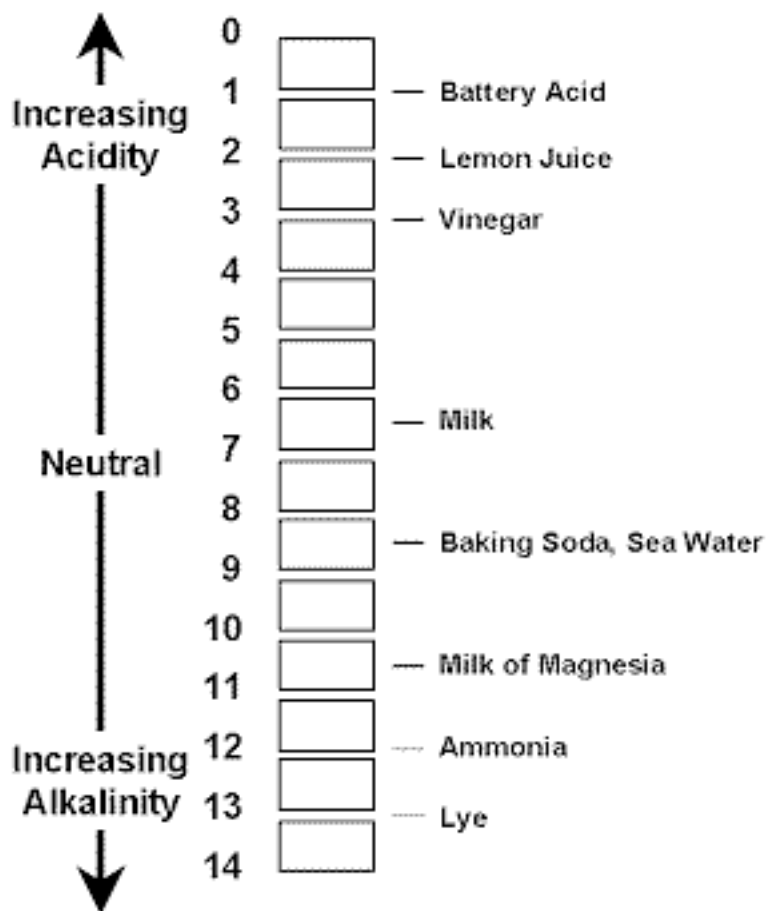


TEACHER NOTES

Background

One way scientists study samples gathered from Mars' surface is by classifying each compound as acidic, basic or neutral. The use of the pH scale, ranging from 0 to 14, reveals the amount of acidity or alkalinity of a compound.



Acids are nonmetallic chemical compounds that react with some metals to produce hydrogen gas. Acids have a pH less than 7, and those that are safe to taste are sour. An acid will neutralize a base.

Bases are metallic chemical compounds that react with water and have a pH greater than 7. Bases feel slippery and those that are safe to taste are bitter. A base will neutralize an acid.

A substance that is neither an acid or a base is considered **neutral**, with a pH of 7. Water is an example of a neutral substance.

An **indicator** is used to test a solution for its pH. It may be in the form of a liquid, or paper which has been soaked in an indicator liquid. One easily prepared indicator is *cabbage juice*.



PRE-MISSION ACTIVITIES ACIDS AND BASES



TEACHER NOTES CONTINUED

Activity Preparation

1. Gather materials and assign students to cooperative groups.
2. Prepare red cabbage indicator. [Note: Commercially available indicators or test strips may be used instead.]
 - a. Cut a red cabbage into eight parts.
 - b. Place cabbage in non-aluminum pan, cover with water, and boil for 10-15 minutes. [You may wish to use bottled water to ensure neutral pH.]
 - c. Pour pan contents through a strainer and discard the cabbage leaves.
 - d. Cool the juice and store covered in the refrigerator. Freeze the juice in ice cubes trays for extended use.

3. Prepare solutions:

- | | | | |
|----------------|-------------------|----------|-------------------|
| 1) lemon juice | 2) bleach water* | 3) water | 4) aspirin water |
| 5) milk | 6) ammonia water* | 7) tea | 8) vinegar water* |
| 9) soap* | | | |

* use 1 tsp. per 250 mL of water.

Process Skills

Predict Interpret data Experiment Infer Observe Classify

Manipulative Skills

Use and care of materials.

Science Content

- Gr. 5: Learning and experiencing science.
Gr. 6: Classification of compounds.
Gr. 7 & 8: Investigation of general properties of matter.

Answers

Acid: lemon juice, aspirin water, ammonia water, tea, vinegar water.
Base: bleach water, soap water, ammonia
Neutral: water, milk

Extensions

1. Follow-up discussion on experiment conclusions.
2. Students choose other solutions to be tested for pH.
3. Students research acid rain.
4. Students collect water samples from local water sources to test for pH.
5. Students make paper indicators by cutting white blotting paper into strips and soaking the strips in the red cabbage indicator.
6. Discuss why it is safe and useful to know about acids and bases in household products.
7. Students use commercially sold synthetic indicators to compare test results.
8. Students experiment to find other plants, fruits, or vegetables that can be used as indicators for an acid, base, or neutral substance.
9. Start a classroom aquarium. Put students in charge of maintaining neutral pH with pH up or pH down chemical additives.

Name _____ Date _____

Objective: You will experiment with many everyday materials to determine whether they are acids or bases.

Materials

9 solutions	9 small plastic cups 20 ml ²
eyedroppers	2 large plastic cups 250 ml
1 egg carton	pencil



PROCEDURE

1. Look at the list of household products on the following page. Predict which solutions are acids, bases, or neutral.
2. Label small cups 1-9. Label one large cup **water** and the other **indicator**. Label egg carton sections 1 - 9.
3. Fill each small cup half full of solutions 1-9. Fill one large cup half full of water and the other half full of indicator.
4. Use one eyedropper to put 10 drops of indicator in the egg carton compartment labeled 1.
5. Use the other eyedropper to put 10 drops of solution 1 in the egg carton compartment labeled 1.
6. Gently shake the egg carton to mix the solutions.
7. Observe the color and record your observations on the chart. Indicate whether the solution is an acid, base, or neutral.
8. Clean your solution eyedropper in your water cup and repeat steps 4-7 for each of the solutions.



PRE-MISSION ACTIVITIES ACIDS AND BASES



Name _____

Date _____

Indicator + neutral = purple
Indicator + base = green
Indicator + acid = pink



Solution Name	Prediction	Color	Acid, Base, or Neutral
Lemon Juice			
Bleach Water			
Water			
Aspirin Water			
Milk			
Ammonia Water			
Tea			
Vinegar Water			
Soap			

Look at the prediction section of your data sheet. Were your predictions correct? If not, why do you think your predictions were not correct?
