THE PHOTOCHEMICAL DECOMPOSITION OF NO_2

Sir:

The band spectrum[1] of NO_2 shows regions of diffuse absorption below 3700 Å. and 2448 Å. These have been interpreted by R. Mecke[2] and V. Henri[3] as predissociation spectra. At 3700 Å. the NO_2 should decompose into NO and a normal O atom, whereas at 2448 Å. the oxygen atom should be in a (^{1}D) state. If these statements are correct, then it should be possible to prove chemically the presence of oxygen atoms. Therefore mixtures of NO_2 with H_2, $H_2 + O_2$ and $CO + O_2$ have been exposed to light of various wave lengths.

With light of wave length below 3700 Å., H_2O and CO_2 were formed. From the ratio of the quanta of light absorbed to the amount of water formed it was calculated that the reaction

$$O + H_2 \longrightarrow OH + H$$

proceeds at least 10^4 times as slowly as the reaction

$$O + NO_2 \longrightarrow NO + O_2$$

when the oxygen atom is not excited. With shorter wave lengths (from Cd, Al and Zn sparks) the efficiency of water formation was greater.

From this it may be concluded that in the regions of predissociation oxygen atoms are actually produced. Furthermore, the results obtained confirm the observations of Kistiakowsky,[4] that the probability of a reaction of an O atom with H_2 forming OH + H is small. The experiments with added hydrogen and with added hydrogen and oxygen showed that at room temperature for each hydrogen atom less than two molecules of water are formed.

The details will be given in a paper soon to appear.

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THE ADSORPTION OF COMPLEX AMMONIUM IONS BY SILICA GEL

Sir:

In preparing metallized silica gels by the method of Latshaw and Reyerson,[1] it was early found that complex ammonium salts of platinum and palladium were most easily reduced to the metallic condition by adsorbed hydrogen. On the other hand, the ions of nickel and copper do not reduce

[1] L. Harris, *Proc. Nat. Acad. Sci.*, **14**, 690 (1928).

[2] R. Mecke, *Die Naturw.*, December 20 (1929); *Z. physik. Chem.*, **7B**, 108 (1930).

[3] V. Henri, *Nature*, **125**, 202 (1930).

[4] G. B. Kistiakowsky, THIS JOURNAL, **52**, 1868 (1930).

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[1] Latshaw and Reyerson, THIS JOURNAL, **47**, 610 (1925).

satisfactorily by the above method. It was, therefore, decided to attempt the reduction of complex salts of copper and nickel by passing hydrogen over silica gel containing these salts. When solutions containing complex cupric ammonium ions were poured on silica gel a surprising result occurred. The complex ammonium ions were found to be very strongly adsorbed by the silica gel. The first liquid which came through the silica gel was almost completely decolorized by the silica gel. The same result was found when complex ammonium ions of nickel were used. When these adsorbed ions are reduced by passing hydrogen over the dried gel an excellent metallic deposit results. The deposit resembles the palladium deposit of the previous method very much. We are continuing the investigation with regard to the specific adsorption of complex ions as well as the use of the metallized gels thus produced.

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NEW BOOKS

Experimental Physical Chemistry. By FARRINGTON DANIELS, J. HOWARD MATHEWS and JOHN WARREN WILLIAMS. McGraw-Hill Book Company, Inc., New York, 1929. xvi + 475 pp. 132 figs. 14.5 × 21 cm. Price, $3.50.

The authors state in their preface that the purposes of this book are "to illustrate the principles of physical chemistry, to train in careful experimentation, to develop familiarity with apparatus, to encourage ability in research." These purposes have led them to divide the material into three sections: Laboratory Experiments (Part I, 285 pp.), Apparatus (Part II, 145 pp.), Miscellaneous Operations (Part III, 29 pp.).

Part I provides a laboratory manual of physical chemistry which is unique both in the number and variety of exercises listed and in the treatment of the individual experiment. One might hope to cover about a third of the 78 experiments in the usual one-year laboratory course. Harassed instructors who want their laboratory outlines ready-made will get little comfort from this book, but others will find its wide scope a convenience where equipment is limited, and a powerful stimulus to the ambitious student. If necessary or desirable, a course of 25 or more exercises may be selected, involving only the conventional types of experiments and simple forms of apparatus. On the other hand, the material is sufficiently extensive to meet the needs of an advanced course such as electrochemistry, or a course introductory to research. Some of the topics covered which are seldom if ever included elsewhere are: viscosity of gases, specific heats of liquids, partial molal volumes, conductance in mixed solvents, decomposition potentials and overvoltage, the manganese