

Urinalysis

OBJECTIVE/RATIONALE

Urinalysis is an important tool in diagnosing diseases and disorders. The student will identify and analyze selected physical and chemical properties of urine.

TEKS 121.13 (c) 1A, 1B, 2A, 2B, 8A

TAKS ELA 1, 5

Mathematics 8, 9

Science 1, 4

National Science Education Standards A9-12; C9-12; F9-12; G9-12

National Health Care Skills Standards .01, .02, .03, .04, .05, .06, .07

National Curriculum Standards for School Mathematics S1; S3; S10; S11

KEY POINTS

- I. Urine Production
- II. Urine Composition
 - Normal Constitutes
 - a. nitrogen
 - b. electrolytes
 - Abnormal Constitutes
 - a. blood
 - b. glucose
 - c. bacteria
- III. Urine physical and chemical characteristics
 - 1. color: normally it varies from colorless to dark yellow; may be discolored by certain foods, diseases, and medications.
 - 2. specific gravity: ranges from 1.006 to 1.030; the higher the number, the more concentrated the sample
 - 3. pH: the relative acidity or alkalinity; ranges from 4.6 to 8.0; average pH of urine is 6.0
 - 4. glucose: absent in normal urine; high levels may indicate diabetes
 - 5. protein: absent in normal urine; any present may indicate kidney disorders
 - 6. ketone: absent in normal urine; any present could indicate diabetes, starvation, or alcohol intoxication
 - 7. blood

ACTIVITIES

- I. Complete the Urinalysis Laboratory Investigation.

MATERIALS

Centrifuge
Centrifuge tubes
Microscopes, lens paper
Slides
Coverslips
Paper towels or gauze
Reagent strips
Pre-tested urine
Test tube rack
Distilled water
Pasteur pipettes
Stedi-stain (optional)
Refractometer and/or midget urinometer
Timer
Goggles
Watch with second hand
Gloves
Lab coat
Plastic 15 ml conical centrifuge tube
Urinary sediment slides or pictures
Specimen cups
Simulated urine
Biohazard containers
Surface disinfectant
Paper towels

Urine examination/analysis Biokit (Carolina, phone: 800-227-1150, product number BA-69- 5834

Four-factor urinary test strip 13 x 100mm test tubes (Carolina; product number BA-69-5964

HOSA Medical Laboratory Assisting Event Guidelines

Teacher Note

Make artificial urine (using tap as a base as an unknown test solution; colors can be altered using food colors; sodium chloride can be added to regulate specific gravity; small amounts of sodium hydroxide or vinegar can be used to alter pH; albumin, glucose, and ketone can be added to test positive for these components

ASSESSMENT

Laboratory Investigation Rubric

HOSA Medical Laboratory Assisting Event Rubric – <http://www.hosa.org>

ACCOMODATIONS

For reinforcement, the student will list normal values of constituents in urine.

For enrichment, the student will research a case study of a disease involving the urinary system and create a multimedia presentation.

REFLECTIONS

Urinalysis Laboratory Investigation

PURPOSE:

In this laboratory investigation, the student will test urine for color, specific gravity, pH, and the presence or absence of glucose, protein, and or ketone.

BACKGROUND INFORMATION:

MATERIALS:

- Centrifuge
- Centrifuge tubes
- Microscopes, lens paper
- Slides
- Coverslips
- Paper towels or gauze
- Reagent strips
- Pre-tested urine
- Test tube rack
- Distilled water
- Pasteur pipettes
- Stedi-stain (optional)
- Refractometer and/or midget urinometer
- Timer
- Goggles
- Watch with second hand
- Gloves
- Lab coat
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- Urinary sediment slides or pictures
- Specimen cups
- Simulated urine
- Biohazard containers
- Surface disinfectant
- Paper towels

PROCEDURE:

A. Determination of Physical Properties

1. Wash hands and put on gloves and goggles.
2. Assemble equipment and materials.
3. Prepare work area.
4. Prepare work area. Mix specimen by gently swirling.
5. Record clarity (clear, cloudy, hazy, turbid)
6. Record color (straw, yellow, amber, red)
7. Determine and record specific gravity with urinometer or refractor.
8. Clean work area with surface disinfectant. Remove goggles and gloves and wash hands.

B. Chemical Examination

1. Wash hands and put on gloves and goggles.
2. Assemble equipment and materials.
3. Prepare work area.
4. Mix specimen by gently swirling.
5. Remove lid of reagent container and place lid upside down.
6. Lift strip out of container without contaminating.
7. Close reagent container.
8. Dip strip into urine covering all reagent bars without touching rim of urine container.
9. Remove strip immediately and tap against side of container to remove excess urine.
10. Note time on watch or start timer immediately.
11. Read reagent strip
 - a Read pH at correct time and record results.
 - b Read protein at correct time and record results.
 - c Read glucose at correct time and record results.
 - d Read ketones at correct time and record results.
 - e Read blood at correct time and record results.
12. Discard strip appropriately
13. Clean work area with surface disinfectant. Remove goggles and gloves and wash hands.

C. Microscopic exam of Urinary Sediment

1. Wash hands and put on gloves and goggles.
2. Assemble equipment and materials.
3. Prepare work area.
4. Label centrifuge tube.
5. Mix urine gently by rotating container.
6. Pour 10-12 ml urine into clean centrifuge tube.
7. Centrifuge for 5 minutes.
8. Decant supernatant leaving 1 ml undisturbed.
9. Mix supernatant and sediment by gently shaking or tapping tube.
10. Transform one drop of sediment onto clean glass slide.

11. Place cover slip over urine. Examine with microscope to identify sediments.
12. Discard of materials appropriately
13. Clean work area with surface disinfectant. Remove goggles and gloves and wash hands.

DATA:

Design a table showing the results of clarity, color, and specific gravity

Design a table showing the results of tests for pH, protein, glucose, ketones, and blood.

Draw and identify sediments observed under the microscope.

