300	1910×10^{-9}	1	206			

References Reporting: 203, 206

PERMEANT: Benzene (C_6H_6)

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($Value \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	6750	900×10^{-9}	1	203			
	25	6750	900×10^{-9}	1	206			

References Reporting: 203, 206

PERMEANT: Butane $CH_3 (CH_2)_2 CH_3$

MATERIAL: Rubber, Dimethylsilicone

PERMEANT: Butane $CH_3(CH_2)_2CH_3$

MATERIAL: Rubber, Polydimethylsiloxane

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	12980	1.73×10^{-6}	1	284			Average of 3 samples
	40	12380	1.65×10^{-6}	1	284			Average of 3 samples
	50	11630	1.55×10^{-6}	1	284			Average of 3 samples
	60	11030	1.47×10^{-6}	1	284			Average of 3 samples
	70	11330	1.51×10^{-6}	1	284			Average of 3 samples

References Reporting: 284

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	7250	$.967 \times 10^{-6}$	1	284			Average of 3 samples
	40	7058	$.941 \times 10^{-6}$	1	284			Average of 3 samples
	50	6861	$.916 \times 10^{-6}$	1	284			Average of 3 samples
	60	6691	$.892 \times 10^{-6}$	1	284			Average of 3 samples
	70	6541	$.872 \times 10^{-6}$	1	284			Average of 3 samples

References Reporting: 284

PERMEANT: iso-Butane $(CH_3)_3$ CH

MATERIAL: Rubber, Polydimethylsiloxane

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1250	7500	1.00×10^{-9}	11	294			

References Reporting: 294

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Alumina Ceramic

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Buna S

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	92.8	94×10^{-7}	6	378			
	30	93.0	1240×10^{-10}	3	325			

References Reporting: 325, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	0.06	80×10^{-13}	1	275			

References Reporting: 275

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellophane-Aluminum-Saran Laminate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellulose Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	1.58	2.11×10^{-10}	1	219			
	0	2.35	3.13×10^{-10}	1	219			
	0	2.40	3.20×10^{-10}	1	219			
	0	2.61	3.48×10^{-10}	1	219			2 samples had this value
	0	4.32	5.76×10^{-10}	1	219			
	0	7.20	9.60×10^{-10}	1	219			
	20	1.8	2.4×10^{-9}	3	210			
	25	4.24	5.65×10^{-10}	1	219			
	25	4.73	6.31×10^{-10}	1	219			
	25	6.31	8.41×10^{-10}	1	219			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	6.92	9.23×10^{-10}	1	219			
	25	9.08	12.1×10^{-10}	1	219			
	25	14.1	18.8×10^{-10}	1	219			
	25	6.31	8.41×10^{-10}	1	211			
	Room	4.50	6.0×10^{-10}	1	241			
	Room	5.25	7.0×10^{-10}	1	241			
	Room	6.00	8.0×10^{-10}	1	241			
	Room	6.75	9.0×10^{-10}	1	241			
	Room	10.5	14.0×10^{-10}	1	241			
	Room	15.8	21.0×10^{-10}	1	241			

PERMEANT: Carbon Dioxide (CO_2)
MATERIAL: Cellulose Acetate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellulose Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	6.75	0.9×10^{-9}	1	385			
	Room	5.25	0.7×10^{-9}	1	385			
	Room	9.0	1.2×10^{-9}	1	385			
	30	5.1	68×10^{-10}	3	311			
	30	13.5	18×10^{-9}	3	210			
	50	6.90	9.20×10^{-10}	1	219			
	50	12.2	16.3×10^{-10}	1	219			
	50	13.7	18.3×10^{-10}	1	219			
	50	17.9	23.9×10^{-10}	1	219			
	50	24.8	33.1×10^{-10}	1	219			

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Celanese P-912	25	6.91	7.0×10^{-7}	6	378			

References Reporting: 210, 211, 219, 241, 311, 378, 385

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellulose Acetate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellulose Acetate (plasticized)

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	1.58	2.11×10^{-10}	1	211			.001 in. thick
	0	2.40	3.20×10^{-10}	1	211			.001 in. thick
	0	3.68	4.91×10^{-10}	1	211			.001 in. thick
	0	4.28	5.71×10^{-10}	1	211			.001 in. thick
	0	4.32	5.76×10^{-10}	1	211			.0012 in. thick
	0	7.20	9.60×10^{-10}	1	211			.00125 in. thick
	0	2.35	3.13×10^{-10}	1	211			.00125 in. thick
	0	2.96	3.95×10^{-10}	1	211			.00125 in. thick
	0	3.00	4.00×10^{-10}	1	211			.00113 in. thick
	25	4.24	5.65×10^{-10}	1	211			.001 in. thick

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	4.73	6.31×10^{-10}	1	211			.001 in. thick
	25	6.16	8.21×10^{-10}	1	211			.001 in. thick
	25	8.93	11.9×10^{-10}	1	211			.001 in. thick
	25	9.08	12.1×10^{-10}	1	211			.0012 in. thick
	25	4.84	6.45×10^{-10}	1	211			.00125 in. thick
	25	6.92	9.23×10^{-10}	1	211			.00125 in. thick
	25	14.1	18.8×10^{-10}	1	211			.00125 in. thick
	25	5.49	7.32×10^{-10}	1	211			.00113 in. thick
	30	5.1	68×10^{-10}	3	240			
	50	6.90	9.20×10^{-10}	1	211			.001 in. thick

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellulose Acetate (plasticized)

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellulose Acetate (plasticized)

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	50	9.68	12.9×10^{-10}	1	211			.001 in. thick
	50	12.2	16.3×10^{-10}	1	211			.001 in. thick
	50	16.7	22.3×10^{-10}	1	211			.001 in. thick
	50	9.15	12.2×10^{-10}	1	211			.00113 in. thick
	50	17.8	23.7×10^{-10}	1	211			.0012 in. thick
	50	7.46	9.95×10^{-10}	1	211			.00125 in. thick
	50	17.9	23.9×10^{-10}	1	211			.00125 in. thick
	50	24.8	33.1×10^{-10}	1	211			.00125 in. thick

References Reporting: 211, 240

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	12.8	17.1×10^{-10}	1	211 219			.001 in. thick
	0	21.8	29.1×10^{-10}	1	219			
	25	23.9	31.9×10^{-10}	1	211 219			.001 in. thick
	25	30.2	40.3×10^{-10}	1	219			
	29	24.8	3.30×10^{-9}	1	208			.0026 cm thick
	50	42.5	56.7×10^{-10}	1	211 219			.001 in. thick
	50	39.8	53.1×10^{-10}	1	219			

References Reporting: 208, 211, 219

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellulose Acetate Butyrate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Cellulose Acetate Butyrate (plasticized)

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	22.4	29.9×10^{-10}	1	211			.0018 in. thick
	25	30.2	40.3×10^{-10}	1	211			.0018 in. thick
	50	39.8	53.1×10^{-10}	1	211			.0018 in. thick

References Reporting: 211

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
3010	Room	975	130×10^{-9}	1	203			
2804	Room	1500	200×10^{-9}	1	203			

References Reporting: 203

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: COHR-Coated Glass Fabric

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Delrin (acetal)

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	29.5	1.43	0.19×10^{-9}	1	208			.024 cm thick

References Reporting: 208

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Epon-1001	29	.0645	.0086 x 10^{-9}	1	208			.0022 cm thick
	30	.0645	.086 x 10^{-9}	3	210			
Hypol	30	1.05	0.14 x 10^{-9}	1	208			.026 cm thick
	30	1.05	1.4 x 10^{-9}	3	210			

References Reporting: 208, 210

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Epoxy

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Ethyl Cellulose

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	35.6	28	5	346			
	Room	33.0	4.4×10^{-9}	1	241 385			
	25	33.2	4.43×10^{-9}	1	243			
	25	35.6	4.75×10^{-9}	1	243			
	27.8	35.5	4.73×10^{-9}	1	208			.00254 cm thick
Ethocel	20	30.8	4.1×10^{-9}	1	243			
Ethocel	30	33.0	4.4×10^{-9}	1	243			
Ethocel	40	35.3	4.7×10^{-9}	1	243			
Ethocel-610	25	31.6	32×10^{-7}	6	378			
Plasticized	30	150	2000×10^{-10}	3	240			

References Reporting: 208, 240, 241, 243, 346, 378, 385

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Hydropol	25	36.3	3.68×10^{-7}	8	225		9.1×10^{-7}	
Hydropol	25				222	0.578		
Hydropol	25	36.3	36.8×10^{-7}	6	378			

References Reporting: 222, 225, 378

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Hydropol

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Isoprene-Acrylonitrile-Copolymer

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	3.26	3.3×10^{-8}	8	390			
	50	16.7	16.9×10^{-8}	8	390			

References Reporting: 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	10.7	10.8×10^{-8}	8	390			
	50	39.9	40.4×10^{-8}	8	390			

