Vapor Pressure of Propylene Oxide

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The saturated vapor pressure of propylene oxide in the temperature range 20° to 70° C. has been determined. Between 40° and 70° C., the results are correlated by the equation

$$\log P = 7.658 - \frac{1472}{T}$$

SATURATED VAPOR PRESSURES of propylene oxide at temperatures up to 48.5° C. have been reported in the literature (*2, 3, 4*). The correlation up to a temperature of about 40° C. given by Kireev and Popov (*3*) is:

$$\log P = -\frac{1722.73}{T} + 8.48693 \qquad (1)$$

where T = absolute temperature, °K.

The increasing interest in this material has prompted the confirmation and extension of the data.

APPARATUS AND EXPERIMENTAL METHOD

The apparatus, which is essentially a modified Reid vapor pressure apparatus (*1*) consisted of a 150-ml. chromium-plated brass cylindrical pressure vessel, immersed in a constant temperature bath. A mercury manometer was connected to the vessel by a flexible stainless steel tube. A "tee" junction in this line, having a valve with a connection to a vacuum pump via a cold trap (solid carbon dioxide), enabled the apparatus to be exhausted prior to the determination of vapor pressures.

The vessel and its contents of propylene oxide were held at constant temperature until equilibrium had been established when the level of mercury in the manometer was noted. Corrections were made for barometric pressure and the effects of liquid condensed in the manometer. Accuracy of pressure measurement was better than 0.25% while the temperature was recorded to ± 0.1° C. The purity of the propylene oxide (I.C.I.Ltd., H.O.C. Division) is greater than 99.9%.

RESULTS

The results, given in Table I, when plotted graphically, gave a straight-line relationship up to approximately 40° C. and a slightly different straight-line plot between 40° C. and 70° C.

Table I. Saturated Vapor Pressure of Propylene Oxide at Different Temperatures

Temp., ° C.	Vapor Pressure, Mm. Hg	Temp., ° C.	Vapor Pressure, Mm. Hg
19.0	416	50.2	1265
27.0	574	54.0	1452
36.3	806	59.2	1694
40.8	950	64.7	1994
46.8	1157	71.8	2403

The data obtained in the present work agree well with the data of Kireev and Popov in the range up to about 35° to 40° C.

The results presently reported in the range 40° to 70° C. are correlated by the following equation.

$$\log P = 7.658 - \frac{1472}{T} \qquad (2)$$

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Phase Behavior in the Hydrogen-Cyclohexane System

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THERE HAS BEEN a gradual accumulation of information concerning the phase behavior of binary systems involving hydrogen and a paraffin hydrocarbon. However, data upon the hydrogen-cyclohexane system are limited. An experimental study involving measurements of the specific volume of three mixtures of hydrogen and cyclohexane at four temperatures between 100° and 280° F. was carried out at pressures as high as 10,000 p.s.i.a. The composition of the coexisting gas phase in heterogeneous mixtures of hydrogen and cyclohexane was determined throughout the above-mentioned temperature and pressure interval. This binary system followed the trends of other hydrogen-paraffin hydrocarbon systems, and the critical pressure was above 10,000 p.s.i.a. for all of the temperatures investigated.