

Name: \_\_\_\_\_

## Unsaturated, Saturated, and Supersaturated Solutions and Temperature Change.

A saturated solution contains more solute in a given volume of solvent than an unsaturated solution. A supersaturated solution contains more solute in a given volume than would normally be present at a particular temperature. A supersaturated solution is unstable. When a crystal of solute is added to a supersaturated solution, excess solute crystallizes out of solution: the remaining solution is saturated as it normally would be at that temperature. When a crystal of solute is added to an unsaturated solution, the crystal will dissolve. Most of the time, when the temperature of a solvent increases, the solubility of the solute increases in a given amount of solvent.

### Objectives:

1. Students will compare and contrast the physical properties of unsaturated, saturated, and supersaturated solutions.
2. Students will discover the effects of temperature change on solute solubility and color intensity.

### Materials:

Sodium acetate  
three large test tubes  
test tube holder  
Bunsen burner  
Thermometer  
Stirring rod  
Test tube rack  
Graduated cylinder  
Balance

### Procedure:

1. Prepare a saturated solution of sodium acetate: In a large test tube, dissolve 6.5g of sodium acetate in 10.0 ml of **distilled water** at 25° C. If you cannot get all of the solute to dissolve in your solution after **patiently** stirring, let the mixture settle and pour off most of the liquid into a new clean test tube without getting any of the solid into the new test tube.
2. Prepare an unsaturated solution of sodium acetate: In a large test tube, dissolve 3.0 g of sodium acetate in 10.0 ml of **distilled water** at 25 °C.
3. Prepare a supersaturated solution of sodium acetate: In a large test tube, add 12.0 g of sodium acetate to 10.0 ml of **distilled water** and gradually heat the test tube contents in a water bath on a hot plate until all the sodium acetate is dissolved. Carefully place the test tube into an ice bath and let it cool undisturbed.
4. When all of the solutions have cooled to about room temperature, add a small crystal of sodium acetate to each test tube, observe and record what happens.
5. Observe the appearance of all three solutions, recording observations.

