CXXVIII. A SIMPLE MICRO-TEST FOR ACETONE IN URINE.

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THE nitroprusside test, as modified by Rothera, is commonly used for the detection of acetone bodies in urine. In practice this test has certain disadvantages. Firstly, two of the reagents, concentrated ammonia and solid or saturated ammonium sulphate, are a menace to a clinical laboratory where blood analysis is in progress, while the third reagent, sodium nitroprusside, is unstable in solution. Secondly, acetoacetic acid responds to the test much more readily than acetone, so that the response is difficult to interpret. Finally, the presence of blood or bile may mask a faint reaction.

It is well known that acetone combines with mercury salts under certain conditions giving complex precipitates. Nessler's reagent, which is potassium mercuric iodide in alkaline solution, also reacts with acetone. This test is so delicate, that if a bottle of acetone be opened near a nesslerised solution, the latter will become turbid in a few minutes. At the boiling-point, this change appears to be almost instantaneous, with the formation of a copious creamy precipitate. Under suitable conditions 0.01 mg. of acetone yields a definite precipitate with 0.5 ml. of Nessler's reagent.

Test.

Reagents: (1) Nessler's reagent [Koch and McMeekin, 1924] diluted with an equal volume of water.

(2) 5% salicylsulphonic acid in 1% sodium sulphate solution.

Apparatus: This is an apparatus previously used for the distillation of ammonia [Beaumont and Dodds, 1934]. It consists essentially of two bulbs, about 8–10 ml. in capacity, connected by a U-tube containing the liquid. When steam is blown through, the liquid oscillates in the tube, but the bulbs prevent either sucking back or blowing out. The apparatus is easily cleaned with hydrochloric acid.

Procedure: Place approximately 0.2 ml. of urine and 3 ml. of acid in an 8 × 1 in. monax test-tube. Add a porcelain chip. Close the tube with the trap tube containing 0.5 ml. of diluted Nessler's reagent. Place the tube on a sand-bath and heat steadily and strongly until steam begins to pass through the Nessler's reagent. If the sand-bath is hot, this process takes 1–2 min.

Interpretation.

The test is given by acetone and acetoacetic acid since the latter is decomposed by boiling in acid solution. Under the above conditions normal urines give no definite response. A small but definite creamy precipitate is given by acetone solutions containing 0.01 mg. per ml. When urine contains more than 1%

acetone, the reaction is characteristic. The dense initial precipitate, which appears, dissolves gradually and may be reprecipitated by continued boiling. Volatile reducing substances, *e.g.* formaldehyde, when present in urine, interfere with the test, giving a red precipitate. In this case, repeat the test, adding one drop of 1 % sodium hypochlorite to the Nessler's reagent before heating. This alteration renders the test less sensitive. The normal output of acetone and acetoacetic acid is generally considered to be less than 20 mg. *per diem* or 0.01 mg. per ml. The test may also be applied to blood filtrates; in this case 2 ml. tungstic acid filtrate are used and treated as described above.

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REFERENCES.

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