Section on Practical Pharmacy and Dispensing

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SOME ADDITIONAL SOURCES OF ERROR IN THE CHEMICAL EXAMINATION OF URINE.

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At the 1907 meeting of the Association I read a paper, "Some Sources of Error in the Chemical Examination of Urine" (Proc., 1907, page 486) in which attention was called to various factors which if not observed would lead to faulty findings in connection with analyses of urine; since that time other sources of error have presented themselves which are of sufficient importance to be offered now.

In testing for sugar Fehling's Solution has the disadvantage that too large an amount of urine is employed with the consequence that foreign substances very frequently interfere, therefore Haines' Solution which only employs 8 or 10 drops of urine is suggested to overcome this difficulty, but as I pointed out in another paper, (Merck's Report, June, 1905), this solution is not stable, but deposits red oxide of copper on standing without the presence of urine and for that reason it is not of much value.

Recently Benedict, (Druggists' Circular from Jour. Amer. Med. Ass'n, January, 1912), has suggested the use of a solution in which 8 drops of urine are employed and the keeping qualities of the solution are such that it will keep indefinitely.

The solution and urine must be heated a minute or two to obtain the best results, a reaction only being regarded as positive when the greenish tinge extends throughout the whole mixture. A test tube is very unsatisfactory to perform the test in, therefore I employ a very small Erlenmeyer flask into which 5 cc. of Benedict's solution is measured with a pipette, and then 8 drops of urine added from a medicine dropper and the whole placed on the hot plate, and when the material starts to boil it is timed for 1½ minutes and then poured into a small test tube and allowed to cool spontaneously. It is a good plan to place a small funnel in the neck of the Erlenmeyer flask to act as a reflex condenser and prevent undue evaporation.

Where the quantity of sugar is large the presence of sugar is indicated at once by the green color whereas a small quantity of sugar is only revealed when the solution cools. If the mixture remains blue, sugar is absent.

For the quantitative estimation of sugar, Benedict's solution for quantitative work gives excellent results if properly employed. Benedict directs measuring the reagent into a porcelain evaporating dish, adding sodium carbonate, powdered pumice stone or talcum and boiling over a free flame.

This procedure did not yield very good results and I therefore altered it as follows:

Into a 100 cc. Erlenmeyer flask, with cord wrapped around the neck to prevent burning the fingers, measure with a pipette 25 cc. of Benedict's quantitative solution, add about 10 gram anhydrous sodium carbonate, a couple of pieces of pumice stone which have been heated to white heat and plunged into water, and about 10 cc. distilled water and place the whole on a hot plate until the solution boils and the sodium carbonate is dissolved, then begin adding the urine in small amounts from a burette, allowing sufficient time between each addition for the reaction to proceed, the end being indicated by the disappearance of the last trace of blue. As in the qualitative test it is a good plan to place a small funnel in the neck of the Erlenmeyer flask.

The use of the hot plate which I suggested in a paper read before the N. Y. S. Ph. Ass'n (Proc. N. Y. S. Ph. Ass'n, 1911, page 261) enables the qualitative and quantitative determinations to be carried out without any source of error.

Purdy's test for albumin using three-fourths of a test tube full of filtered urine, adding 1/6 of the volume of saturated solution of sodium chloride, acidifying with acetic acid and heating the upper inch of the mixture is a very sensitive and trustworthy one, but care must be exercised to keep the tubes very clean for when they are in use some time the portion of the tube which is constantly heated assumes a milky appearance with the result that albumin is indicated where none should appear.

Testing for acetone by adding solution of sodium nitroprusside to the urine acidifying with glacial acetic acid and overlaying with ammonia water is a very good test, but if the urine contains phenolphthalein there will be produced a coloration very much the same as when acetone is present.

In testing for indican by adding hydrochloric acid and an oxidizing agent, it is well to remember that after large doses of codeine a purple-red color is frequently produced which may obscure the blue color. In addition, if the urine contains iodine, the chloroform portion of the test will be colored carmine and it becomes necessary to add solution of sodium thiosulphate to decolorize it when the blue color will be plainly seen, if present.

In testing for diacetic acid the fact must not be overlooked that it is very volatile and that tests must not be made after the sample is a day old. The test is made by adding ferric chloride solution to the sample when the phosphates are all precipitated; further addition of the reagent produces a deep reddish-brown color which also appears if salicylic acid, phenol, acetic acid and other substances, produced after taking various other drugs are present.

A better test is Lipliawsky's modification of the Arnold reaction, which according to Wood (Wood's Chemical and Microscopical Diagnosis, page 553) is carried out as follows:

Two solutions are kept in stock. One is a 1% aqueous solution of para-amido-acetophenon with 2 cc. of strong hydrochloric acid in each 100 cc. of the mixture; the other is a 1% solution of potassium nitrite. To apply the test take 6 cc. of the first solution, 3 cc. of the second solution and 9 cc. of the urine to be tested. Add a drop of strong ammonia and then shake the whole thor-

oughly when a brick red color will appear. Ten drops to 2 cc. of the mixture of urine and reagent are then removed to another tube and 20 cc. of strong hydrochloric acid and 4 drops ferric chloride solution added, together with 3 cc. of chloroform. The corked test tube is then slowly tilted from side to side so as not to emulsify the chloroform. At the end of a minute, if diacetic acid is present, the chloroform will assume a violet color. In normal urines the color will be either a yellow or pale red. Salicylic acid and similar drugs do not interfere with the reaction.

In testing for bile with tincture iodine, the test to be successful must be made with a tincture of iodine diluted with alcohol until the color is a dark yellow which is applied by using a dropper to form a layer of reagent over the urine. A green ring indicates a positive reaction. Antipyrine yields the same reaction.

A better test is to take some of the suspected sample, add enough U. S. P. magnesia mixture to produce a precipitate and filter. When the material has filtered through, place the paper containing the precipitate on a white porcelain surface and add to it a drop of yellow nitric acid. A green color indicates bile.

These few notes like those published before are not intended as a course of instruction in uranalysis, but simply to point out some sources of error in the chemical examination of urine.

DISCUSSION.

Otto Raubenheimer, of Brooklyn, said he wished to call attention to two points in connection with this paper. One was, that Benedict's solution was not at all a new one. An attempt had been made to introduce Benedict's solution in the U. S. P., but it was declined with thanks.

R. H. Needham, of Ft. Worth, Tex., said that a good many authorities claimed that Haines' solution would keep indefinitely. His experience had not shown this to be true. Benedict's solution he had used for quite a while, and his experience had been that it kept well for two years. The last he had was four ounces in a five-pint bottle, which seemed to be just as sensitive at the end of that time as at the time he made it up.

CAMPHORATED OIL IN AMPOULES, SIMPLE APPARATUS FOR FILLING.

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In 1909 Mr. Caswell A. Mayo read a very interesting paper before the New York Branch of the Association entitled: "Ampoules and Their Use in the Preservation of Sterile Solutions," in which he explained how easily the dispensing pharmacist can put up any sterile solution in ampoule form.

I was very much interested in this subject, and began experimenting, with the result that I met with marked success.

My object in selecting the subject of Camphorated Oil Ampoules, is that during my experience as a pharmacist I have had more calls for Camphorated Oil Ampoules than any other kind. In former years, when physicians prescribed camphorated oil for hypodermic use they had to be prepared extemporaneously,