

This article was downloaded by:

On: 25 January 2011

Access details: *Access Details: Free Access*

Publisher *Taylor & Francis*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Separation Science and Technology

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713708471>

On the Permeability of Silicone Rubber to Acetylene

F. D. Wall^a; E. K. Lee^a; A. G. Williamson^a

^a DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSITY OF CANTERBURY, CHRISTCHURCH, NEW ZEALAND

To cite this Article Wall, F. D. , Lee, E. K. and Williamson, A. G.(1976) 'On the Permeability of Silicone Rubber to Acetylene', Separation Science and Technology, 11: 3, 301 — 302

To link to this Article: DOI: 10.1080/01496397608085322

URL: <http://dx.doi.org/10.1080/01496397608085322>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

NOTE

On the Permeability of Silicone Rubber to Acetylene

F. D. WALL, E. K. LEE, and A. G. WILLIAMSON

DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF CANTERBURY
CHRISTCHURCH, NEW ZEALAND

Abstract

Very high rates have been reported for the permeation of acetylene through silicone rubber. Measurements in this laboratory, while consistent with the reported data for the permeation of other gases through silicone rubber, do not confirm the rates reported for acetylene.

Permeation rates of acetylene through silicone rubber were measured with the simple apparatus shown in Fig. 1. The circular membrane (~2.5 in. diameter) was supported mechanically by a sintered stainless steel disk, and the steady-state gas flow rates were measured with a soap bubble flowmeter. Permeation rates were measured with ambient downstream pressure, and the pressure differentials across the membrane were from 10 to 60 psig for all gases except acetylene for which the maximum pressure difference used was 24 psig. The thickness of the membrane used in the calculations was that quoted by the suppliers. Permeability constants were substantially constant for pressure differences across the membrane greater than 20 psig. The membrane used was 0.003 in. unfilled silicone rubber film obtained from Sandev Ltd., Essex, England.

The permeability constants are shown in Table 1 along with values taken from Robb (*1*). As can be seen, there is good agreement between the results from different studies except for acetylene for which our figure is only

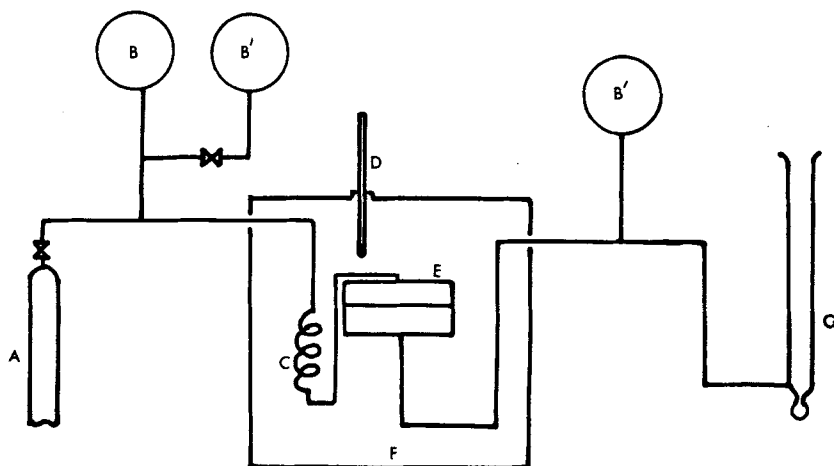


FIG. 1. A, gas supply cylinder; B, high pressure gauge, B', low pressure gauge; C, equilibrating coil; D, thermometer; E, permeation cell; F, air thermostat; and G, soap bubble meter.

TABLE 1

Permeation Constants P , $\left[\frac{\text{cm}^3(\text{STP}) \cdot \text{cm}}{\text{cm}^2 \cdot \text{cm Hg} \cdot \text{sec}} \right] \times 10^9$

| Substance | 20°C | 25°C (1) | 40°C | 60°C |
|-------------------------------|------|----------|------|------|
| CO ₂ | 326 | 325 | 309 | 295 |
| CH ₄ | 95 | 95 | 109 | 123 |
| C ₂ H ₆ | 271 | 250 | 270 | 268 |
| C ₂ H ₂ | 310 | 2640 | 296 | |

about 11 % of that quoted by Robb (1). We believe that this difference is real and probably represents a misprint in the original report.

Acknowledgment

We wish to thank Sandev Ltd., Essex, England for the gift of the membrane material used in this work.

REFERENCE

I. W. C. Robb, *Ann. N. Y. Acad. Sci.*, 146, 119 (1968).

Received by editor October 20, 1975