References Reporting: 390

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Isoprene-Methacrylonitrile-Copolymer

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Mipolam MP

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	3.95	4.0×10^{-7}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	.024	.0032 x 10^{-9}	1	211			.002 in. thick
	0	.0263	.0035 x 10^{-9}	1	211			.001 in. thick
	25	.104	.0139 x 10^{-9}	1	211			.002 in. thick
	25	.104	.0139 x 10^{-9}	1	211			.001 in. thick
	50	.181	.0241 x 10^{-9}	1	211			.002 in. thick
	50	.179	.0238 x 10^{-9}	1	211			.001 in. thick
Plasticized	0	.233	.031 x 10^{-9}	1	211			.0065 in. thick
Plasticized	0	.263	.035 x 10^{-9}	1	211			.0035 in. thick
Plasticized	25	1.34	.178 x 10^{-9}	1	211			.0065 in. thick
Plasticized	25	1.37	.182 x 10^{-9}	1	211			.0035 in. thick

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Monochlorotrifluoroethylene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Monochlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Plasticized	50	6.00	$.80 \times 10^{-9}$	1	211			.0065 in. thick
Plasticized	50	5.63	$.75 \times 10^{-9}$	1	211			.0035 in. thick

References Reporting: 211

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	22.3	9.98	13.3×10^{-11}	2	418			
G	25	19.2	19.5×10^{-7}	6	378			
	30	18.8	250×10^{-10}	3	325			

References Reporting: 325, 378, 418

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Neoprene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Nylon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	0.12	1.6×10^{-10}	3	325			
3(DuPont)	0	0.0204	0.00272×10^{-9}	1	211			.001 in. thick
3(DuPont)	25	0.223	0.031×10^{-9}	1	211			.001 in. thick
3(DuPont)	50	1.09	0.145×10^{-9}	1	211			.001 in. thick
6(Polyamide)	0	0.024	0.32×10^{-10}	3	242			.113 mm thick
6(Polyamide)	20	0.066	0.88×10^{-10}	3	242			.113 mm thick
6	25	.92	$.093 \times 10^{-7}$	6	378			
6(Polyamide)	30	.12	1.6×10^{-10}	3	210 240 311			
6(Polyamide)	60	0.76	10.13×10^{-10}	3	242			.113 mm thick
6(Polyamice)	80	1.34	17.8×10^{-10}	3	242			.113 mm thick

References Reporting: 210, 211, 240, 242, 311, 325, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	104	13.8×10^{-9}	1	241			
	Room	103.5	13.8×10^{-9}	1	385			
	25	103.6	105×10^{-8}	8	390			
	25	103.6	105×10^{-7}	6	378			
	30	103.5	1380×10^{-10}	3	325			
	50	197.4	200×10^{-8}	8	390			

References Reporting: 241, 325, 378, 385, 390

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polybutadiene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polybutadiene-Acrylonitrile

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	5.63	7.5×10^{-9}	3	210			
	30	47.7	63.6×10^{-9}	3	210			

References Reporting: 210

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lexan	25	6.0	8.0×10^{-9}	3	388			
Lexan	26	6.00	0.8×10^{-9}	1	208			.008 cm thick
Lexan	50	9.75	1.3×10^{-8}	3	388			
Lexan	75	16.5	2.2×10^{-8}	3	388			
Lexan	100	20.25	2.7×10^{-8}	3	388			
Mobay	31	8.40	1.12×10^{-9}	1	208			.0042 cm thick
	20	6.4	8.5×10^{-9}	3	210			

References Reporting: 208, 210, 388

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polycarbonates

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polychlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F-300	20	.036	0.048×10^{-9}	3	210			
Kel-F-300	30	.940	1.25×10^{-9}	3	210			
Kel-F-300	30	.054	0.72×10^{-10}	3	240			
Kel-F-300	30	.083	0.11×10^{-9}	3	340 374			30% Crystallinity
Kel-F-300	30	.023	0.03×10^{-9}	3	340 374			80% Crystallinity
Kel-F-300	40	.158	2.11×10^{-10}	3	311			30% Crystallinity
Kel-F-300	40	.036	0.48×10^{-10}	3	311			80% Crystallinity
Kel-F-300	50	.278	3.7×10^{-10}	3	311			Unplasticized
Kel-F-300	50	5.63	75×10^{-10}	3	311			Plasticized
Kel-F-300	50	.067	0.89×10^{-10}	3	311			80% Crystallinity

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F-300	60	.459	6.12×10^{-10}	3	311			30% Crystallinity
Kel-F-300	60	.103	1.37×10^{-10}	3	311			80% Crystallinity
Kel-F-300	75	.435	5.8×10^{-10}	3	311			2 mm Extruded
Kel-F-300	75	.461	6.15×10^{-10}	3	311			5 mm Extruded
Kel-F-300	75	1.09	14.5×10^{-10}	3	311			30% Crystallinity
Kel-F-300	75	.225	3.0×10^{-10}	3	311			80% Crystallinity
Kel-F-300	80	1.39	18.5×10^{-10}	3	311			30% Crystallinity
Kel-F-300	80	.275	3.67×10^{-10}	3	311			80% Crystallinity
Trithene	0	.248	$.033 \times 10^{-9}$	1	219			Plasticized
Trithene	0	.0250	$.0034 \times 10^{-9}$	1	219			

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polychlorotrifluroethylene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polychlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Trithene	25	.109	0.11×10^{-7}	6	378			
Trithene	25	1.36	$.180 \times 10^{-9}$	1	219			Plasticized
Trithene	25	.104	$.0139 \times 10^{-9}$	1	219			
Trithene	50	5.81	$.78 \times 10^{-9}$	1	219			Plasticized
Trithene	50	.180	$.0240 \times 10^{-9}$	1	219			

References Reporting: 210, 219, 240, 311, 340, 374, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon-14	25	9.5	9.6×10^{-7}	6,8	225 378		3.72×10^{-7}	
Alathon-15	0	2.85	3.8×10^{-10}	1	223			Variable Pressure Test
Alathon-15	0	3.83	5.1×10^{-10}	1	223			Variable Volume Test
Alathon 15	30	28.5	3.8×10^{-9}	1	209			
Alathon-15	30	15.0	2.0×10^{-9}	1	223			Variable Pressure Test
Alathon-15	30	18.4	2.45×10^{-9}	1	223			Variable Volume Test
Alathon-15	50	65.3	8.7×10^{-9}	1	209			
Alathon-15	50	37.5	5.0×10^{-9}	1	223			Variable Pressure Test
Alathon-15	50	40.5	5.4×10^{-9}	1	223			Variable Volume Test
DE2400	0	2.4	$.32 \times 10^{-9}$	1	211			.00156 in. thick

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyethylene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
DE2400	25	8.9	1.18×10^{-9}	1	211			.00156 in. thick
DE2400	50	27.0	3.60×10^{-9}	1	211			.00156 in. thick
Visking DE2400	0	3.3	$.44 \times 10^{-9}$	1	211			.0013 in. thick
Visking DE2400	25	10.5	1.4×10^{-9}	1	211			.0013 in. thick
Visking DE2400	50	28.1	3.75×10^{-9}	1	211			.0013 in. thick
DE2500	0	3.0	$.405 \times 10^{-9}$	1	211			.0015 in. thick
DE2500	25	9.9	1.32×10^{-9}	1	211			.0015 in. thick
DE2500	50	27.4	3.65×10^{-9}	1	211			.0015 in. thick
DuPont	0	5.1	$.681 \times 10^{-9}$	1	211			.001 in. thick
DuPont	25	14.3	1.9×10^{-9}	1	211			.001 in. thick

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
DuPont	50	35.5	4.73×10^{-9}	1	211			.001 in. thick
DuPont-B	33	20.4	2.72×10^{-9}	1	286			.004 in. thick
Grex	25	.276	0.28×10^{-7}	6	378			.964g/cc
Hypalon	30	12.5	1.67×10^{-9}	1	208			.0069 cc thick
Philips	27	8.03	1.07×10^{-9}	1	208			.961g/cc
Philips	31	2.47	$.33 \times 10^{-9}$	1	208			.929g/cc
.922g/cc	30	21.0	28×10^{-9}	3	311 386			
.922g/cc	30	18.9	252×10^{-10}	3	240			
.938g/cc	30	5.6	74×10^{-10}	3	311			
.953g/cc	30	3.2	43×10^{-10}	3	311			

