dimensions and both waters thus practically crystallize as a single body. This circumstance had formerly been pointed out by myself, but the absolute impossibility of a stepwise fractionation could not be postulated *a priori*.

LABORATORIO DI CHIMICA GENERALE G. BRUNI
R. POLITECNICO
MILANO, ITALY

RECEIVED AUGUST 23, 1934

OXYGEN A FACTOR IN THE BROMINATION OF CINNAMIC ACID

Sir:

We have found that bromine and cinnamic acid combine rapidly in the dark at room temperature when dissolved oxygen has been removed from the solution. When the oxygen has not been removed, the reaction is very slow in the dark, but it proceeds rapidly in the light. Apparently the many previous investigators of the photobromination of cinnamic acid, including ourselves [Bauer and Daniels, THIS JOURNAL, **56**, 378 (1934)] have been dealing with an oxygen-inhibited reaction.

The experimental apparatus and materials were as described before, except that a side arm containing a magnetic hammer and a sealed-off bulblet of bromine was fused to the quartz reaction cell. The cell was filled with a solution of cinnamic acid in carbon tetrachloride and boiled under reduced pressure at room temperature. The cell was then chilled and sealed off. When the cell had reached 20°, the bromine cell was broken in the dark. In every case the bromine reacted and the solution became colorless so rapidly that the rate of reaction could not be measured conveniently.

Under the same conditions, when a bulblet of oxygen was broken before the bromine bulb was broken, the solution retained its reddish color until exposed to bright light, behaving qualitatively as observed in the earlier investigation when air had not been removed.

Similar results were obtained using simpler apparatus and unpurified materials. An inverted U-tube of Pyrex was provided with a stopcock and tilted in such a way that one leg was partially filled with a carbon tetrachloride solution of cinnamic acid and the other with a carbon tetrachloride solution of bromine, care being taken to prevent bromine from getting into the cinnamic acid solution. Evacuation was continued until the solutions had boiled away to about half of their volumes. The stopcock was closed and on mixing the two solutions the bromine faded out within a few minutes. Admission of air practically stopped the reaction.

These results are in agreement with the findings of Kharasch [Kharasch and Mayo, THIS JOURNAL, **55**, 2468 (1933)] that peroxides affect the addition of hydrobromic acid to the double bond, with those of Schultze [*ibid.*, **56**, 1552, (1934)] that the rate of bromination of cyclopentadiene is affected by oxygen, and with those of Dickinson and Leermakers [*ibid.*, **54**, 3852 (1932)] that oxygen inhibits the photochlorination of tetrachloroethylene.

Experiments in this Laboratory indicate that the influence of oxygen on reactions of this type may be quite general.

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RECEIVED AUGUST 24, 1934

NEW BOOKS

A Comprehensive Treatise on Inorganic and Theoretical Chemistry. By J. W. MELLOR, D.Sc., F.R.S. Vol. XIII. **Iron.** Longmans, Green and Co., 55 Fifth Ave., New York, 1934. ix + 948 pp. 559 figs. 15.5 × 25 cm. Price, $20.00.

This volume continues the discussion of iron and its compounds. Specifically it covers the physical and chemical properties of the free element and the occurrence, preparation and properties of its oxides.

There are many special chapters of great interest and merit; for instance (18) The Mechanical—(19) The Thermal—(20) The Optical—(21) The Electrical—and (22) The Magnetic Properties of Iron and Iron Carbon Alloys; (24) The Corrosion of Iron and Steel; (26) The Passivity of Iron; (31) and (32) Hydrated Ferric Oxide-Hydrosol and-Hydrogel.

An extraordinary amount of information has been assembled in this volume in compact and accessible form, and as tested in a few restricted fields familiar to the reviewer, this information appears to be surprisingly complete. There is certainly no other treatise on this subject in our language which can compare with it in these respects.