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On the separate determination of acetone and diacetic acid in diabetic urines.

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The Messinger-Huppert method is valuable for the determination of acetone and diacetic acid in urine but it gives only the sum of these two products and there is manifestly need of an additional quantitative method for the separate determination either of acetone or of diacetic acid.

While acetone is a liquid with a boiling point of 56°C. and dissolves in water in all proportions, I have found that it can be removed from its solutions by means of an air current and at ordinary room temperatures even more readily than ammonia. It can be determined in about half an hour, according to the same principle and by the help of the same apparatus which I use for the determination of ammonia. The determination is made as follows:

Measure 20–25 c.c. of acetone solution or urine into an aerometer cylinder and add 0.2–0.3 gm. oxalic acid or a few drops of 10 per cent. phosphoric acid, 8–10 gm. sodium chloride and a little petroleum. Connect with the absorbing bottle (as in the ammonia determination) in which has been placed water and 40 per cent. KOH solution (about 10 c.c. of the latter to 150 c.c. of the former) and an excess of a standardized solution of iodine. Connect the whole with a Chapman pump and run the air current through for 20–25 minutes. (The air current should be fairly strong but not as strong as for the ammonia determination.) Every trace of the acetone will now have been converted into iodoform in the receiving bottle. Acidify the contents of the latter by the addition of concentrated hydrochloric acid (10 c.c. for each 10 c.c. of the strong alkali used) and titrate the excess of the iodine, as in the Messinger-Huppert method, with standardized thiosulphate solution and starch.

The determination of the acetone can be made simultaneously with the determination of the ammonia with the use of the same air current and even in the same sample of urine but I do not

recommend such a combination except for cases where the amount of available urine is small.

In order to obtain reliable results by this method it is necessary to observe certain precautions.

No time should be wasted after the alkali has been added to the standardized iodine solution because the potassium hypoiodite in the latter changes gradually to potassium iodate which is not available for the formation of iodoform. The alkaline iodine solution must not touch rubber. The absorption tube must therefore not consist of two tubes joined by a rubber stopper as I have heretofore used them in ammonia determinations but must be connected by the glass blower. Eimer and Amend have made me some excellent tubes suitable for this purpose. Finally no one should attempt to use the method on unknown solutions or urines until he has satisfied himself that he can get accurate figures with known acetone solutions. Such solutions can be made and standardized in a few minutes by direct titration with the iodine and thiosulphate solutions. Ten c.c. of pure acetone diluted up to one-fourth of a liter and twenty c.c. of this solution diluted to half a liter makes a suitable test solution of acetone.

The addition of an excess of sodium chloride as described above is important and should not be omitted. Acetone is insoluble or at least very little soluble in saturated sodium chloride solutions.

I am now investigating the acetone and diacetic acid contents of diabetic urines by the help of this method. Most such urines even when rich in diacetic acid contain surprisingly little acetone.

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On magnesium and contractile tissues.

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The experiments reported extend and confirm the findings of Meltzer and Auer. Magnesium is found to have a direct inhibitory effect on automatic tissue (plain and cardiac muscle) and a depressing effect upon the irritability of the non-automatic striped muscle.