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Area	Laboratory-Chemistry
Applicability	Royal Oak

pH in Urine (Multistix 10 SG) - Royal Oak

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

A. Indicators methyl red and bromthymol blue give a range of orange through yellow and green to blue as pH rises. The test permits differentiation of pH values to half a unit within the range of 5 to 9.

B. Urine pH reflects the ability of the kidneys to maintain normal H^+ (hydrogen) concentration in plasma. The metabolic activity of the body produces non-volatile acids (primarily sulfuric, phosphoric, and hydrochloric). These are excreted by the glomerulus with cations, chiefly sodium (Na^+). The tubular cells than exchange H^+ for Na^+, and indirectly reabsorb HCO_3^- (bicarbonate), resulting in the acidification of urine. Hydrogen ions are also excreted as ammonium ions (NH_4^+).

C. Acidifying agents or alkalinizing agents may be used to induce pH changes in urine. This facilitates antibiotic therapy for urinary tract infections, treatment of urinary calculi and salicylate and barbiturate overdoses.

D. The urinalysis pH result aids the technologist with identification of crystals observed.

E. This document describes the steps for this procedure to assist technologists.

II. SPECIMEN COLLECTION AND HANDLING:

Fresh, well-mixed, uncentrifuged urine. It is recommended that testing be done within one hour after voiding. Otherwise immediately refrigerate the specimen and return to room temperature before testing.

III. REAGENTS/SUPPLIES:

A. Siemens Multistix 10 SG (#2161)

B. 0.2% weight for weight (w/w) methyl red
C. 2.8% w/w bromthymol blue
D. 97.0% w/w nonreactive ingredients

IV. QUALITY CONTROL (QC):

A. Both Normal and Abnormal Kova-Trols are run and results are recorded:
    1. at the beginning of each shift
    2. whenever a new lot number of reagent strips is opened
    3. whenever troubleshooting warrants it

V. PROCEDURE:

A. Briefly dip the test area of the strip in fresh, **well-mixed** uncentrifuged urine.
B. While removing the strip, run the edge against the rim of the urine container to remove excess urine. Hold the strip in a horizontal position to prevent mixing of chemicals from adjacent reagent areas and/or contaminating the hands with urine.
    1. If reading visually, check the **pH** reagent area after dipping. If the test pad color **is not** uniform, read the reagent area immediately, comparing the darkest color to the corresponding Color Chart on the bottle label. If the test pad color **is** uniform, the pH may be read at **60 seconds**, or at any time up to 2 minutes after dipping.
    2. If reading instrumentally, follow directions given in the Clinitek Advantus procedure.

VI. REPORTABLE RANGE:

A. The color comparison chart has **SEVEN** color blocks ranging from pH=5.0 to 8.5 in increments of 0.5. The Clinitek Advantus measures pH from 5.0 to ≥9.0.
    1. pH readings are not affected by variations in the urinary buffer concentrations

VII. REFERENCE RANGE:

A. Both the normal and abnormal urinary pH ranges from 5-9
B. **ACID** urine may be caused by:
    1. high protein diet
    2. cranberries
    3. metabolic/respiratory acidosis
    4. acidifiers used to treat urinary calculi
C. **ALKALINE** urine may be caused by:
    1. high vegetable diet or certain citrus fruits
    2. metabolic/respiratory alkalosis
    3. alkalinizing agents used to treat calculi, facilitate antibiotic therapy for UTI and in

management of salicylate and barbiturate overdoses.

4. renal tubular acidosis

VIII. LIMITATIONS/INTERFERING SUBSTANCES:

A. Proper dipping procedure is required so that excess urine does not cause runover from the protein pad. This would wash acid buffer onto the pH area, and falsely lower the pH result.

B. Prolonged exposure of unpreserved urine to room temperature may result in microbial proliferation with increase in pH.

C. Urine containing glucose may decrease in pH as organisms metabolize the glucose.

IX. REFERENCES:

1. Multistix 10 SG. Miles, Inc. Diagnostics Division, Elkhart, IN 46515, rev. 04/99.
2. Henry, J.B. Clinical Diagnosis and Management by Laboratory Methods, 20th edition, Philadelphia, W.B. Saunders Co., 2001, pp. 372-373.
3. Hundley, J.M and Fleming, J.K., Urine Analysis American Society of Clinical Pathologists Workshop, Dearborn, MI., 1991.

Approval Signatures

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