

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

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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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