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyethylene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.960g/cc	30	2.64	35.2×10^{-10}	3	240			
Mol. Wt. 1700-1800	0	3.83	0.51×10^{-9}	1	211			.00111 in. thick
Mol. Wt. 1700-1800	25	13.9	1.85×10^{-9}	1	211			.00111 in. thick
Mol. Wt. 1700-1800	50	42.8	5.7×10^{-9}	1	211			.00111 in. thick
Mol. Wt. 20000	0	4.13	$.55 \times 10^{-9}$	1	211			00225 in. thick
Mol. Wt. 20000	25	13.5	1.80×10^{-9}	1	211			.00225 in. thick
Mol. Wt. 20000	50	39.8	5.30×10^{-9}	1	211			.00225 in. thick
Mol. Wt. 21000	0	3.75	$.50 \times 10^{-9}$	1	211			.001 in.thick
Mol. Wt. 21000	25	12.0	1.60×10^{-9}	1	211			.001 in.thick
Mol. Wt. 21000	50	36.0	4.80×10^{-9}	1	211			.001 in.thick

References Reporting: 208, 209, 211, 223, 225, 240, 286, 311, 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	0	.0345	$.0046 \times 10^{-9}$	1	211 219			.0025 in. thick
Mylar	20-30	.075	$.10 \times 10^{-9}$	3	210			
Mylar	25	.0885	$.0118 \times 10^{-9}$	1	211 219			.0025 in. thick
Mylar	50	.203	$.027 \times 10^{-9}$	1	211 219			.0025 in. thick
Mylar-A	25	.888	0.90×10^{-7}	6	378			
Mylar-A	30	.115	1.53×10^{-10}	3	240 311 325			
	55				314		3.29×10^{-9}	
	65				314		5.96×10^{-9}	
	75				314		9.56×10^{-9}	

References Reporting: 210, 211, 219, 240, 311, 314, 325, 378

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyethylene Terephthalate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyformaldehyde

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	.143	0.19×10^{-9}	3	210			

References Reporting: 210

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	3.9	5.2×10^{-9}	3	210			

References Reporting: 210

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyisobutylene-Isoprene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polymethylbutadiene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	33.8	34.2×10^{-8}	8	390			
	50	99.5	100.8×10^{-8}	8	390			

References Reporting: 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	5.13	5.2×10^{-7}	6	378			
	30	6.3	8.4×10^{-9}	3	374			.907g/cm^3
	30	6.9	9.2×10^{-9}	3	210 386			.907g/cm^3
Escon	27.2	3.38	0.45×10^{-9}	1	208			Monoaxial
Escon	27.2	1.35	0.18×10^{-9}	1	208			Biaxial
Cryovac	24	12.4	1.65×10^{-9}	1	208			.0024 cm thick
Cryovac	30	2.48	0.33×10^{-9}	1	208			.0015 cm thick
Profax	28	3.38	0.45×10^{-9}	1	208			.0015 cm thick

References Reporting: 208, 210, 374, 378, 386

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polypropylene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polystyrene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	17.4	13.7	5	346			
	20	26.3	3.50×10^{-9}	1	243			
	30	27.8	3.70×10^{-9}	1	241 243			
	40	29.3	3.90×10^{-9}	1	243			
Polyflex	25	6.15	0.82×10^{-9}	1	208			Biaxial
	30	6.6	88×10^{-10}	3	240 311			
	Room	27.8	3.70×10^{-9}	1	385			
DOW 0641	20	5.63	7.5×10^{-9}	3	210			
	30	27.8	37.0×10^{-9}	3	210			

References Reporting: 208, 210, 240, 241, 243, 311, 346, 385

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	.81	1.08×10^{-9}	3	210			

References Reporting: 210

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polystyrene-Acrylonitrile

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyurethane

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	10.5	14×10^{-9}	3	210			
	30	30.0	40×10^{-9}	3	210			
Estadene	32	10.5	1.40×10^{-9}	1	208			.0025 cm thick
Adidene-L	29	30.0	4.00×10^{-9}	1	208			.0021 cm thick
PC 6	30	5.40	0.72×10^{-9}	1	208			.010 cm thick

References Reporting: 208, 210

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Butacite-10	20	33.8	4.50×10^{-9}	1	208			.038 cm thick
Butvar B-76	26.5	19.4	2.59×10^{-9}	1	208			.00094 cm thick

References Reporting: 208

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Butyral

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	.77	1.02×10^{-9}	3	210			
	29	10.5	1.40×10^{-9}	1	208			.0067 cm thick
	30	2.78	3.7×10^{-9}	3	210			
	30	.75	10×10^{-10}	3	240 311			
Commercial	20	23.6	3.15×10^{-9}	1	243			
Commercial	30	31.7	4.22×10^{-9}	1	243			
Commercial	40	42.0	5.60×10^{-9}	1	243			
THF - 16.8% Plasticizer	31.1	3.45	0.46×10^{-9}	1	208			.00788 cm thick
THF - 19.2% Plasticizer	31.1	5.33	0.71×10^{-9}	1	208			.00457 cm thick
THF no-Plasticizer	32.3	1.20	0.16×10^{-9}	1	208			.00508 cm thick

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Plasticized	0	1.86	$.248 \times 10^{-9}$	1	219			
Plasticized	25	6.98	$.930 \times 10^{-9}$	1	219			
Plasticized	50	22.1	2.95×10^{-9}	1	219			
Geon 101	25	.75	0.762×10^{-7}	6	378			

References Reporting: 208, 210, 219, 240, 243, 311, 378

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Chloride

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Chloride-Dioctyl Phthalate

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Geon-100-EP-100, GP-261-30	0	1.86	$.248 \times 10^{-9}$	1	211			.0045 cm thick
Geon-100-EP-100, GP-261-30	25	6.98	$.930 \times 10^{-9}$	1	211			.0045 cm thick
Geon-100-EP-100, GP-261-30	50	22.1	2.95×10^{-9}	1	211			.0045 cm thick
101-EP-100	20	.720	$.096 \times 10^{-9}$	1	243			
101-EP-100	30	.765	$.102 \times 10^{-9}$	1	243			
101-EP-100	40	.818	$.109 \times 10^{-9}$	1	243			
101-EP-100, GP-261-5	20	30.0	4.00×10^{-9}	1	243			
101-EP-100, GP-261-5	30	28.9	3.85×10^{-9}	1	243			
101-EP-100, GP-261-5	40	27.8	3.70×10^{-9}	1	243			
101-EP-100, GP-261-20	20	1050	140×10^{-9}	1	243			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
101-EP-100, GP-261-20	30	975	130×10^{-9}	1	243			
101-EP-100, GP-261-20	40	885	118×10^{-9}	1	243			

References Reporting: 211, 243

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Chloride-Dioctyl Phthalate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Chloride (fluorinated)

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Fluorinax	27.5	10.5	1.4×10^{-9}	1	208			.00256 cm thick

References Reporting: 208

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	3.60	$.480 \times 10^{-9}$	1	211 219			
	25	12.7	1.69×10^{-9}	1	211 219			
	Room	12.8	1.7×10^{-9}	1	241 385			
	50	37.1	4.95×10^{-9}	1	211 219			
VYHH	1				221		$.16 \times 10^{-4}$	
VYHH	10				221		$.247 \times 10^{-4}$	
VYHH	26.5				221		$.48 \times 10^{-4}$	
VYHH	33				221		1.12×10^{-4}	
VYHH	45				221		3.41×10^{-4}	
VYHH	50				221		4.88×10^{-4}	

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
VYHH	90.8			221			63.1×10^{-4}	

References Reporting: 211, 219, 221, 241, 385

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	0.68	$.09 \times 10^{-9}$	1	210			

References Reporting: 210

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinyl Fluoride

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinylidene Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran	NG	.011	2.4	7	389			
Saran	30	.022	$.029 \times 10^{-9}$	3	210,240 311,325			
Saran	31.1	.0248	$.0033 \times 10^{-9}$	1	208			.00254 cm thick
Saran 517	0	.0046	$.061 \times 10^{-10}$	3	242			.0025 cm thick
Saran 517	25	.024	$.024 \times 10^{-7}$	6	378			
Saran 517	30	.022	$.29 \times 10^{-10}$	3	242			.0025 cm thick
Saran 517	60	.23	3.1×10^{-10}	3	242			.0025 cm thick
Saran 517	80	.38	5.0×10^{-10}	3	242			.0025 cm thick
Saran 517	90	1.1	14.7×10^{-10}	3	242			.0025 cm thick

References Reporting: 208, 210, 240, 242, 311, 325, 378, 389

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20-30	5.85	7.8×10^{-9}	3	210			
Viton A	26	3.83	0.51×10^{-9}	1	208			0.02 cm thick

References Reporting: 208, 210

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Polyvinylidene Fluoride-Hexafluoropropylene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber Hydrochloride

