245 (2768)

The use of the bicolorimeter for the estimation of the hydrogen-ion concentration of urine.

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In connection with a study of the acid-base balance of the blood in alkalosis it seemed necessary to secure information regarding the hydrogen ion concentration of the urine. The use of the bicolorimeter for this purpose was suggested in an earlier communication,[1] but details of the technique remained to be worked out. The method as now employed is outlined below. We believe that it increases the simplicity, delicacy and accuracy of the determination.

Three indicators have been employed—phenol red, brom cresol purple and brom cresol green (or methyl red). Wedges are calibrated for each of these indicators, the range employed for phenol red being pH 6.6 to 8.6; for brom cresol purple pH 5.2 to 7.0; and for brom cresol green (or methyl red) pH 4.6 to 5.4. Phenol red is employed in an 0.02 per cent concentration, while an 0.04 per cent solution is used for the other two indicators. The alkaline wedges employed with the phenol red and brom cresol purple indicators are filled with *m*/15 secondary phosphate diluted with 10 per cent of the indicator solution (1 cc. for 10 cc. of phosphate solution); while the acid wedges are filled with *m*/15 primary phosphate similarly diluted with indicator. The wedges for the brom cresol green indicator are made up with Clark's phthalate-NaOH mixture, the alkaline wedge having a pH of 5.8, and the acid wedge of 4.0. In the calibration of the wedges Clark's phthalate-NaOH mixture is used for the range pH 4.6 to 5.2, and Sörenson's buffer phosphates for the range pH 5.2 to 8.6. Since brom cresol purple covers the range pH 5.2 to 7.0 it will take care of the great majority of urines, although for very strongly acid urines, or for alkaline urines, the other two indicators are necessary.

[1] Myers, V. C., PROC. SOC. EXP. BIOL. AND MED., 1919, xix, 78; *J. Biol. Chem.*, 1922, liv, 675.

For the estimation, urine is collected in clean Pyrex beakers with as little contact with air as possible. Two 1 cc. samples are diluted to 10 cc. with distilled water in Pyrex test tubes. To one of these tubes 1 cc. of the brom cresol purple indicator is added, and the solution mixed. If the pH of the urine falls within the range of the indicator, readings are at once made in the bicolorimeter. If not, 1 cc. of either brom cresol green or phenol red is added to the second tube, depending upon whether the urine is strongly acid or alkaline, and color comparison made. So far as the matching of colors goes, the method has a probable error of ± pH 0.02 to 0.04.

246 (2769)

Observations on the excretion of an acid urine in alkalosis.

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It has been customary to use the reaction of the urine as a guide to the therapeutic administration of sodium bicarbonate. In their most recent discussion of the subject Palmer, Salvesen and Jackson[1] state that the first significant effect on the pH of the urine, *i. e.*, a rise to pH 7.0, can be taken as a safe and reliable guide for discontinuing alkali administration. This is probably true in the great majority of cases, but we believe that occasionally cases are encountered which do not readily excrete alkali, and that in such instances the reaction of the urine is not a safe criterion. We can record observations on two cases where the reaction of the urine remained strongly acid despite the development of an alkalosis. The data are self explanatory.

[1] Palmer, W. W., Salvesen, H., and Jackson, H., Jr., *J. Biol. Chem.*, 1920-21, xlv, 101.