Acids and Bases

Mystery Liquids

5th Grade

Estimated Time: 45 minutes

Model: Inquiry- The inquiry model allows students to practice their problem solving skills and become more familiar with the scientific method as a way to solve problems.

Goal: To reinforce understanding of the pH scale and the differences between an acid and a base while providing more experience with the scientific method.

Objectives: Students will be able to:

* Explain the properties of acids and bases
* Explain how acids and bases are measured on a pH scale
* Apply the scientific method to inquiry problems
* Hypothesize solutions based on observations
* Draw conclusions based on evidence
* Evaluate hypotheses based on outcomes
* Think critically about scientific inquiry

National Standards:

* National Content Standard A: As a result of activities in grades K-4, all students should develop:
  + - * + Abilities necessary to do scientific inquiry
        + Understanding about scientific inquiry
* National Content Standard B: As a result of activities in grades K-4, all students should develop:
  + - * + Properties of Objects and Materials

State (ALCOS) Standards:

Science:

3.) Use everyday indicators to identify common acids and bases.

Counseling and Guidance:

2.) A: A1.2 - display a positive interest in learning

38.) C: A1.4 - learn how to interact and work cooperatively in teams

Materials:

* Orange Juice
* Purified water
* Lemon Lime Soda
* Vanilla Extract
* Bleach Gel
* Household Cleaner
* 36 plastic cups
* Litmus paper strips
* Color match pH scales
* pH scales
* Power Point presentation
* Organizing Data matrices

Procedures:

* Preplanning:
  + - Create a power point presentation to review with students on their understanding of properties of acids and bases.
    - Gather all materials
    - Create a graphic organizer for students to record their data found during their testing
    - Set up six workstations with materials needed for groups to complete their tests
* Whole Class
  + - Set Induction: Present students with power point presentation while simultaneously asking students if they can explain the properties of acids and bases. Then present to class the mystery liquids that I am in need of identifying.
    - Introduce the Inquiry problem: “How can we identify these mystery liquids?”
    - Explain the process of observing and testing the pH levels of each liquid.
* Group Work:
  + - Monitor small groups as students begin to observe the liquids basic properties without testing.
    - Have students hypothesize cooperatively as a group what they think which everyday liquid each mystery liquid could be based on initial observations. They will record their hypotheses and initial observations on their graphic organizers.(Pre-testing)
    - Students will begin to test each liquid’s pH level and will record their results in their graphic organizers.
    - Based on their data students should conclude whether or not each liquid is an acid or a base.
    - Students connect their observations, and the pH level of the liquid in order to evaluate their hypotheses and draw conclusions deciding which everyday liquid they believe the mystery liquid actually is.
* Whole Class Discussion and Review
  + - Each group of students will share their hypotheses, results, and conclusions to the rest of the class.
    - Teacher will identify the actual identities of each mystery liquid and reflect with students the properties of each acid and base.
    - Teacher will informally discuss with students the harmful effects of certain everyday liquid acids and bases, such as the ones used as mystery liquids.

Assessment

* + - Teacher will monitor small group work for individual responsibility and that each group member was following directions.
    - Teacher will monitor students’ group presentations in whole class discussion and review.
    - Teacher will use performance assessments to examine how well students performed during the activity and if they were able to finish the activity.
    - Teacher will take up graphic organizer to determine level of independent work during the activity.
    - Through systematic observation, teacher will assess how well students were able to follow the process of the scientific method.
    - Teacher will test understanding of the material with a ten multiple choice quiz.