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	.13	.17 x 10^{-9}	3	210			
	30	1.37	1.82 x 10^{-9}	3	210			
Pliofilm	Room	.45 to 68.6	.06 to 9.15 x 10^{-9}	1	241 385			
Pliofilm	27	6.6	0.88 x 10^{-9}	1	208			.0183 cm thick
Pliofilm 140-N2	0	.107	.0143 x 10^{-9}	1	211 219			2 units plasticized
Pliofilm 140-N2	25	.480	.064 x 10^{-9}	1	211 219			2 units plasticized
Pliofilm 140-N2	25	.48	0.49 x 10^{-7}	6	378			
Pliofilm 140-N2	50	1.73	.230 x 10^{-9}	1	211 219			2 units plasticized
Pliofilm 120-P4	0	.255	.0340 x 10^{-9}	1	211 219			4 units plasticized
Pliofilm 120-P4	25	1.11	0.148 x 10^{-9}	1	211 219			4 units plasticized

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm 120-P4	30	13.7	182×10^{-10}	3	240 311 325			
Pliofilm 120-P4	50	3.96	$.528 \times 10^{-9}$	1	211 219			4 units plasticized
Pliofilm NO	30	.13	1.7×10^{-10}	3	240 311 325			
Pliofilm FM1	25	.70	$.71 \times 10^{-7}$	6	378			

References Reporting: 208, 210, 211, 219, 240, 241, 311, 325, 378, 385

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber Hydrochloride

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber, Methyl

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{-8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	10.9	11×10^{-7}	6	378			
	25	5.63	5.7×10^{-8}	8	390			
	30	5.63	75×10^{-10}	3	325			
	50	23.7	24×10^{-8}	8	390			

References Reporting: 325, 378, 390

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	98.3	99.6×10^{-8}	8	390			
	25	116	11.7×10^{-7}	8	225		12.5×10^{-7}	
	25	100.7	102×10^{-7}	6	378			
	25				222	0.96		
	Room	90.8	12.1×10^{-9}	1	385			
	30	98.3	13.1×10^{-9}	1	240 241 325			
	50	218	221×10^{-8}	8	390			

References Reporting: 222, 225, 240, 241, 325, 378, 385, 390

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber, Natural

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber, Polysulfide

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Thiokol ZR-300	23	7.95	1.06×10^{-9}	1	208			.2 cm thick
Thiokol B	25	2.37	2.4×10^{-7}	6	378			

References Reporting: 208, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
RTV-510	6	2025	270×10^{-9}	1	409			
RTV-501	23	2138	285×10^{-9}	1	409			
RTV-501	32.5	2085	278×10^{-9}	1	409			
RTV-501	43.0	2100	280×10^{-9}	1	409			
RTV-502	10.5	2018	269×10^{-9}	1	409			
RTV-502	23	2145	286×10^{-9}	1	409			
RTV-502	24	1410	188×10^{-9}	1	208			0.0141 cm thick
RTV-502	33	2100	280×10^{-9}	1	409			
RTV-502	43	2115	282×10^{-9}	1	409			
RTV-40	24	1538	205×10^{-9}	1	409			

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber, Silicone

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber, Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
RTV-40	33.5	1523	203×10^{-9}	1	409			
RTV-40	43	1478	197×10^{-9}	1	409			
RTV-601	33	2145	286×10^{-9}	1	409			
RTV-601	43	2115	282×10^{-9}	1	409			
RTV-11	29	1800	240×10^{-9}	1	409			
RTV-11	33	1785	238×10^{-9}	1	409			
RTV-11	43.5	1763	235×10^{-9}	1	409			
RTV-20	28.5	1433	191×10^{-9}	1	409			
RTV-20	33	1425	190×10^{-9}	1	409			
RTV-20	43	1418	189×10^{-9}	1	409			

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
RTV-90	23	2150	287×10^{-9}	1	208			0.031 cm thick
Eccosil 4712	20.5	1028	137×10^{-9}	1	409			
Eccosil 4712	32	1035	138×10^{-9}	1	409			
Eccosil 4712	43.5	1043	139×10^{-9}	1	409			
Sylgard 182	20.5	1530	204×10^{-9}	1	409			
Sylgard 182	33.5	1545	206×10^{-9}	1	409			
Sylgard 182	43.5	1538	205×10^{-9}	1	409			
Silastic	25	2280	304×10^{-9}	1	208			0.0136 cm thick
Silastic LS-63	26	444	59.2×10^{-9}	1	208			0.23 cm thick
Silastic 50	Room	780	104×10^{-9}	1	241			

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber, Silicone

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Rubber, Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Silastic 50	NG	788	105×10^{-9}	1	203			
GE #SE 450	NG	2030	270×10^{-9}	1	203			
Cohrlastic 2804	Room	1500	200×10^{-9}	1	241			
Cohrlastic 3010	Room	975	130×10^{-9}	1	241			
Nitrile	31	1290	172×10^{-9}	1	208			.02 cm cured 16 hrs
Nitrile	31	1340	178×10^{-9}	1	208			.02 cm cured 1 hr
	Room	2030	270×10^{-9}	1	241			
	Room	2025	270×10^{-9}	1	385			
	Room	975	130×10^{-9}	1	385			Fabric Coated
	Room				375		3×10^{-5}	

References Reporting: 203,208,241, 375,385,409

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP	25	7.51	1670	7	334			
TFE	30	NC	0.66	24	333			
	Room				375		4×10^{-7}	

References Reporting: 333,334,375

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Teflon

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Vinyl Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	2.39	0.31×10^{-9}	1	219			
	25	6.00	0.80×10^{-9}	1	219			
	50	13.1	1.75×10^{-9}	1	219			

References Reporting: 219

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
VB 1300	20	0.555	$.074 \times 10^{-9}$	1	243			
VB 1300	30	.683	$.091 \times 10^{-9}$	1	243			
VB 1300	40	.825	$.11 \times 10^{-9}$	1	243			
VB 1920	20	13.5	1.80×10^{-9}	1	243			
VB 1920	30	15.0	2.00×10^{-9}	1	243			
VB 1920	40	16.4	2.18×10^{-9}	1	243			
VB 1925	20	3.60	$.48 \times 10^{-9}$	1	243			
VB 1925	30	5.78	$.77 \times 10^{-9}$	1	243			
VB 1925	40	9.00	1.20×10^{-9}	1	243			
VB 1930	20	5.10	$.68 \times 10^{-9}$	1	243			

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Vinyl Chloride-Polyvinyl Acetate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Vinyl Chloride-Polyvinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
VB 1930	25	4.8	0.49×10^{-7}	6	378			.0039 cm thick
VB 1930	30	8.85	1.18×10^{-9}	1	243			.0039 cm thick
VB 1930	40	14.3	1.90×10^{-9}	1	243			.0039 cm thick

References Reporting: 243, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	2.39	$.318 \times 10^{-9}$	1	211			
	25	6.00	$.80 \times 10^{-9}$	1	211			
	50	13.1	1.75×10^{-9}	1	211			

References Reporting: 211

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Vinyl Chloride-Vinyl Maloate

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Vinylidene Chloride-Acrylonitrile

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
F218	NG	.008	1.77	7	389			
F220	NG	.036	7.91	7	389			

References Reporting: 389

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
X-500	0	.0075	$.10 \times 10^{-10}$	3	311			
X-500	25	.06	$.80 \times 10^{-10}$	3	311			
X-500	50	.394	5.25×10^{-10}	3	311			
X-500	75	1.46	19.5×10^{-10}	3	311			
X-800	0	.014	$.19 \times 10^{-10}$	3	311			
X-800	25	.14	1.83×10^{-10}	3	311			
X-800	50	1.14	15.2×10^{-10}	3	311			
X-800	75	5.31	70.8×10^{-10}	3	311			
X-5500	25	2.99	39.8×10^{-10}	3	311			
X-5500	50	18.6	248×10^{-10}	3	311			

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Vinylidene Fluoride-Chlorotrifluoroethylene

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Vinylidene Fluoride-Chlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
X-3700	0	.205	2.73×10^{-10}	3	311			
X-3700	25	2.04	27.2×10^{-10}	3	311			
X-3700	50	10.3	137×10^{-10}	3	311			
X-3700	75	33.0	440×10^{-10}	3	311			

References Reporting: 311

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	20	9.15	1.22×10^{-9}	1	243			.019 cm thick
	20	10.9	1.45×10^{-9}	1	243			
	30	14.9	1.98×10^{-9}	1	243			.019 cm thick
	30	16.5	2.20×10^{-9}	1	243			
	40	23.3	3.10×10^{-9}	1	243			.019 cm thick
	40	24.0	3.20×10^{-9}	1	243			

References Reporting: 243

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Visqueen

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Visten

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
A	0	.274	$.0365 \times 10^{-9}$	1	219			
A	25	1.50	$.200 \times 10^{-9}$	1	219			
A	50	6.30	$.84 \times 10^{-9}$	1	219			
B	0	.75	$.100 \times 10^{-9}$	1	219			
B	25	3.14	$.419 \times 10^{-9}$	1	219			
B	50	10.6	1.41×10^{-9}	1	219			

References Reporting: 219

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	14.0	186×10^{-10}	3	325			
A	25	13.9	14.1×10^{-8}	8	378 390			
A	50	47.6	48.2×10^{-8}	8	390			

