Diffusion of Argon and Air through Polyvinylchloride and Rubber

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In connection with experiments in which argon was circulated in a closed apparatus, a remarkable diffusion of the gas through rubber and polyvinylchloride tubing was observed. The gas was circulated by means of a pump described by Clusius¹, using tubing of rubber or polyvinylchloride (PVC).

The permeability constant P was measured for PVC and argon or air, respectively. P is equal to unity if one cm³ of gas at NTP per sec. is passing through one

cm² area of the membrane (thickness 1 mm) when the difference in partial pressure is one cm of mercury. In these units the results at $18 \pm 2^\circ \text{C}$ are:

$$P = 0.83 \times 10^{-9} \text{ for argon and PVC,}$$

and

$$P = 0.48 \times 10^{-9} \text{ for air and PVC.}$$

The diffusion of these gases through rubber tubing was similar. If the Clusius pump was working, the permeability was still higher.

The conclusion is, that in chemical experiments using gases, rubber or PVC containers, connections and especially Clusius pumps should not be used if diffusion out of or into the system has to be avoided.

1. Clusius, K. *Chimia* 4 (1950) 275.

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