ARE WE SATURATED YET?

PRE LAB DISCUSSION

A solution is made up of two parts: the solvent and the solute. In this experiment, water will be the solvent and sodium thiosulfate [photography fixer] will be the solute. A true solution is optically clear. If there are undissolved particles, the solution will be cloudy. Do not confuse color with clarity. A true solution can have color. Scientists use an electrical apparatus that shines a narrow beam of light through a solution and measures the light that is scattered in other directions by the undissolved particles. This indicates the amount, if any, of undissolved particles. Before starting the procedure, write an operational definition of:

unsaturated solution

saturated solution

supersaturated solution

Air is a gaseous solution. It has water vapor dissolved in it. [An understanding of the factors that influence the saturation point of water vapor dissolved in the air is important in predicting weather.] Likewise the energy changes related to vaporization and condensation are major factors in both weather and climate.

A review of a map of the United States and the results of ***HEAT-HIDE & SEEK*** will be helpful in thinking about the observations made of these solutions.

OBJECTIVE: To make and observe the properties of unsaturated, saturated, and supersaturated solutions.

CHEMICALS/EQUIPMENT: Sodium hyposulfite [also known as hypo or fixer], Test tubes (large), graduated cylinder, balance, beaker, test tube holders, Bunsen burner

PROCEDURE:

1. Place 2 ml of water in a test tube and add 1 gram of hypo crystals. Shake the tube to dissolve the crystals. [Do not shake any tube for more than five minutes]

2. Place 2 ml of water in a test tube and add 2 grams of hypo crystals. Shake the tube to dissolve the crystals.

3. Place 2 ml of water in a test tube and add 3 grams of hypo crystals Shake the tube to dissolve the crystals.

4. Place 2 ml of water in a test tube and add 4 grams of hypo crystals. Shake the tube to dissolve the crystals.

5. Continue adding one gram more of hypo crystals until a saturated solution is produced.

6. Place 2 ml of water in a test tube and add 30 grams of hypo crystals. Gently heat this mixture until it boils and forms a clear solution. Then place this test tube in a beaker of cold water or in a test tube rack until it nearly room temperature. Make and record observations of this tube.

7. When the tube has cooled to room temperature, place one crystal of hypo in the tube. Make and record observations of this tube. Use your hand to detect any temperature changes.

OBSERVATIONS

The following test tubes were unsaturated:

The amount of hypo needed to produce a saturated solution with 2 ml of water was _____grams.

Did the temperature of the test tubes rise, fall or remain the same as the hypo dissolved? _____

Procedure number 6 produced a _____ solution.

When a "seed" crystal is placed in a supersaturated solution, the result is _____

What energy change was observed when a "seed" is added to a supersaturated solution?

What is the proper term for this energy change? _____

THINKING SCIENTIFICALLY

1. Why are saturation points for various solutes always stated at a given temperature?

2. In the United States, air masses generally move from west to east. As moist air masses rise over the Rocky Mountains, air cools 10º C for every kilometer it rises. What will happen as moist air rises to the top of the Rocky Mountains?

3. The temperature of air will increase 10º C as it descends downward. If moist air that is 24º C rises to the top of the mountains and then descends down the other side of the mountain as dry air, will it be the same temperature when it reaches the leeward base of the mountain?

Using the knowledge gained in this experiment, explain your answer.

4. What factors of elevation, prevailing winds, and topography make Death Valley the hottest and driest area of the United States?

5. On a hot, humid summer day, why is it likely to rain and/or thunderstorm in the late afternoon or early evening?