

In this equation a_{H} is the hydrogen ion activity, S is the number of moles of water carried across the boundary by one mole of hydrogen ions and $a_{\text{H}_2\text{O}}$ is the activity of the water. If the glass electrode acted as a perfect hydrogen electrode, the equation would be

$$E_2 = \frac{RT}{F} \ln \frac{a'_{\text{H}}}{a_{\text{H}}} \quad (2)$$

Subtracting E_2 from E_1 , an equation for the error of the glass electrode in acid solutions is obtained, namely

$$\Delta E = E_1 - E_2 = S \frac{RT}{F} \ln \frac{a'_{\text{H}_2\text{O}}}{a_{\text{H}_2\text{O}}} \quad (3)$$

If the activity of the water is decreased in solution ('), the error will be negative, as is actually observed (Ref. 4). In order to test equation (3) further experiments have been carried out in alcoholic solutions and in acid solutions of various salts; they will be fully described in a paper to be submitted shortly for publication. At this time it should be emphasized that this apparent connection between the activity of the water and the proper functioning of the glass electrode must be considered by those who are using or hope to use the glass electrode for determining the P_{H} in non-aqueous solutions.

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THE CATALYTIC INFLUENCE OF DRIED CELLULOSE ON THE HYDROLYSIS OF SUCROSE

Sir:

The writers have found that the rate of hydrolysis of sucrose in aqueous solution is subject to a many-fold increase in the presence of dried cellulose fiber at elevated temperatures.

The cellulose fiber which was used as a catalyst in these studies was prepared from the purest quantitative filter paper (Whatman number 43). The paper was disintegrated to a pulp by boiling with distilled water. This treatment was repeated five times with fresh supplies of water. The pulp was pressed into a cake on a Büchner funnel and dried in air at atmospheric pressure at 130–135° for eighteen hours. The fiber was pulled apart with tweezers into a fluffy mass. It was reheated at the same temperature for several hours, and placed in a desiccator over a fresh charge of Dehydrite. Ash determinations on this fiber showed no more than 0.10% of non-volatile matter.

The hydrolysis of the sucrose was brought about by heating a 10% solution of the sugar at 80–85° in a thermostat for several hours. The increase in the rate of hydrolysis of the sucrose was studied originally by the quantitative determination of the ratio between the amount of reducing sugar formed in the control solution (containing no cellulose) and the amount formed in the solution containing cellulose. In later experiments the effect was studied by comparison of the specific rotation of the unhydrolyzed (unheated) sugar solution with that of the control solution, and that of the solution containing cellulose, respectively.

In a typical determination of the relative amounts of reducing sugar formed in the catalyzed and uncatalyzed hydrolysis of sucrose, the controls showed less than 0.01% of reducing sugar, whereas the cellulose catalyzed solutions showed $0.1 \approx 0.02\%$ of reducing sugar. This corresponds to a ten-fold difference. A one hundred and thirty-fold difference was observed in an hydrolysis carried out at 96–98°.

The writers are at present investigating the catalytic properties of dried cellulose fiber for the purpose of determining: (1) the conditions best suited to the activation of cellulose fiber; (2) the relationship (if any) between the structure of disaccharides and the effectiveness of dried cellulose fiber in promoting their hydrolysis; (3) the nature of the effect herein described.

A full account of this investigation will be submitted shortly to THIS JOURNAL.

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THEBAINONE

Sir:

The investigations of Clemens Schöpf have shown that the ketone originally called thebainone, resulting from reduction of thebaine with stannous chloride in concentrated hydrochloric acid, contains a new structural skeleton, differing from that present in the starting material. The ketone has been renamed metathebainone. In a recent publication [Schöpf and Hirsch, *Ann.*, **489**, 224 (1931)] the isolation of the true thebainone from the mother liquors of metathebainone preparation is described. In a footnote the statement is made that the true thebainone is undoubtedly different from the "sulfur-free ketone" obtained by Pschorr in 1910 by hydrolysis of β -ethylthiocodide.

In the course of studies which we have been conducting in the thiocodide series we have prepared a quantity of the "sulfur-free ketone" and find it to