chain-branching rate expression. Similarly, if deuterium is substituted for hydrogen, one would expect the rates of reactions e and g to be decreased much more than that of reaction f. Hence one expects the deuterium pressure to appear in the chain branching rate expression at lower temperatures than those at which the hydrogen pressure appears. Using the data of Frost and Alyea[7] for deuterium–oxygen explosions and a value of 0.5 for K_1'/K_1 of equation (4) the lines of Figure 5 for D_2 were obtained. It is apparent that the substitution of D_2 for H_2 practically obliterates the temperature effect observed for H_2.

The authors wish to express their sincere appreciation for many helpful criticisms made by Dr. L. S. Kassel.

Summary

An equation has been suggested for representing the explosion limits of hydrogen–oxygen mixtures as a function of the partial pressures of the reactants. This equation is shown to be qualitatively consistent with a series of possible reactions for the chain branching and chain breaking mechanisms; and it is in quantitative agreement with most of the available data.

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[7] Frost and Alyea, THIS JOURNAL, **56**, 1251 (1934).

NOTES

Boron Arsenate

BY WALTER C. SCHUMB AND WINSLOW H. HARTFORD

In connection with our study of the compounds of boron described elsewhere,[1] we have prepared the relatively little known boron arsenate,[2] and have determined certain of its properties. The method of Meyer[3] for the preparation of boron phosphate was employed, but modifications were necessary due to the greater tendency of boron arsenate to hydrolyze. The best results were obtained by the following procedure: 100 g. of arsenic acid was dissolved in water, the solution was filtered from any suspended matter, heated to boiling, and 20 g. of boric acid then was added. The liquid was maintained at the boiling point until, suddenly, a viscous, white precipitate formed, which was washed rapidly by decantation, filtered and dried; 24.5 g. of a pure white product was obtained. This product still contained a small amount of boric acid, but when boiled with ethyl alcohol, in which boric acid is somewhat soluble and hydrolysis does not occur, a substance was obtained which analysis showed to be very nearly pure boron arsenate. Boron and arsenic were determined on separate samples, using the standard Chapin method for boron, and the U. S. Department of Agriculture method for arsenic.[4] *Anal.* Calcd. for $BAsO_4$: B, 7.27; As, 50.34. Found: B, 7.21, 7.27; As, 50.17, 50.07, 50.20.

The ready hydrolysis of boron arsenate is indicated by the facts that in contact with water the substance was wholly decomposed after three days, and that even in acid solution hydrolysis slowly progressed.

The specific gravity of this substance was found to be, at room temperature, 3.40, a fact which, taken in comparison with the much lower specific gravities of the reactants, indicates a highly condensed internal structure. Its index of refraction (n_D) was 1.66. It is readily decomposed by hot water or warm solutions of sodium carbonate or sodium hydroxide; concentrated hydrochloric acid dissolves it on warming, forming arsenic trichloride and liberating chlorine. It is soluble in dilute sulfuric acid but not in the cold, concentrated acid. It is slowly dissolved by dilute or concentrated nitric acid. At red heat it is slightly decomposed without melting.

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[1] Schumb and Hartford, THIS JOURNAL, **56**, 2613 (1934).

[2] Berger, *Compt. rend.*, **170**, 1492 (1920); Schulze, *Naturwiss.*, **21**, 562 (1933); *Z. physik. Chem.*, **B24**, 215 (1934); Gruner, *Z. anorg. allgem. Chem.*, **219**, 181 (1934).

[3] Meyer, *Ber.*, **22**, 2919 (1889).

[4] Chapin, THIS JOURNAL, **30**, 1687 (1908); U. S. Dept. of Agriculture, Bull. 107, p. 239.

Occurrence and Position of the Principal Inflection Point in Certain Acid–Base Titration Curves

BY E. D. EASTMAN

This note comprises a refutation of the statements of P. S. Roller[1] concerning my previous

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[1] Roller, THIS JOURNAL, **54**, 3485 (1932).