

tates. However, the extreme dissimilarity of the two chloroacetylfructoses suggests that they, too, may not constitute an  $\alpha, \beta$ -pair. Dr. Brauns has remarked on their great difference in stability.

We now have experimental evidence that the so-called " $\alpha$ -chloroacetylfructose" and the " $\alpha$ -pentaacetylfructose" differ *structurally* from their isomer in that they are derivatives of the open-chain fructose and contain a free ketone group. The strongest evidence for the presence of a ketone group in " $\alpha$ -pentaacetylfructose" is its catalytic reduction to the alcohol. On account of the new asymmetric carbon atom formed during the reduction, sorbitol and mannitol derivatives should be obtained. After acetylation two compounds were isolated and identified as hexaacetylmannitol and hexaacetylsorbitol with melting points 121 and 97°, respectively.

Under the same conditions of reduction the " $\alpha$ -chloroacetylfructose" took up hydrogen and there resulted a substance which, like the starting material, contained a very stable chlorine atom.

The chlorine atom in " $\alpha$ -chloroacetylfructose" could not be replaced by heating the substance in acetic anhydride solution with silver acetate. This behavior suggests the presence of a firmly bound, primary chlorine atom.

For these reasons we conclude that the " $\alpha$ -chloroacetylfructose" represents a derivative of the open-chain fructose with a chlorine atom at carbon atom 6.

The details of this investigation will be published within a short time.

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#### THE CONSTANT $a$ IN THE DEBYE-HÜCKEL LIMITING EQUATION

Sir:

In THIS JOURNAL for February, 1932 (p. 831), Professor Hall discusses the numerical value of the constant  $a$  in the Debye-Hückel limiting equation:  $-\log f = aC^{1/2}$ , and refers to a publication ("Conductivity of Solutions," 1930) in which I pointed out that attempts to determine  $a$  experimentally have always led to values nearer to 0.4 than to the theoretical value 0.5.

In the same place I remarked that further data on the point are needed, and that conductivity measurements probably provide the most accurate way of obtaining them. Since then, Mr. Banks in this Laboratory has made conductivity measurements on mandelic acid at 25° which agree, after applying Onsager's correction for the mobility changes, with the theoretical value of  $a$ . We had intended to study further weak acids, but abandoned this plan when MacInnes and Shedlovsky [THIS JOURNAL, 53,

2419 (1931)] announced that their new conductivity measurements on acetic acid were in complete agreement with the Debye-Hückel value  $\alpha = 0.505$ .

I think that these two independent investigations provide the best possible verification of the theoretical formula, and it is interesting to find that Hall's calculations on hydrochloric acid are also in agreement with them. Incidentally, further support, if that were needed, for the theoretical value is afforded by the most recent solubility measurements [La Mer and Goldman, *THIS JOURNAL*, **51**, 2632 (1929), on thallous iodate; unpublished measurements in this Laboratory on barium iodate]. I am glad, therefore, to express my agreement with Professor Hall's conclusions, and have already taken an opportunity of replacing the older, misleading figures in the book to which he refers.

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### NEW BOOKS

**Svante Arrhenius.** By ERNST H. RIESENFELD, Professor at the University of Berlin. Akademische Verlagsgesellschaft m. b. H., Schlossgasse 9, Leipzig C 1, Germany, 1931. 110 pp. Illustrated. 16 × 23.5 cm. Price, unbound, M. 7; bound, M. 8.50.

This is a biographical sketch giving a readable and clear delineation of Svante Arrhenius and his important place in contemporaneous science for a third of a century, accompanied by a bibliography. The author shows a thorough understanding of men and events as well as of the important part played by the dissociation theory in the decade and a half prior to 1900, when the infant science of physical chemistry was going through its growing pains. Students of the history or philosophy of science will gain an insight from this book into the obstacles that ideas in advance of the times frequently and probably quite generally have to overcome before being accepted.

"There are not many scientists who have shaken so deeply the foundations of their science and pointed the way for its future development so far in advance as Svante Arrhenius, the creator of the doctrine of electrolytic dissociation," the author very truly states in the opening paragraph.

The tardy recognition of Arrhenius by scientific men in his own country is regrettable but not unusual, and perhaps we may say even according to the Scriptures. The reader, at least the American reader, is somewhat puzzled by several references to the work of Arrhenius' enemies in retarding his scientific advancement because no reasons are apparent why he should have had enemies, or at least active ones, particularly as the picture painted of him by the author is that of a genial, modest personality without conceit.