

Time, minutes	16	18	19
% Conversion	81.0	93.1	93.1

Ethyl maleate was treated in a similar manner with boron fluoride in carbon tetrachloride, with boron fluoride-ether complex alone and with dry hydrogen bromide added, and with hydrogen bromide in carbon tetrachloride. In every case less than 1% of the ester was isomerized. The analyses were carried out as before.⁸

Summary

It has been found that boron fluoride readily converts *cis*-stilbene to the *trans*-isomer.

(8) Price and Thorpe, *THIS JOURNAL*, **60**, 2839 (1938).

Many compounds have in common the ability to catalyze the Friedel-Crafts type of reaction, the polymerization of olefins, the condensation of olefins with aromatic compounds and the *cis-trans*-isomerization of olefins. It is suggested that the common factor in these reactions is the electron-deficient nature of the catalyst and that such catalysts may associate with the electrons of the carbon-carbon double bond to give an active intermediate common to each reaction.

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NOTES

Note on the Leakage of Helium through Pyrex Glass at Room Temperature. III

BY G. P. BAXTER

Some years ago an experiment was begun to measure the rate of leakage of helium through Pyrex glass at room temperature.¹ A sealed globe (1044 ml.) filled with helium originally under slightly less than average atmospheric pressure in this locality, 75 cm., was occasionally compared in weight with a very similar sealed globe, containing argon under a pressure somewhat above atmospheric, 79 mm. Over a period of three and one-half years the rate of loss was about 1% per year.

Recently, after over eleven years, when a reweighing of the globe was undertaken, a small crack was discovered in the argon globe. Since the argon was originally at a pressure above atmospheric, mechanical loss of argon would diminish, not increase, the loss in weight of the helium globe. In spite of the crack the helium globe was found to have lost a total of 17.8 mg., in a little over eleven years (4128 days), or over 10% of the original helium or 109 cm.³ The over-all rate for the total period is 0.053 mm.³ per day per cm.² of Pyrex glass of average thickness 1.34 mm. This is a slightly lower rate than that calculated from the first year's experience, 0.059 mm.³ per day per cm.² but the greater part of this difference is accounted for by the diminishing helium content of the globe.²

(1) Baxter, Starkweather and Ellestad, *Science*, **68**, 516 (1928); Baxter and Starkweather, *ibid.*, **73**, 618 (1931).

(2) Original weight of helium = 0.171 g. Erroneously given in ref. 1 as 0.168 g.

In the following table are given the leakage constants (years⁻¹) assuming the rate to be proportional to the pressure, for periods from one year to over eleven years, the actual losses in weight, and the losses calculated from the average leakage constant for the first three periods.³ From the leakage constant and loss in weight for the total period it seems probable that the argon counterpoise was losing in weight owing to the crack, although in the recent weighing, which was continued over several weeks, the helium globe was still diminishing in weight by comparison.

Years	K, years ⁻¹	Actual loss in wt., mg.	Calcd. loss in wt., mg.
1	0.0102	1.73	1.78
1.5	.0106	2.71	2.66
3.5	.0106	6.23	6.15
	Av. .0105		
11.3	.0097	17.8	19.1

(3) For a discussion of the mechanism of the leakage of helium through glass, see Urry, *THIS JOURNAL*, **54**, 3887 (1932). Urry's experimental data are not inconsistent with the above.

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Isotopes of Potassium in Phosphate Rocks and Soils

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Taylor and Urey¹ have shown recently that in the base exchange of potassium in zeolites "the heavier isotope is taken up more readily and is more difficult to replace." Since base exchange regularly occurs in nature, isotope abundance

(1) I. W. Taylor and H. C. Urey, *J. Chem. Phys.*, **6**, 429 (1938).