

amount was present. When potatoes that had been stored for several months were treated with ethylene chlorohydrin, the cuprous salt could be isolated, but in smaller yield than with freshly-harvested tubers. In one experiment, 1 liter of juice yielded 280 mg. of the cuprous salt; in another 600 cc. yielded 60 mg. The copper content of the latter preparation was 17.15%.

This is believed to be the first isolation of glutathione from a seed plant.

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YONKERS, NEW YORK

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JOHN D. GUTHRIE

E. L. HIRST'S COMMENTS ON IRVINE AND MCGLYNN'S PAPER ON
"A POSSIBLE SOURCE OF ERROR IN DETERMINING THE CONSTITUTION
OF DI- AND POLYSACCHARIDES"¹

Sir:

The criticisms made by Dr. E. L. Hirst reveal that in his reading of the paper to which he refers he has overlooked the essential features of the work described. Constitutions are not assigned to di- and polysaccharides but attention is directed, systematically and on the evidence of experimental work described for the first time, to possible sources of error in determining the constitution of these compounds by the methylation method. It is the case that the possibility of 2,3,6-trimethylglucose functioning in both a normal and a γ -form has already been suggested but our omission of any reference to Schlubach and Bomhard [*Ber.*, 59, 845 (1926)] does not involve that we overlooked previous work on the subject. It is at least unlikely that, as the originator of the method of solving the constitution of di- and polysaccharides by methylation, the efforts of other workers in this field should have been overlooked by me. But it may be pointed out that Schlubach and Bomhard merely converted the sugar into tetramethyl- γ -glucose through the intermediate formation of an unpurified glucoside, while in our case this glucoside was isolated after vacuum distillation as a pure compound, was analyzed and, among other reactions, was subjected to the graded hydrolysis which is obviously an essential part of the experimental scheme. The tautomerism of 2,3,6-trimethylglucose is in consequence no longer conjectural but is based on experimental evidence.

With regard to his criticisms of our studies on the oxidation of trimethylglucose, Dr. Hirst assumes that, when this reaction is carried out in the presence of calcium carbonate under the conditions we describe, the whole of the acid produced is transformed into the calcium salt. Such is

¹ Irvine and McGlynn, *THIS JOURNAL*, 54, 358 (1932).

not the case and his criticism is pointless. The remaining papers he quotes were known to us.

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JAMES C. IRVINE

AMMONIUM ACETATE AS A NEUTRAL BUFFERED STANDARD

Sir:

On theoretical grounds, Williams and Lyman [THIS JOURNAL, 54, 1911 (1932)] point out that ammonium acetate should be a good buffer at the neutral point, with P_H value practically independent of concentration. They suggest it, therefore, as a practically useful standard for hydrogen ion work and accurate titrations to P_H 7, which can be prepared in one minute. They do not describe the method for preparing the solution, but the emphasis upon the brief time required and statement that concentration is of minor importance suggest that it is only necessary to dissolve a few grams of the dry salt in a little water to secure a standard solution accurately buffered at P_H 7.

In this Laboratory, ammonium acetate solutions buffered near P_H 7 have been much used in the extraction of exchangeable bases from soil. In a description of the procedures employed [Schollenberger and Dreibelbis, *Soil Science*, 30, 161 (1930)] attention has been directed to the fact that solutions of "C. P. Analyzed Reagent" ammonium acetate in pure water are likely to be far from neutral; with several lots of the salt, normal solutions so prepared were near P_H 5, indicating the presence of about one mole of free acetic acid to two of ammonium acetate. Preparation of the solution by mixing equal volumes of accurately prepared 2 *N* solutions of acetic acid and ammonia was recommended. Experience has been that a solution so prepared is invariably very nearly neutral.

According to a well-known authority [Morley and Muir, "Watt's Dictionary of Chemistry," 1899, Vol. I, p. 9], pure ammonium acetate may be prepared by saturating glacial acetic acid with dry ammonia, and is then dry, white and odorless. It is difficult to crystallize, the aqueous solution tending to lose ammonia on evaporation, leaving an acid salt.

The crystalline salt sold as a reagent is often quite moist, with a strong odor of acetic acid, indicating either improper preparation or subsequent deterioration. Hence, a solution of commercial reagent quality ammonium acetate may be of doubtful value as a neutral buffer standard. Implicit reliance upon the purity and neutrality of a solution of the crystallized salt is certainly unjustifiable.

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