Furan Reactions. III. Absorption of Furan Vapors

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Mixtures of furan and air were made by introducing furan from a pipet into a 2-liter flask. Using a stopcock attachment, this gas was readily transferred into the buret of a modified Orsat type apparatus.[1] Fuming sulfuric acid (8% SO_3) was found to absorb the furan quickly and quantitatively, hence it was used to determine the percentage by volume of furan in the gas. The mixtures which were studied below contained about 10% of furan. The fuming acid is immediately darkened in color as the furan reaches it.

Using 40% potassium hydroxide solution in an absorption pipet, only one-third of the furan content of the gas was removed after thirty passes in and out of the reagent. With alkaline potassium iodomercurate (the reagent for acetylene) or 52% sulfuric acid solution, about 35 to 40% of the furan was removed by seven two-minute passes. With 62.5, 67.5 and 72.5% sulfuric acid, the percentage of furan removed after seven passes, respectively, was 57, 90 and 95. Using 82.5% sulfuric acid, the furan was absorbed completely in three passes. The 82.5% acid is the reagent which is used for the absorption of propylene, α- and β-butylenes, butadiene, etc. Furan was also removed quantitatively with mercuric acetate solution (50 g. in 225 cc. of water) thereby forming[2] tetraacetoxymercurifuran, $C_4O(HgOAc)_4$. Unfortunately for its use in separating furan from other gases, this reagent also removes carbon dioxide and unsaturated hydrocarbons.

Conclusions.—Furan (gas) may be absorbed quantitatively by 82.5% sulfuric acid. A mixture of furan and ethylene could be analyzed in this manner since ethylene is not absorbed unless fuming sulfuric acid is used. The absorption method is not applicable for the quantitative analysis of furan when it is admixed with other unsaturated hydrocarbon gases. With such mixtures, liquefaction and distillation (by precise methods of fractionation) would be necessary for exact analysis.

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[1] Hurd and Spence, This Journal, **51**, 3357 (1929).

[2] Ciusa and Grilla, *Gazz. chim. ital.*, **57**, 323 (1927).