Chlorine Dioxide Explosion.—It seems proper to issue a warning as to possible danger in the oxidation of primary alcohols by means of chlorate and dilute sulfuric acid in presence of vanadium pentoxide as described by Milas.[1]

A first trial of this interesting reaction, as applied to *n*-butyl alcohol, was uneventful, but gave a smaller yield than was expected, and a second trial was undertaken. This had proceeded about thirty minutes beyond the addition of the specified 18 cc. of 6 *N* sulfuric acid (see p. 498) when a detonation of the utmost violence occurred in the reflux condenser, scattering a shower of glass with great force. The reaction flask was undisturbed by the detonation.

It must be stated that Milas' directions were in both experiments modified by use of potassium instead of sodium chlorate, and that in the second trial the quantities of 5% sulfuric acid and chlorate were increased about 10% in the hope of decreasing the amount of alcohol unattacked; after the explosion part of the chlorate was still present in solid form. At the time of the accident the liquid was boiling gently.

Communication with Dr. Milas reveals the fact that, except in the oxidation of methyl alcohol (for which a special and safer procedure is described), sixty-two trials of the method were made with no explosion. He also states the substitution of potassium for sodium chlorate to be inadmissible, the former being "much more reactive" and also more likely to cause explosion because of its lower solubility in water. Most important, there is pointed out the absolute necessity for regulating the temperature of the liquid to 75–80° during and also following any addition of fresh acid. This appears clearly stated in the general directions (p. 495), but in the specific directions the first period of heating to 75–80° is followed by a period of *boiling*, and then more acid is introduced and the "heating" is continued. Throughout the directions the word "heating" is used, in a sometimes puzzling sequence, to imply either a temperature of 75–80° or the boiling temperature of the mixture.

In the interest of safety, therefore, it seems wise to emphasize the apparently urgent need for such a control of temperature that the liquid is not above 80° when fresh acid is added, and that this temperature be not exceeded until some time after the final addition of acid has been made.

According to Dr. Milas the method is quite safe if the conditions are properly controlled. It is hoped by this emphasis upon the conditions whose control is important, the oxidation may be rendered as free from hazard as is claimed. A very vivid recollection of a storm of glass, and the fact that the ill-fated experiment, heated only about five and a

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[1] Milas, This Journal, **50**, 493 (1928).

half hours, gave a very fair yield of ester, have combined to satisfy the writer's curiosity.

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NEW BOOKS

Oxidation-Reduction Reactions in Inorganic Chemistry. By ERIC R. JETTE, Ph.D., Assistant Professor of Chemistry, Washington Square College, New York University. The Century Company, 353 Fourth Avenue, New York, 1927. xvi + 152 pp. 10 figs. 13 × 19.5 cm. Price $1.10.

The author has discussed oxidation-reduction equations from two viewpoints: the "valence-change" and the "ion-electron" methods. The principles behind this book have been developing gradually since the publication of Ostwald's "Grundlinien der Anorganischen Chemie" about thirty years ago and have been taught from the electronic point of view in certain technical schools and colleges even before Alexander Smith in his "General Chemistry for Colleges" in 1914 brought out a scheme for balancing such equations. In recently published modern textbooks more than fifty per cent. of the equations discussed and studied are of the oxidation-reduction type. The author has attempted to explain these changes and methods of balancing equations for the student who has not had physical chemistry, the qualitative rather than the quantitative side being emphasized.

Topics discussed are: oxidation-reduction in relation to atomic structure; balancing equations of non-ionic type (valence change type) and those in aqueous solutions (ion-electron type); cell reactions and activity of metals; effect of hydrogen-ion concentration applied to manganese and nitrogen reactions; application of the ion-electron method to insoluble and weakly dissociated compounds, and the formation of complex ions in reactions in which oxidation-reduction changes take place. The book contains four appendices: the thermodynamic basis of the ion-electron method; in tabular form all common oxidizers and reducers, the main products of their oxidation-reduction action and notes on conditions of their reaction; oxidation-reduction potentials; a table of ionization constants of weak inorganic acids. References to the literature are given at the ends of chapters.

The book will appeal to students who wish to round out their cultural chemistry course, to advanced students in inorganic chemistry and to students of qualitative analysis. All teachers interested in modern ways of presenting inorganic chemical facts will be interested in reading this book.

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