References Reporting: 325, 378, 390

PERMEANT: Carbon Dioxide (CO_2)

MATERIAL: Vulcaprene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	67500	9000×10^{-9}	1	203 297			

References Reporting: 203, 297

PERMEANT: Carbon Disulfide CS_2

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1250	3750	5×10^{-9}	11	294			

References Reporting: 294

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Alumina (ceramic)

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Ethyl Cellulose

Type or Trade Name	Temp. °C	Permeability Std. Units ($Value \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	2.7	2.1	5	346			

References Reporting: 346

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.069		
	25	4.64	$.47 \times 10^{-7}$	8	225		8.2×10^{-7}	

References Reporting: 222, 225

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Hydropol

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Inconel

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1225	75000	1×10^{-8}	11	294			

References Reporting: 294

Type or Trade Name	Temp. C	Permeability Std. Units ($Value \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	NC	8.1×10^{-16}	13	378			

References Reporting: 378

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Iron

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Molybdenum

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	1150	75000	1×10^{-8}	11	294			.0083 cm disilicide coating

References Reporting: 294

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.065		
Alathon 14	25	1.12	$.113 \times 10^{-7}$	8	225		3.32×10^{-7}	

References Reporting: 222, 225

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Polyethylene

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Polystyrene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	2.4	1.9	5	346			

References Reporting: 346

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
VYHH	10.4				221		0.25×10^{-4}	
VYHH	24.7				221		1.53×10^{-4}	
VYHH	26.7				221		1.96×10^{-4}	
VYHH	51.0				221		17.4×10^{-4}	
VYHH	70.0				221		53.4×10^{-4}	
VYHH	88.0				221		170.2×10^{-4}	

References Reporting: 221

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	255	34×10^{-9}	1	203 297			

References Reporting: 203, 297

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.08		
	25	11.8	1.20×10^{-7}	8	225		13.5×10^{-7}	

References Reporting: 222, 225

PERMEANT: Carbon Monoxide (CO)

MATERIAL: Rubber, Natural

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	52500	7000×10^{-9}	1	290 297			

References Reporting: 290, 297

PERMEANT: Carbon Tetrachloride CCl_4

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	11250	1500×10^{-9}	1	203			

References Reporting: 203

PERMEANT: Carbonyl Chloride $COCl_2$

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	24.97	2.53×10^{-7}	8	225		2.40×10^{-7}	
	25				222	1.49		

References Reporting: 222, 225

PERMEANT: Ethane C_2H_6

MATERIAL: Hydropol

PERMEANT: Ethane C_2H_6

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Alathon 14	25	5.13	$.52 \times 10^{-7}$	8	225		0.68×10^{-7}	
	25				222	1.27		
	33	18.6	2.48×10^{-9}	1	286			

References Reporting: 222, 225, 286

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	1.9	1.5	5	346			

References Reporting: 346

PERMEANT: Ethane C_2H_6

MATERIAL: Polystyrene

PERMEANT: Ethane C_2H_6

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	1875	250×10^{-9}	1	203			
	25	1875	250×10^{-9}	1	206			

References Reporting: 203, 206

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				225		4.0×10^{-7}	

References Reporting: 225

PERMEANT: Ethane C_2H_6

MATERIAL: Rubber, Natural

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	8.9	7.0	5	346			

References Reporting: 346

PERMEANT: Ethylene C_2H_4

MATERIAL: Ethyl Cellulose

PERMEANT: Ethylene C_2H_4

MATERIAL: Polystyrene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	2.0	1.6	5	346			

References Reporting: 346

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	1013	135×10^{-9}	1	203			

References Reporting: 203

PERMEANT: Ethylene C_2H_4

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lumarith P-912	0	55.5	7.4×10^{-8}	3	242			163 mmHg
Lumarith P-912	30	30.0	4.0×10^{-8}	3	242			163 mmHg
Lumarith P-912	60	26.3	3.5×10^{-8}	3	242			163 mmHg

References Reporting: 242

PERMEANT: Ethylene Oxide $(CH_2)_2O$

MATERIAL: Cellulose Acetate

PERMEANT: Ethylene Oxide $(CH_2)_2O$

MATERIAL: Ethyl Cellulose

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Ethocel	30	308	41×10^{-8}	3	242			

References Reporting: 242

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Trithene B	0	.90	$.12 \times 10^{-8}$	3	242			383 mmHg
Trithene B	30	.98	$.13 \times 10^{-8}$	3	242			383 mmHg
Trithene B	60	3.3	$.44 \times 10^{-8}$	3	242			383 mmHg

References Reporting: 242

PERMEANT: Ethylene Oxide $(CH_2)_2O$

MATERIAL: Polychlorotrifluoroethylene

PERMEANT: Ethylene Oxide $(CH_2)_2O$

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	24	3.2×10^{-8}	3	242			237 mmHg
	30	75	10.0×10^{-8}	3	242			237 mmHg
	60	263	35×10^{-8}	3	242			237 mmHg

References Reporting: 242

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	30	.098	$.013 \times 10^{-8}$	3	242			340 mmHg
Mylar	60	.195	$.026 \times 10^{-8}$	3	242			340 mmHg
Mylar	80	.33	$.044 \times 10^{-8}$	3	242			340 mmHg

References Reporting: 242

PERMEANT: Ethylene Oxide $(CH_2)_2O$

MATERIAL: Polyethylent Teraphthalate

PERMEANT: Ethylene Oxide $(CH_2)_2O$

MATERIAL: Polyvinyl Alcohol

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	0	.0015	$.0002 \times 10^{-8}$	3	242			

References Reporting: 242

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran	30	.48	$.064 \times 10^{-8}$	3	242			

References Reporting: 242

PERMEANT: Ethylene Oxide $(CH_2)_2O$

MATERIAL: Polyvinylidene Chloride

PERMEANT: Ethylene Oxide $(CH_2)_2O$

MATERIAL: Rubber Hydrochloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm	0	31.5	4.2×10^{-8}	3	242			123 mmHg
Pliofilm	0	548	73×10^{-8}	3	242			343 mmHg

References Reporting: 242

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	8330	1110×10^{-9}	1	203			

References Reporting: 203

PERMEANT: Formaldehyde HCHO

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	11250	1500×10^{-9}	1	206			

References Reporting: 206

PERMEANT: Freon 11

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	8.78	117×10^{-10}	3	374			

References Reporting: 374

PERMEANT: Freon 12

MATERIAL: Neoprene

PERMEANT: Freon 12

MATERIAL: Polybutadiene Nitrile

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{-8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.3 to 5.5	4 to 73 x 10^{-10}	3	374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Hypalon	25	4.5	60×10^{-10}	3	374			

References Reporting: 374

PERMEANT: Freon 12

MATERIAL: Polyethylene

PERMEANT: Freon 12

MATERIAL: Polyvinylidene Fluoride-Hexafluoropropylene

Type or Trade Name	Temp. °C	Permeability Std. Units $_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Viton	25	2.4 to 63	32 to 840 x 10^{-10} $_{13}$		374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1.05 to 55.5	14 to 740 $\times 10^{-10}$	3	374			

References Reporting: 374

PERMEANT: Freon 12

MATERIAL: Rubber, Butyl

PERMEANT: Freon 12

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1035	138×10^{-9}	1	206			

References Reporting: 206

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	14.55	194 x 10^{-10}	3	374			

References Reporting: 374

PERMEANT: Freon 12

MATERIAL: Rubber, Urethane

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	19.5	260×10^{-10}	3	374			

References Reporting: 374

PERMEANT: Freon 22

MATERIAL: Neoprene

PERMEANT: Freon 22

MATERIAL: Polybutadiene-Acrylonitrile

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	353	4700×10^{-10}	3	374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Hypalon	25	8.03	107×10^{-10}	3	374			
.92 g/cc	25	7.65	102×10^{-10}	3	374			

References Reporting: 374

PERMEANT: Freon 22

MATERIAL: Polyethylene

PERMEANT: Freon 22

MATERIAL: Polyvinylidene Fluoride-Hexafluoropropylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Viton	25	57	760×10^{-10}	3	374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	3.0	40×10^{-10}	3	374			

References Reporting: 374

PERMEANT: Freon 22

MATERIAL: Rubber, Butyl

PERMEANT: Freon 22

MATERIAL: Rubber, Urethane

Type or Trade Name	Temp. °C	Permeability Std. Units$_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	225	3000×10^{-10}	3	374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP	22.3	NC	300 ± 40	18	334			

References Reporting: 334

PERMEANT: Freon F113 (TF)

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP	22.3	NC	70 ± 8	18	334			

References Reporting: 334

PERMEANT: Freon 114B2

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	7050	940×10^{-9}	1	203 206			

References Reporting: 203, 206

PERMEANT: η -Hexane $CH_3(CH_2)_4CH_3$

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
15% Plasticized	30	4.2	56×10^{-10}	3	325			
	NG	198	17300	4	383			

