

glyoxal⁶ passed into a solution of cyclohexylmagnesium bromide gave a poor yield of the iso compound, iso- α,β -dicyclohexylethylene glycol, a result in line with the formation of iso-hydrobenzoin by a similar method.⁷

Finally, dodecahydrobenzoin was prepared by the method of Danilow and Venus-Danilowa.⁸ This compound was reduced catalytically, and gave an excellent yield of a product which proved to be identical with the previously described compound melting at 194°. Mixed melting point determinations showed no depression.

Hexahydromandelonitrile is a pale yellow, fairly mobile oil, with a faint aromatic odor. It is surprisingly stable and may be distilled under reduced pressure (reported undistillable by Godchot and Frezouls³). It is smoothly converted by the Radziscewski⁹ method into the amide³: b. p. 104° (0.70 mm.), 121° (1.6 mm.), d_{25}^{25} 1.0163, n_D^{25} 1.4716, M_D (n^2) calcd. 38.29, found, 38.19.

Anal. Calcd. for $C_8H_{13}ON$: C, 69.01; H, 9.42. Found: C, 68.68; H, 9.72.

Iso- α,β -dicyclohexylethylene Glycol.—When recrystallized from aqueous alcohol, the compound forms a white, felted mass of slender needles. It is very soluble in absolute alcohol and in most of the usual solvents. Cold, concd. sulfuric acid gives no coloration. The melting point is 153° (corr.).

Anal. Calcd. for $C_{14}H_{26}O_2$: C, 74.27; H, 11.59. Found: C, 74.61; H, 11.64.

⁶ Harries and Temme, *Ber.*, **40**, 165 (1907).

⁷ Wren and Still, *J. Chem. Soc.*, **103**, 1772 (1913).

⁸ Danilow and Venus-Danilowa, *Ber.*, **62**, 2653 (1929).

⁹ Method of Rupe and Majewski, *Ber.*, **33**, 3401 (1900).

CONTRIBUTION FROM THE
EXPERIMENTAL RESEARCH LABORATORIES
BURROUGHS WELLCOME AND CO.
TUCKAHOE, N. Y.

JOHANNES S. BUCK
WALTER S. IDE

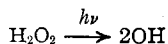
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COMMUNICATIONS TO THE EDITOR

THE PHOTOCHEMICAL REACTION BETWEEN HYDROGEN PEROXIDE AND HYDROGEN OR CARBON MONOXIDE IN THE GAS PHASE

Sir:

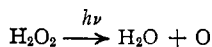
The absorption spectrum of gaseous hydrogen peroxide has been shown by Urey, Dawsey and Rice¹ to be continuous below 3000 Å. Their interpretation of the continuum favored the direct dissociation into OH radicals, namely



In order to test this point of view the writer carried out experiments to

¹ Urey, Dawsey and F. O. Rice, *THIS JOURNAL*, **51**, 1376 (1929).

detect the presence of OH radicals by a possible interaction with hydrogen molecules or carbon monoxide. If the dissociation occurs according to



no interaction with hydrogen or carbon monoxide should be observed, because the oxygen atoms would be expected to react with hydrogen peroxide much faster than with hydrogen or carbon monoxide.²

The experiments were so carried out that a mixture containing a constant percentage of hydrogen peroxide (about 1%) and the rest hydrogen or carbon monoxide was continuously recirculated in a system at 40°. The drop in pressure represented the disappearance of hydrogen or carbon monoxide. Details of the experimental arrangement will be published later. In the case of carbon monoxide, carbon dioxide could easily be detected in a barium hydroxide solution. The gases were illuminated with the radiation 2070 Å. and 2530 Å. from a zinc spark. Blank experiments were made in the dark.

A very decided but slow reaction was measured. The following table gives a few representative experiments.

TABLE I

Mixture	Partial pressure of H ₂ O ₂ approx. in mm.	Time of illumination, min.	Total pressure		Decrease in pressure per hour in mm.
			Initial	Final	
H ₂ O ₂ + H ₂	5	70	712.5	709.6	2.5
	5	50	711.1	709.0	2.5
H ₂ O ₂ + CO	5	60	706.0	702.0	4.0
	2	60	702.7	700.4	2.3

The results may best be explained on the basis of dissociation of hydrogen peroxide into OH radicals. These then collide with hydrogen or carbon monoxide and react in the following way with a low efficiency



Both reactions have long been proposed by Bonhoeffer and Haber.³

The results as they stand furnish an upper limit of the efficiency of Reactions 1 and 2. A more exact value will be given elsewhere⁴ together with a discussion of its bearing on the much discussed mechanism of the chains in the thermal reaction between hydrogen and oxygen.

COBB CHEMICAL LABORATORY
UNIVERSITY OF VIRGINIA
UNIVERSITY, VIRGINIA

GUENTHER VON ELBE

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² See Kistiakowsky, *THIS JOURNAL*, **52**, 1868 (1930), and Harteck and Kopsch, *Z. physik. Chem.*, **12B**, 327 (1931), for the reaction between O atoms and H₂ or CO.

³ Bonhoeffer and Haber, *Z. physik. Chem.*, **137A**, 263 (1928). See also Lavin and Jackson, *THIS JOURNAL*, **53**, 383, 3189 (1931), for Reaction 2.

⁴ G. von Elbe and Bernard Lewis, *THIS JOURNAL*, **54**, 552 (1932).