

Reduction of Oxygen to Hydrogen Peroxide by the Irradiation of Its Aqueous Solution with X Rays

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Reduction of Oxygen to Hydrogen Peroxide by the Irradiation of Its Aqueous Solution with X-Rays

Irradiation, with x-rays, of oxygen dissolved in water causes its reduction to hydrogen peroxide, because of a primary activation of the water. The amount produced is independent of the oxygen pressure, up to 70 cm. It depends on the hydrogen ion concentration of the solution, as shown by Fig. 1, in which microequivalents of hydrogen

peroxide produced per kiloroentgen of dosage are given as a function of the hydrogen ion concentration. The curve is represented by the equation

$$\frac{\text{H}_2\text{O}_2}{\text{kiloroentgen}} = 2.2 \frac{1 + 2 \cdot 10^{10.1} [\text{H}^+]}{1 + 10^{10.1} [\text{H}^+]} \frac{\text{microequivalents}}{1000 \text{ cc.}}$$

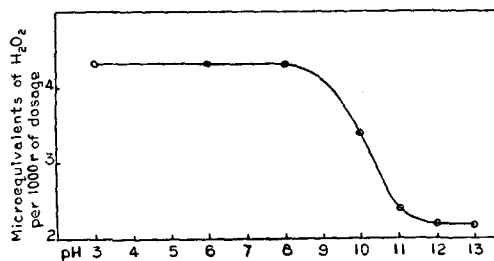


FIG. 1. The production of hydrogen peroxide as a function of the hydrogen ion concentration.

Twice as much hydrogen peroxide is produced in acid as in basic solution. Possibly both atoms of the oxygen molecule are transformed in the former case, as against only one transformed in the latter.

I am indebted to Dr. E. R. Brownscombe for assisting me with these measurements.

HUGO FRICKE

The Dr. Walter B. James Laboratory for Biophysics,
Biological Laboratory,
Cold Spring Harbor, L. I., New York,
April 19, 1934.

Raman Effect in Diiodoacetylene

We are interested in this laboratory in a systematic study of the acetylene bond as affected by substitution of hydrogen by various other elements or radicals. To this end we hope to investigate substituted acetylenes wherein the substituting group is of varying chemical character. Monomethyl acetylene¹ has been reported and the present communication deals with diiodoacetylene. The Raman spectrum of its solutions in alcohol has been studied and five lines have been measured. The frequency shifts of these lines are given in Table I and are believed to represent

frequency shift corresponding to the C—I vibration (627 cm⁻¹) is about 100 cm⁻¹ greater than those observed in iodine compounds of the saturated hydrocarbons.⁴ The C : C frequency (2109 cm⁻¹) is in the region characteristic of acetylenic compounds and does not support the acetylidine structure of this substance.

Other lines found on the photographic plates could be ascribed to the solvent. The details of this study will be published later.

GEORGE GLOCKLER
CHARLES MORRELL

TABLE I.

Frequency (cm ⁻¹)	191	310	627	688	2109
Intensity	strong	medium	weak	weak	strong

the fundamental vibrational frequencies of the C₂I₂ molecule. The diiodoacetylene was prepared and purified by the method of Dehn.² By using a mercury discharge tube and a filter of 12 mm of a saturated sodium nitrite solution³ excitation was obtained only from the mercury line of wave-length 4358Å. Photographs were taken on a Steinheil spectrograph equipped with glass prisms. The

University of Minnesota,
Minneapolis, Minnesota,
April 19, 1934.

¹ G. Glockler and H. M. Davis, Phys. Rev. **41**, 370 (1932).

² W. Dehn, J. Am. Chem. Soc. **33**, 1598 (1911).

³ H. Pfund, Phys. Rev. **42**, 581 (1932).

⁴ A. Dadiou and K. W. F. Kohlrausch, Wien. Ber. **137**, 717 (1930).