References Reporting: 325, 383

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Cellulose Acetate

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Nylon

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
6	30	.26	3.4×10^{-10}	3	325			

References Reporting: 325

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	32.3	430×10^{-10}	3	325			

References Reporting: 325

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Polyethylene

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Polyethylene Terephthalate

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	30	.05	$.71 \times 10^{-10}$	3	325			
	NG	.34	30	4	383			

References Reporting: 325, 383

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	NG	680	59500	4	383			

References Reporting: 383

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Polyolefin

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Polyvinyl Butyral

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	4.9	65×10^{-10}	3	325			

References Reporting: 325

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran	30	.02	$.27 \times 10^{-10}$	3	325			

References Reporting: 325

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Polyvinylidene Chloride

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	7500	1000×10^{-9}	1	203			
	25	4870	650×10^{-9}	1	203 297			

References Reporting: 203, 297

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm NO	30	.10	1.33×10^{-10}	3	325			

References Reporting: 325

PERMEANT: Hydrogen Sulfide H_2S

MATERIAL: Rubber Hydrochloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	75000	1000×10^{-9}	1	297			

References Reporting: 297

PERMEANT: Iodine I_2

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	735	98×10^{-9}	1	297			

References Reporting: 297

PERMEANT: Krypton Kr

MATERIAL: Rubber, Dimethylsilicone

PERMEANT: Krypton Kr

MATERIAL: Rubber, Natural

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	35	47.8	48.4×10^{-8}	8	342			

References Reporting: 342

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	4.80	.64 x 10^{-9}	1	214			
	NG	5.6	4.4	5	346			

References Reporting: 214, 346

PERMEANT: Methane CH_4

MATERIAL: Ethyl Cellulose

PERMEANT: Methane CH_4

MATERIAL: Ethylene-Vinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	8.25	1.1×10^{-9}	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	9.77	$.99 \times 10^{-7}$	8	225		5.4×10^{-7}	
	25				222	.26		

References Reporting: 222, 225

PERMEANT: Methane CH_4

MATERIAL: Hydropol

PERMEANT: Methane CH_4

MATERIAL: Inconel

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	710	18800000.	2.5×10^{-6}	11	294			
	810	15000000.	2.0×10^{-6}	11	294			

References Reporting: 294

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	2.6	34×10^{-10}	3	374			

References Reporting: 374

PERMEANT: Methane CH_4

MATERIAL: Neoprene

PERMEANT: Methane CH_4

MATERIAL: Platinum

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	915	52500000	7×10^{-6}	11	288 294			

References Reporting: 288, 294

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	2.4	32×10^{-10}	3	374			

References Reporting: 374

PERMEANT: Methane CH_4

MATERIAL: Polybutadiene-Acrylonitrile

PERMEANT: Methane CH_4

MATERIAL: Polybutadiene-Styrene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	15.8	211×10^{-10}	3	374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	2.70	$.36 \times 10^{-9}$	1	214			

References Reporting: 214

PERMEANT: Methane CH_4

MATERIAL: Polycarbonate

PERMEANT: Methane CH_4

MATERIAL: Polychlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($_8$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Trithene B	30	.0585	7.8×10^{-12}	1	223			
Trithene B	30	.06	8.0×10^{-12}	1	209			
Trithene B	30	.063	$.0084 \times 10^{-9}$	1	214			
Trithene B	60	.98	1.3×10^{-10}	1	223			
Trithene B	60	.83	1.1×10^{-10}	1	209			

References Reporting: 209, 214, 223

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.202		
Alathon 14	25	2.17	$.220 \times 10^{-7}$	8	225		1.93×10^{-7}	
DuPont B	33	12.4	1.65×10^{-9}	1	214			
Hypalon	25	1.7	22×10^{-10}	3	374			
.92g/cc	25	2.18	29×10^{-10}	3	374			
.96g/cc	25	.29	3.9×10^{-10}	3	374			

References Reporting: 214, 222, 225, 374

PERMEANT: Methane CH_4

MATERIAL: Polyethylene

PERMEANT: Methane CH_4

MATERIAL: Polyethylene Terephthalate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	25	.0045	$.006 \times 10^{-10}$	1	214			
	25				224	.197		
	40				224	.128		
	45				314		1.17×10^{-9}	
	55				224	.086		
	64				314		3.35×10^{-9}	

References Reporting: 214, 224, 314

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	1.73	$.23 \times 10^{-9}$	1	214			
	NG	2.04	1.6	5	346			
	125				347		1.8631×10^{-9}	

References Reporting: 214, 346, 347

PERMEANT: Methane CH_4

MATERIAL: Polystyrene

PERMEANT: Methane CH_4

MATERIAL: Polyvinyl Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Plasticized	30	1.5	$.2 \times 10^{-9}$	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.0043	$.057 \times 10^{-10}$	3	374			
	30	.0049	$.0065 \times 10^{-10}$	1	214			

References Reporting: 214, 374

PERMEANT: Methane CH_4

MATERIAL: Polyvinyl Fluoride

PERMEANT: Methane CH_4

MATERIAL: Polyvinylidene Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran	25	.00014	.00018 x 10^{-10}	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Viton A	30	.12	$.016 \times 10^{-9}$	1	214			

References Reporting: 214

PERMEANT: Methane CH_4

MATERIAL: Polyvinylidene Fluoride-Hexafluoropropylene

PERMEANT: Methane CH_4

MATERIAL: Rubber, Butyl

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.56	7.4×10^{-10}	3	374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	705	94×10^{-9}	1	206			
	Room	713	95×10^{-9}	1	203 297			

References Reporting: 203, 206, 297

PERMEANT: Methane CH_4

MATERIAL: Rubber, Dimethylsilicone

PERMEANT: Methane CH_4

MATERIAL: Rubber, Methyl

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.60	7.9×10^{-10}	3	374			

References Reporting: 374

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	.26		
	25	22.7	2.3×10^{-7}	8	225		8.9×10^{-7}	
	25	21.8	290×10^{-10}	3	374			

References Reporting: 222, 225, 374

PERMEANT: Methane CH_4

MATERIAL: Rubber, Natural

PERMEANT: Methane CH_4

MATERIAL: Rubber, Nitrile Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	75	1.0×10^{-8}	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	150	2.0×10^{-8}	1	214			

References Reporting: 214

PERMEANT: Methane CH_4

MATERIAL: Rubber, Phenylene silicone

PERMEANT: Methane CH_4

MATERIAL: Rubber, Silicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	443	5.9×10^{-8}	1	214			

References Reporting: 214

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
FEP	25	.83	11×10^{-10}	3	374			
FEP	25	.702	156	7	334			
FEP	30	1.05	$.14 \times 10^{-9}$	1	214			
FEP	50	2.02	450	7	334			
FEP	75	4.50	1000	7	334			
FEP	100	8.99	2000	7	334			
TFE	30	1.13	1.5×10^{-10}	1	209			
TFE	50	3.0	4.0×10^{-10}	1	209			

References Reporting: 209, 214, 334, 374

PERMEANT: Methane CH_4

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F-300	60	.061	$.81 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	67	.11	1.4×10^{-10}	3	311			30% Crystallinity
Kel-F-300	75	.18	2.4×10^{-10}	3	311			30% Crystallinity
Kel-F-300	85	.38	5.1×10^{-10}	3	311			30% Crystallinity
Kel-F-300	95	.65	8.7×10^{-10}	3	311			30% Crystallinity
Kel-F-300	105	.68	9.1×10^{-10}	3	311			30% Crystallinity
Kel-F-300	115	.71	9.4×10^{-10}	3	311			30% Crystallinity

References Reporting: 311

PERMEANT: Methanol CH_3OH

MATERIAL: Polychlorotrifluoroethylene

PERMEANT: Methanol CH_3OH

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	10430	1390×10^{-9}	1	203			

References Reporting: 203

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lumarith P-912	20	4.4	$.58 \times 10^{-8}$	3	242			394 mmHg
Lumarith P-912	60	5.1	$.68 \times 10^{-8}$	3	242			405 mmHg
Lumarith P-912	80	7.2	$.96 \times 10^{-8}$	3	242			386 mmHg
Lumarith P-912	90	9.8	1.3×10^{-8}	3	242			378 mmHg

References Reporting: 242

PERMEANT: Methyl Bromide CH_3Br

MATERIAL: Cellulose Acetate

PERMEANT: Methyl Bromide CH_3Br

MATERIAL: Nylon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	60	.63	$.084 \times 10^{-8}$	3	242			380 mmHg
	70	.90	$.12 \times 10^{-8}$	3	242			389 mmHg
	80	2.1	$.28 \times 10^{-8}$	3	242			387 mmHg
	90	3.1	$.41 \times 10^{-8}$	3	242			388 mmHg

