Sodium Sulfathiazole Sesquihydrate

When a warm concentrated aqueous solution of sulfathiazole in sodium hydroxide is cooled and the resulting crystalline solid is isolated by filtration, rinsed with a small amount of alcohol to free it of adhering mother liquor and then air dried, sodium sulfathiazole in the form of a hydrate is obtained. Under these conditions our material has regularly been the sesquihydrate. Thus, results found in volatile determinations have regularly been close to 8.7% as compared with 8.9% for the sesquihydrate. This hydrate is a white odorless, crystalline powder, dissolving in water to the extent of 1 g. per 1.9 cc. of water and in ethyl alcohol to the extent of 1 g. per 15 cc. 10% solutions in water are clear and colorless and show *p*H's in the neighborhood of 10. The conclusion that this is a sesquihydrate is further supported by the fact that a nitrite assay shows 83.5–83.9% as compared with a calculated value of 83.9%[1] for the sesquihydrate.

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[1] By calculation each gram of sodium sulfathiazole sesquihydrate contains 0.839 g. of sulfathiazole.

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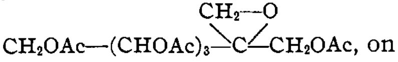
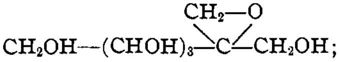
RECEIVED DECEMBER 14, 1940

COMMUNICATIONS TO THE EDITOR

THE ACTION OF DIAZOMETHANE UPON ACYCLIC SUGAR DERIVATIVES

Sir:

In continuation of our studies on the action of diazomethane upon acyclic sugar derivatives,[1] we wish to report the following new results. *keto-d*-Fructose pentaacetate,[2] in absolute chloroform solution containing a trace of methanol, yielded the ethylene oxide derivative (I)  $\mathrm{CH_2OAc{-}(CHOAc)_3{-}\overset{CH_2{-}O}{C}{-}CH_2OAc}$, on treatment with diazomethane; yield 75%, m. p. 86–87°, spec. rot. +32° (24°, *c* 3, abs. $CHCl_3$, D-line). Saponification of I with barium methylate (0.05 calcd. amount) followed by carbonation yielded II,  $\mathrm{CH_2OH{-}(CHOH)_3{-}\overset{CH_2{-}O}{C}{-}CH_2OH}$; m. p. 136°. Both I and II showed no coloration on heating with a methanol solution of potassium hydroxide but reduced Tollens reagent (pyridine solution of I).

Treatment of 1-diazo-1-desoxy-*keto-d*-glucoheptulose pentaacetate (III)[1] with an ethereal solution of dry hydrogen chloride produced 1-chloro-*keto-d*-glucoheptulose pentaacetate; m. p. 100–101°, spec. rot. −5.5° (22°, *c* 5, abs. $CHCl_3$, D-line). Similar treatment of III with hydrogen bromide yielded the corresponding 1-bromo-*keto-d*-glucoheptulose pentaacetate; m. p. 86–87°, spec. rot. −4° (24°, *c* 5, abs. $CHCl_3$, D-line). Treatment of a suspension of III in hot water with silver oxide, followed by silver ion removal with hydrogen sulfide and concentration, yielded 2-desoxy-*d*-glucoheptonolactone tetraacetate (IV); m. p. 129–130°, spec. rot. +39.5° (20°, *c* 4, abs. $CHCl_3$, D-line). Saponification of IV with barium hydrate, followed by removal of barium ion with sulfuric acid and concentration, yielded a crystalline product which is under further investigation; m. p. 170°, spec. rot. +20° (26°, *c* 5, H_2O, D-line).

Full details will be communicated in a later publication.

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THE OHIO STATE UNIVERSITY D. I. WEISBLAT
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RECEIVED JANUARY 20 1941

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[1] M. L. Wolfrom, D. I. Weisblat, W. H. Zophy and S. W. Waisbrot, THIS JOURNAL, **63**, 201 (1941).

[2] C. S. Hudson and D. H. Brauns, *ibid.*, **37**, 2736 (1915); E. Pacsu and F. V. Rich, *ibid.*, **55**, 3018 (1933); M. L. Wolfrom and A. Thompson, *ibid.*, **56**, 880 (1934).

APPLICATION OF THE SULFITE CLEAVAGE OF THIAMIN TO THE YEAST FERMENTATION METHOD

Sir:

The problem of specificity in the yeast fermentation method[1,2] for the determination of thiamin has been partially solved by the use of a technique involving oxidation of thiamin to the inactive thiochrome by means of alkaline ferricyanide.[3,4] Application of this method to substances of low potency, *e. g.*, refined white flour, requires extraction and concentration of the thiamin with the attendant dangers of loss or destruction. The work of Williams and co-workers[5] on the sulfite

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[1] Schultz, Atkin and Frey, THIS JOURNAL, **59**, 2457 (1937).

