

Topic: Acids and Bases

Teacher Information

Time Allowance

50 minutes

Background

Scientists need to be able to conduct tests and analyze and classify the resulting data. For example, scientists use the pH scale to identify and classify compounds. The pH scale is a measure of how acidic or basic a sample is.

Materials

Each of the following solutions: water, bleach, ammonia, vinegar, milk, lemon juice, tomato juice, tea and liquid soap.

Small plastic cups – 20 mL - 9 per station

Eyedroppers - 2 per station

Large plastic cups – 250 mL - 2 per station

Test tubes - 9 per station

Safety goggles – 1 per student

Aprons – 1 per student

A head of red cabbage

Graduated cylinder

Distilled Water

Paper towels - several per station

Preparation

1. Cut a red cabbage into eight parts.
2. Place cabbage in a non-aluminum pan, cover with water, and boil for 10-15 minutes. (You may wish to use bottled water to ensure neutral pH.)
3. Pour the pan contents through a strainer and discard the cabbage leaves.
4. Cool the juice and store covered in the refrigerator.
5. Freeze the juice in ice cube trays for extended use.
6. Prepare the bleach, ammonia, soap and vinegar solutions by mixing 1 teaspoon of each liquid with 250 mL of water.
7. For each station label the small cups 1-9.
8. For each station label one large cup *water* and the other *indicator*.
9. For each station fill the nine small cups half full of each solution
10. For each station fill the *water* cup half full with the distilled water.
11. For each station fill the *indicator* cup half full of the cabbage juice indicator.
12. For each station label the test tubes 1-9.
13. Divide the students into cooperative groups.

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Student Worksheet

Water supplies onboard the space station or a spacecraft must be tested frequently to make sure that they are safe for human use.

Procedure

1. Look at the solutions listed in the first column below.
2. Make a prediction as to the solution will be acidic, basic or neutral.
3. At each station, use an eyedropper to put 10 drops of indicator into the test tube labeled 1. Return the eyedropper to the cup.
4. Use the other eyedropper to put 10 drops of solution number 1 into the same test tube.
5. Gently swirl the mixture in the test tube.
6. Observe the color of the mixture and record it in the chart on your data log.
7. Clean your solution eyedropper in the water cup.
8. Repeat steps 1-6 for the remaining 8 solutions.
9. Use the paper towel for any spills.

Classification of Solutions			
Solution name	Prediction	Color	Acid, Base or Neutral
1. Lemon juice			
2. Bleach			
3. Water			
4. Tomato juice			
5. Milk			
6. Ammonia water			
7. Tea			
8. Vinegar water			
9. Liquid soap			

Indicator + acid = pink

Indicator + base = green

Indicator + neutral = purple