References Reporting: 242

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Trithene B	30	.068	$.009 \times 10^{-8}$	3	242			314 mmHg
Trithene B	60	3.5	$.46 \times 10^{-8}$	3	242			393 mmHg
Trithene B	80	4.7	$.63 \times 10^{-8}$	3	242			393 mmHg
Trithene B	90	10.5	1.4×10^{-8}	3	242			370 mmHg

References Reporting: 242

PERMEANT: Methyl Bromide CH_3Br

MATERIAL: Polychlorotrifluoroethylene

PERMEANT: Methyl Bromide CH_3Br

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.922g/cc	0	37.6	501×10^{-10}	3	372			
.922g/cc	15	73.1	975×10^{-10}	3	372			
.922g/cc	30	140.3	187×10^{-9}	3	372 386			
.922g/cc	45	237	316×10^{-9}	3	372			
.922g/cc	0	16.8	224×10^{-10}	3	372			Irradiated by 10^8 Roentgens
.922g/cc	15	33.5	446×10^{-10}	3	372			Irradiated by 10^8 Roentgens
.922g/cc	30	66.5	887×10^{-10}	3	372			Irradiated by 10^8 Roentgens
.922g/cc	45	122.3	163×10^{-9}	3	372			Irradiated by 10^8 Roentgens

References Reporting: 372, 386

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar	30	.017	$.0022 \times 10^{-8}$	3	242			314 mmHg
Mylar	60	.06	$.008 \times 10^{-8}$	3	242			403 mmHg
Mylar	80	.11	$.015 \times 10^{-8}$	3	242			391 mmHg

References Reporting: 242

PERMEANT: Methyl Bromide CH_3Br

MATERIAL: Polyethylene Teraphthalate

PERMEANT: Methyl Bromide CH_3Br

MATERIAL: Polypropylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($_{-8}$) (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.907g/cc	30	15	20×10^{-9}	3	386			

References Reporting: 386

Type or Trade Name	Temp. °C	Permeability Std. Units (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran	30	.22	$.029 \times 10^{-8}$	3	242			385 mmHg
Saran	60	.59	$.079 \times 10^{-8}$	3	242			397 mmHg
Saran	90	3.0	$.40 \times 10^{-8}$	3	242			375 mmHg

References Reporting: 242

PERMEANT: Methyl Bromide CH_3Br

MATERIAL: Polyvinylidene Chloride

PERMEANT: Methyl Bromide CH_3Br

MATERIAL: Rubber Hydrochloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm	20	38.3	5.1×10^{-8}	3	242			399 mmHg
Pliofilm	60	25.5	3.4×10^{-8}	3	242			392 mmHg

References Reporting: 242

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lexan	100	10.9	1.45×10^{-8}	3	388			

References Reporting: 388

PERMEANT: Neon Ne

MATERIAL: Polycarbonate

PERMEANT: Neon Ne

MATERIAL: Rubber, Natural

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	35	8.5	8.6×10^{-8}	8	342			

References Reporting: 342

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	450	60×10^{-9}	1	203 297			

References Reporting: 203, 297

PERMEANT: Nitric Oxide NO

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	5701	760×10^{-9}	1	203 297			

References Reporting: 203, 297

PERMEANT: Nitrogen Dioxide NO_2

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Fused Silicone	25	.00000000000061	6.2×10^{-20}	6	378			

References Reporting: 378

PERMEANT: Nitrous Oxide N_2O

MATERIAL: Glass

PERMEANT: Nitrous Oxide N_2O

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	3263	435×10^{-9}	1	203 297			

References Reporting: 203, 297

Type or Trade Name	Temp. °C	Permeability Std. Units$_{-8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	6450	860×10^{-9}	1	203 206			

References Reporting: 203, 206

PERMEANT: Octane C_8H_{18}

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	15000	2000×10^{-9}	1	203 206			

References Reporting: 203, 206

PERMEANT: Pentane C_5H_{12}

MATERIAL: Rubber, Dimethylsilicone

PERMEANT: Pentane C_5H_{12}

MATERIAL: Rubber, Polydimethylsiloxane

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	30	32600	4.34×10^{-6}	1	284			Average of 3 samples
	40	28900	3.85×10^{-6}	1	284			Average of 3 samples
	50	25700	3.42×10^{-6}	1	284			Average of 3 samples
	60	22900	3.06×10^{-6}	1	284			Average of 3 samples
	70	20700	2.76×10^{-6}	1	284			Average of 3 samples

References Reporting: 284

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	8100	1080×10^{-9}	1	206			

References Reporting: 206

PERMEANT: Phenol C_6H_5OH

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kodapak II	31	2.0	$.27 \times 10^{-9}$	1	208			

References Reporting: 208

PERMEANT: Propane C_3H_8

MATERIAL: Cellulose Acetate Butyrate

PERMEANT: Propane C_3H_8

MATERIAL: Cellulose Nitrate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.0057	$.0058 \times 10^{-7}$	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	22			222	4.67		
	25	40.5	4.1×10^{-7}	8	225 378		1.20×10^{-7}	

References Reporting: 222, 225, 378

PERMEANT: Propane C_3H_8

MATERIAL: Hydropol

PERMEANT: Propane C_3H_8

MATERIAL: Neoprene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
GN	25	5.4	5.5×10^{-7}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				222	3.92		
Alathon 14	25	7.1	$.72 \times 10^{-7}$	8	225		$.322 \times 10^{-7}$	
Alathon 14	25	.41	$.41 \times 10^{-7}$	6	378			

References Reporting: 222, 225, 378

PERMEANT: Propane C_3H_8

MATERIAL: Polyethylene

PERMEANT: Propane C_3H_8

MATERIAL: Polyvinylidene Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Saran 517	25	.00027	$.00027 \times 10^{-7}$	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1.28	1.3×10^{-7}	6	378			

References Reporting: 378

PERMEANT: Propane C_3H_8

MATERIAL: Rubber, Butyl

PERMEANT: Propane C_3H_8

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	3080	410×10^{-9}	1	203 206			

References Reporting: 203, 206

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25				220 222	6.1		
	25	126	12.8×10^{-7}	8	225 378		2.1×10^{-7}	

References Reporting: 220, 222, 225, 378

PERMEANT: Propane C_3H_8

MATERIAL: Rubber, Natural

PERMEANT: Propane C_3H_8

MATERIAL: Rubber, Polysulfide

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Thiokol 3000ST	25	1.09	1.1×10^{-7}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
		2.0	1.6	5	346			

References Reporting: 346

PERMEANT: Propene C_3H_6

MATERIAL: Polystyrene

Type or Trade Name	Temp. °C	Permeability Std. Units ($Value \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	1430	1910×10^{-9}	1	203			
	25	1580	2100×10^{-9}	1	206			

References Reporting: 203, 206

PERMEANT: Pyridine C_5H_5

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	11250	1500×10^{-9}	1	203			

References Reporting: 203

PERMEANT: Sulfur Dioxide SO_2

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lexan	25	.0000049	6.5×10^{-15}	3	388			
Lexan	50	.000025	3.3×10^{-14}	3	388			
Lexan	75	.000090	1.2×10^{-13}	3	388			
Lexan	100	.00038	5.0×10^{-13}	3	388			
Lexan	125	.00098	1.3×10^{-12}	3	388			
Lexan	150	.0083	1.1×10^{-11}	3	388			
Lexan	175	.075	1.0×10^{-10}	3	388			

References Reporting: 388

PERMEANT: Sulfur Hexafluoride SF_6

MATERIAL: Polycarbonate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	6850	913×10^{-9}	1	203 206			

References Reporting: 203, 206

PERMEANT: Toluene $C_6H_5CH_3$

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units $_{8}$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	5100	6800×10^{-10}	3	311			
	25	4125	4180×10^{-7}	6	378			
Unplasticized	25	4130	550×10^{-8}	3	216			
Plasticized	25	5630	750×10^{-8}	3	240			90% R.H.
Plasticized	30	5550	7500×10^{-9}	3	216			
15% Plasticized	25	5550	740×10^{-8}	3	216			

References Reporting: 216, 240, 311, 378

PERMEANT: Water H_2O

MATERIAL: Cellulose Acetate

PERMEANT: Water H_2O

MATERIAL: Cellulose Nitrate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	4740	4800×10^{-7}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Plasticized	25	9800	1300×10^{-8}	3	216 240			
Plasticized	30	9800	13000×10^{-9}	3	216			
Ethocel 610	25	9750	9880×10^{-7}	6	378			
N-100	25	6530	870×10^{-8}	3	423			

References Reporting: 216, 240, 378, 423

PERMEANT: Water H_2O

MATERIAL: Ethyl Cellulose

PERMEANT: Water H_2O

MATERIAL: Lucite

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	2171	2200×10^{-7}	6	378			

References Reporting: 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
6	25	133	1770×10^{-10}	3	311			
6	25	53	70×10^{-9}	3	240			90% R.H.
6	25	53 to 510	7.0 to 68 $\times 10^{-8}$	3	216			Dependent upon humidity
6	30	54	72×10^{-9}	3	216			90% R.H.
66	25	2453	327×10^{-8}	3	423			
610	25	2040	272×10^{-8}	3	423			

