

# UREASE TESTING

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## OBJECTIVE/RATIONALE

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Biochemical reactions are important in the identification of bacteria. The student will perform the urease test to aid in the identification of unknown bacteria.

TEKS 121.14 (c) 1A, 1B, 4B, 4C, 4D, 5B

TAKS ELA 1, 4

Mathematics 8

Science 1, 2, 4

National Science Education Standards A9-12;C9-12

National Health Care Skills Standards .01, .04, .05, .06, .07, .08

National Curriculum Standards for School Mathematics S1; S3

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## KEY POINTS

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The urease reaction is used to identify the rapid urease producers Proteus and Morganella species, as well as slower urease producers Klebsiella and some species of Enterobacter.

- I. The urease reaction
  - a. Principle: Urease is an enzyme that splits urea into alkaline end products of ammonia, carbon dioxide, and water. The ammonia reacts in solution to form ammonium carbonate resulting in a lower pH of the broth. This causes the indicator to change from a buff color to pink-red (fuschia).
  - b. Purpose: identification of Proteus, Morganella, Klebsiella, and some species of Enterobacter.
  - c. Procedure:
    1. Place one single isolated colony into the urea broth with an inoculating loop. The colony should be 18 to 24 hours old.
    2. Replace the cap loosely on the broth or use parafilm over the opening.
    3. Incubate at 35C for 18 to 24 hours.
    4. Tubes may be placed in the refrigerator after incubation until they can be interpreted by the student.
    5. Record observations:
      - a. Positive: Pink-red color broth
      - b. Negative: Buff color broth
- II. Quality control
  1. Positive: Proteus vulgaris
  2. Negative: Escherichia coli

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## ACTIVITIES

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- I. Complete the Urease Laboratory Investigation.

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## MATERIALS/RESOURCES

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TSA plate with 18 – 24 hour cultures.

Suggested bacteria:

Urease positive: Nonpathogenic Proteus vulgaris

Urease negative: Nonpathogenic Escherichia coli

Urea broth tubes

Incubator

Inoculating loops

Bunsen burner

Gloves

Laboratory coat or apron

Bunsen burner

Goggles

Biohazard containers

Surface disinfectant

Paper towels

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## ASSESSMENT

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Laboratory Investigation Rubric

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## ACCOMMODATIONS

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For reinforcement, the student will review the steps in the urease procedure and repeat the laboratory investigation.

For enrichment, the student will research diseases caused by Proteus vulgaris.

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## REFLECTIONS

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# UREASE LABORATORY INVESTIGATION

**NAME:**

**DATE:**

**PURPOSE:**

In this laboratory investigation, the student will learn the steps of urease testing.

**BACKGROUND INFORMATION:**

**MATERIALS:**

TSA plate with 18 – 24 hour growth of the following bacteria:.

Nonpathogenic Proteus vulgaris

Nonpathogenic Escherichia coli

Urea broth tubes

*Incubator*

*Inoculating loops*

*Bunsen burner*

Gloves

Laboratory coat or apron

Bunsen burner

Goggles

Biohazard containers

Surface disinfectant

Paper towels

**PROCEDURE:**

1. Wash hands and put on gloves and goggles.
2. Assemble equipment and materials.
3. Prepare work area.
4. Flame and cool the inoculating loop.
5. Place one single isolated colony into the urea broth with an inoculating loop. The colony should be 18 to 24 hours old.
6. Flame and cool the inoculating loop.
7. Replace the cap loosely on the broth or use parafilm over the opening.
8. Incubate at 35C for 18 to 24 hours.
9. Tubes may be placed in the refrigerator after incubation until the student can interpret them.
10. Record observations:

