

Title: What's in the Cup?

Grade Ranges:

 K-4
 5-8
 X 9-12

Subject Tag:

Science: Chemistry

Synopsis:

Students will utilize cups filled with solutions of acids, bases, and/or an indicator in order to determine the contents and pH of each cup without knowing the contents of each cup in advance. This activity is a brainteaser to help reinforce the concepts of pH and pH indicators.

Keywords:

chemistry, pH, indicators, acids, bases, demonstrations

Body:

Background: This activity can be done as a demonstration to start a class after students have learned to use pH indicators. Phenolphthalein indicator solution turns pink in the presence of base and remains clear in the presence of an acid. By adding drops of phenolphthalein to a solution and watching the color change, students can determine if the pH of a solution is in an acidic range or a basic range.

Safety: Phenolphthalein is an alcohol solution, which means it is flammable. Ammonia is a weakly basic solution and will irritate the eyes. Vinegar is a weakly acidic solution and will irritate the eyes.

Set up: Set up three small plastic cups on a tray and number each cup. To cup #1, add 20mL of ammonia. To cup #2, add five drops of phenolphthalein indicator and 20mL of water. To cup #3, add 20mL of vinegar.

Conducting the Activity:

1. Ask students to take a sheet of paper out and number 1-3 on the page. Tell them you will conduct a short demonstration and their job is to determine what could be in each cup and then explain why. The choices for cup contents include an acid, a base, and an indicator.
2. Pour cup #1 into cup #2, the solution in cup #2 will turn pink. Give the students a few seconds to think about what just occurred.
3. Then, pour cup #2 into cup #3. The solution will turn clear as it touches the contents of cup #3 and cup #3 will be the only cup remaining with any liquid (and it will be clear). Give students a few seconds to think about what just occurred.
4. Ask the students to list the contents of each cup and then write a paragraph justifying their choices.

Features:

- Contains special education tips
- Quick Activity (less than 30 minutes; story starter)
- Requires Internet access for students to complete

Objectives:

1. Students will learn to identify a solution as acidic or basic using an indicator.

Standards:

NY: 4.3: The Physical Setting. Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

NYC: S1c Physical Science Concepts: The student produces evidence that demonstrates understanding of: Chemical reactions, such as everyday examples of chemical reactions; electrons, protons, and energy transfer; and factors that affect reaction rates such as catalysts.

CT: 11: Structure Of Matter. Students will know the characteristic properties of matter and the relationship of these properties to structure and composition.

NJ: 5.8. All Students Will Gain An Understanding Of The Structure and Behavior Of Matter

Prerequisite Skills:

1. Students should be familiar with the concept of pH.
2. Students should be familiar with the concepts of acids and bases.
3. Students should be familiar with pH indicators.

Time Required:

- Setup: five to 10 minutes
- Activity: 10 to 15 minutes.

Technology and Materials Needed:

1. Ammonia
2. Vinegar
3. Water
4. Three plastic cups or 100mL glass beakers
5. Phenolphthalein indicator solution

Assessment Criteria:

1. The written responses for the contents of each cup.
2. The written responses justifying choices for the contents of each cup.

Recommended Lesson Plan Review Date:

NA

Review Comments:
NA