References Reporting: 216, 240, 311, 423

PERMEANT: Water H_2O

MATERIAL: Nylon

PERMEANT: Water H_2O

MATERIAL: Polycarbonate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Lexan	25	51	68×10^{-9}	3	388			

References Reporting: 388

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F	30	.22	$.29 \times 10^{-9}$	3	216 240			
Kel-F-300	25	.022	$.29 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	25	.22	$.22 \times 10^{-7}$	6	378			
Kel-F-300	45	.064	$.85 \times 10^{-10}$	3	311			30% Crystallinity
Kel-F-300	60	.11	1.5×10^{-10}	3	311			30% Crystallinity
Kel-F-300	75	.21	2.8×10^{-10}	3	311			30% Crystallinity
Kel-F-300	80	.25	3.3×10^{-10}	3	311			30% Crystallinity
Kel-F-300	85	.32	4.3×10^{-10}	3	311			30% Crystallinity
Kel-F-300	95	.57	7.6×10^{-10}	3	311			30% Crystallinity
Kel-F-300	105	.98	13×10^{-10}	3	311			30% Crystallinity

PERMEANT: Water H_2O

MATERIAL: Polychlorotrifluoroethylene

PERMEANT: Water H_2O

MATERIAL: Polychlorotrifluoroethylene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Kel-F-300	115	1.5	20×10^{-10}	3	311			30% Crystallinity

References Reporting: 216, 240, 311, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.922g/cc	25	68	9.0×10^{-8}	3	216			
.922g/cc	25	75	1000×10^{-10}	3	311			
.922g/cc	25	60	8.0×10^{-8}	3	240			
.922g/cc	25	67.5	68.4×10^{-7}	6	378			
.922g/cc	30	93	124×10^{-9}	3	386			
.922g/cc	30	60	80×10^{-9}	3	216			
.938g/cc	25	18.8	2.5×10^{-8}	3	216			
.938g/cc	25	22.4	298×10^{-10}	3	311			
.953g/cc	25	12.0	160×10^{-10}	3	311			
.954g/cc	30	13.5	18×10^{-9}	3	216 386			

PERMEANT: Water H_2O

MATERIAL: Polyethylene

PERMEANT: Water H_2O

MATERIAL: Polyethylene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.954g/cc	25	9.8	1.3×10^{-8}	3	240			90% R.H.
.960g/cc	25	9.0	9.1×10^{-7}	6	378			
.960g/cc	25	9.0	1.2×10^{-8}	3	216			

References Reporting: 216, 240, 311, 378, 386

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Mylar A	25	98	13×10^{-8}	3	216 240 311			
Mylar A	25	97.5	98.8×10^{-7}	6	378			
Mylar A	30	98	130×10^{-9}	3	216 240 311			

References Reporting: 216, 240, 311, 378

PERMEANT: Water H_2O

MATERIAL: Polyethylent Terephthalate

PERMEANT: Water H_2O

MATERIAL: Polymethyl Methacrylate

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1050	140×10^{-8}	3	240			90% R.H.

References Reporting: 240

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
.907g/cc	25	38.3	5.1×10^{-8}	3	216			
.907g/cc	25	35.2	35.7×10^{-7}	6	378			
.907g/cc	30	51.0	68×10^{-9}	3	216 386			

References Reporting: 216, 378, 386

PERMEANT: Water H_2O

MATERIAL: Polypropylene

PERMEANT: Water H_2O

MATERIAL: Polystyrene

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	900	120×10^{-8}	3	240			90% R.H.
	25	622	630×10^{-7}	6	378			

References Reporting: 240, 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	7500	1000×10^{-8}	3	240			90% R.H.

References Reporting: 240

PERMEANT: Water H_2O

MATERIAL: Polyvinyl Acetate

PERMEANT: Water H_2O

MATERIAL: Polyvinyl Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	117	15.6×10^{-8}	3	240 311			90% R.H.
Geon 101	25	109	110×10^{-7}	6	378			

References Reporting: 240, 311, 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Vinylite VYNWO	25	271	275×10^{-7}	6	378			

References Reporting: 378

PERMEANT: Water H_2O

MATERIAL: Polyvinyl Chloride-Polyvinyl Acetate

PERMEANT: Water H_2O

MATERIAL: Polyvinylidene Chloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1.1	$.14 \times 10^{-8}$	3	240			90% R.H.
Saran	25	2.3 to 7.5	.3 to 1.0 $\times 10^{-8}$	3	216			
Saran	25	.75	10.0×10^{-10}	3	311			
Saran	30	1.1 to 7.5	1.4 to 10.0 $\times 10^{-9}$	3	216			
Saran 517	25	7.4	7.5×10^{-7}	6	378			

References Reporting: 216, 240, 311, 378

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	22500	3000×10^{-9}	1	297			
	Room	27000	3600×10^{-9}	1	203			
	25	28500	3800×10^{-9}	1	206			

References Reporting: 203, 206, 297

PERMEANT: Water H_2O

MATERIAL: Rubber, Dimethylsilicone

PERMEANT: Water H_2O

MATERIAL: Rubber Hydrochloride

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Pliofilm NO	25	18.8	19×10^{-7}	6	378			
Pliofilm NO	25	18.8	2.5×10^{-8}	3	216			
Pliofilm NO	25	18.0	2.4×10^{-8}	3	240			
Pliofilm NO	25	19.5	260×10^{-10}	3	311			
Pliofilm No	30	18.8	25×10^{-9}	3	216			

References Reporting: 216, 240, 311, 378

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	1800	240×10^{-8}	3	240			90% R.H.
	25	2570	2600×10^{-7}	6	378			

References Reporting: 240, 378

PERMEANT: Water H_2O

MATERIAL: Rubber, Natural

PERMEANT: Water H_2O

MATERIAL: Teflon

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
TFE	NG	NC	0.2	24	410			

References Reporting: 410

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
VYHH (unplasticized)	32				351		3.3×10^{-6}	32 mmHg pressure
VYHH (unplasticized)	60				351		9.9×10^{-6}	39.6 mmHg pressure
VYHH (plasticized)	32				351		15.6×10^{-6}	33 mmHg pressure
VYHH (plasticized)	60				351		21.4×10^{-6}	39.6 mmHg pressure

References Reporting: 351

PERMEANT: Water H_2O

MATERIAL: Vinyl--Chloride - Vinyl Acetate

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
Perbunan	25	.60	8×10^{-8}	3	212			
Perbunan	25	2.85	38×10^{-10}	3	348			

References Reporting: 212, 348

PERMEANT: Xenon Xe

MATERIAL: Butadiene-Acrylonitrile Copolymer

PERMEANT: Xenon Xe

MATERIAL: Neoprene

Type or Trade Name	Temp. °C	Permeability Std. Units$_8$ (Value x 10^{-8})	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	7.5	100×10^{-10}	3	212			
	25	3.4	45×10^{-10}	3	348			

References Reporting: 212, 348

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	.83	11×10^{-10}	3	212			
	25	3.0	40×10^{-10}	3	348			

References Reporting: 212, 348

PERMEANT: Xenon Xe

MATERIAL: Rubber, Butyl

PERMEANT: Xenon Xe

MATERIAL: Rubber, Dimethylsilicone

Type or Trade Name	Temp. °C	Permeability Std. Units ($\text{Value} \times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	Room	1523	203×10^{-9}	1	297			

References Reporting: 297

Type or Trade Name	Temp. °C	Permeability Std. Units ($\times 10^{-8}$)	Permeability as Reported	Units Rptd.	Ref.	Solubility scc/cc Bar	Diffusivity cm^2/sec	Comments
	25	32.2	430×10^{-10}	3	212			
	25	17.3	230×10^{-10}	3	348			
	35	72.5	73.5×10^{-8}	8	342			

References Reporting: 212, 342, 348

PERMEANT: Xenon Xe

MATERIAL: Rubber, Natural

VI Coordinate Index

The following index to the data content of this handbook is a cross-coordinate index. On the left side of each page is a listing of materials and the numbers of the pages on which data for these materials can be found. On the right side of each page is a listing of permeants and the numbers of the pages on which data for these permeants can be found.

Each page is cut down the center. Thus, to find the page on which data for a given permeant-material combination is recorded, for example, N_2O_4-Teflon Laminates, the following procedure is used:

A. Leaf through left-hand pages until 'Teflon Laminates' section is located.

B. Leaf through right-hand pages until 'N_2O_4' section is located.

C. Compare page numbers in these two sections. If a page number common to both is found, that is the number of the page on which data for N_2O_4-Teflon Laminates begin. If no common number is found, data for that combination are not in the handbook.