

Activity #1:

“It’s H-two-O!”

Using laboratory investigations, students will identify water from various sample liquids by determining pH, boiling point, freezing point, and by graphing collected data.

Objective: Upon completion of the activity, students will demonstrate knowledge of selected properties of water and use their knowledge to identify water from unknown samples of liquids.

NEVADA SCIENCE STANDARDS 13:12.1, 16:8.1

Materials: Ten 100 ml beakers, ten thermometers, ten packages of pH paper, hot plate, freezer, tap water, 7-Up, vinegar, alcohol, salt water, distilled water, hydrogen peroxide, sugar water solution, dilute hydrochloric acid, bottled water.

Procedure:

- A. Teacher: Place 50 ml of ten different clear substances in the ten 100 ml beakers and record the contents of each for a key. Place the beakers, thermometer, pH paper and data sheets at each student-group workstation.
- B. Remind students of the following:

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WARNING – DILUTE ACIDS USED

- USE SAFETY GLASSES.
- DO NOT TASTE ANY SAMPLES.
- CHECK FOR ODORS by gently wafting fumes from liquids toward your face. (see illustration)
- WASH HANDS IF THEY COME IN CONTACT WITH ANY SAMPLES.
- CAREFULLY CLEAN ANY SPILLS.



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C. Students:

1. Remove a strip of pH paper carefully from the container. Dip the pH paper into the solution and determine the numerical value. Record the results for all containers on the Data Sheet.
2. To observe odor, waft the top of the beaker with a hand towards your nose. Record on the Data Sheet whether there is or is not an odor. If you do not recognize an odor, enter a “?” on the sheet.
3. Put a thermometer into a beaker and place the beaker on the hot plate. Bring the solution to a boil while watching the thermometer. As soon as boiling begins, record the temperature. Repeat for all remaining beakers. (Wear your goggles!)
4. After boiling, let the solutions cool to room temperature. Place all ten beakers on a tray in a freezing compartment. Put thermometers in each container. Check every 15 minutes for crystal formation and remove the beaker from the freezer when crystallization starts. (One student group can be responsible for this portion of the laboratory activity and can report the results to the class.)
5. Have each group prepare three bar graphs for the three variables (pH, boiling point and freezing point), showing the measurements from all ten beakers. Compare graphs among groups. Using the graphed data, determine which of the substances are water.

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