[2] Schultz, Atkin and Frey, *ibid.*, **60**, 1514 (1938).

[3] Schultz, Atkin and Frey, *ibid.*, **60**, 3084 (1938).

[4] Schultz, Atkin and Frey, *J. Biol. Chem.*, **136**, 713 (1940).

[5] Williams and Spies, "Vitamin B_1 and Its Use in Medicine," The Macmillan Co., New York, N. Y., 1938, p. 146.

cleavage of thiamin has suggested a modification of the yeast fermentation method which has wide applicability yet is simple and convenient to use.

Under appropriate conditions of *p*H and temperature thiamin is quantitatively (99%) cleaved by sulfite to yield 2-methyl-6-amino-pyrimidine-5-methyl-sulfonic acid and 4-methyl-5-(β-hydroxy)-ethylthiazole. We have found that neither of these substances is active in the yeast fermentation method for thiamin determination. 2-Methyl-5-ethoxymethyl-6-aminopyrimidine, which is a potential interfering substance in the original method, is unaffected by sulfite treatment. The corresponding 5-hydroxymethylpyrimidine or its esters which would also interfere are likewise unaffected by sulfite under mild conditions. The new method therefore consists of a determination of the fermentation response before and after sulfite treatment: the difference appears to represent the true thiamin content of the unknown.

To a solution or suspension of the unknown in a volume of 20 ml. add 0.2 g. of sodium sulfite [$Na_2SO_3 \cdot 7H_2O$] and adjust the *p*H to 5.0. Place in flowing steam for thirty minutes, cool and destroy excess sulfite with 3% hydrogen peroxide using acidified starch–iodide solution as an outside indicator (spot plate). Adjust *p*H to 6.2 and make to volume. An aliquot of this mixture is then assayed for its effect on fermentation.

Solutions of pure thiamin or cocarboxylase have negligible effects on fermentation after such treatment. Preliminary studies in which this method has been applied to natural substances of widely different potencies indicate that equally satisfactory results may be obtained with them. Together with a study of the most suitable condition for the sulfite treatment of various materials, these results will form the subject of a later communication.

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NEW YORK, N. Y.

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NEW BOOKS

The Life of Ira Remsen. By FREDERICK H. GETMAN. Published by the Journal of Chemical Education, Easton, Penna., 1940. 172 pp. 16 × 24 cm. Price, regular edition $2.50, de luxe edition, $3.50.

In reviewing "The Life of Ira Remsen," it is extremely difficult to resist the temptation to add to the biography rather than merely to review the work of the biographer. The reviewer feels sure that every student of Remsen would have the same inclination, since each one of these students could recite some particular episode of interest not only to the student in question, but to all of Remsen's student family. The reviewer was for four years the laboratory and lecture room assistant to Remsen and can unhesitatingly deny that Remsen was ever difficult to approach.

Dr. Getman has accomplished a splendid work. He has been fortunate in having been able to consult original sources in securing all the data concerning Remsen's ancestry and his family life. He has divided his biography into seven parts, namely, Youth and Education, Teacher and Scientist, University President and Public Servant, Private Life, Public Addresses, A Chemist Again, and Closing Years. There is also included in an appendix a list of the investigations carried out by Remsen or under his direction. These number one hundred and sixty.

Most of those who read this biography will for the first time learn of the youth and education of Remsen as well as of his private life and services as a university president and public servant. The readers of this biography will enjoy most the reminiscences brought to mind in connection with Remsen as a teacher and a scientist.

When Remsen returned to the United States from Germany, he was saturated with the German spirit of investigation acquired under Fittig, Liebig and Wöhler and he began his work at Johns Hopkins under the influence of that atmosphere. It must be remembered that Johns Hopkins was the first real university in the United States and it was eight years after its beginning that it became also a college by establishing an undergraduate course.

The methods which Remsen used in teaching were productive of splendid results in his students and this almost entirely on account of the inspiration with which he imbued them. He was simple, straightforward and honest. Money meant little to him. He sought the truth in a scientific way. Consider how lightly he passed off Fahlberg's capitalization on saccharin when von Bayer in Munich said that saccharin was a substance discovered by Remsen and stolen by Fahlberg.

The biographer has dealt in detail with the many phases of Remsen's life and the book should be read by every former student of Remsen who is alive, but unfortunately many have passed on. The book is inspirational and should therefore also appeal to the neophytes who are beginning their life work in Chemistry.