 **uper-saturated!**

**Teacher Notes**

**Time you need**: Designed for 1.25 hours, but could be split into two periods.

**Target grade level:** Middle/high school

**Objectives:**

* Understand the different levels of saturation in a solution
* Make a supersaturated solution
* Calculate the saturation point of a sodium acetate solution

**Major Concepts:**

These terms should be discussed sometime prior to the lab, either earlier in the period or in a previous lesson depending on time (they are the vocabulary terms): solute, solvent, solubility, saturated solution, unsaturated solution, supersaturated solution

**Safety:**

* Goggles should be worn during the lab
* Be careful with the hot glassware

**Sample Data:**

|  |  |
| --- | --- |
| Total mass of sodium acetate | *13.32 g* |
| Volume of water | *2.5 mL* |
| Mass of sodium acetate left at saturation | *11.97 g* |

If students let the solution boil and it seems too much water is lost, you may add a few drops.

**Sample Calculations:**

At the saturation point: grams sodium acetate / 100 g H­2O

*Substitute and solve for X:*

*Grams sodium acetate at saturation (NaAcsat)*

*Volume of water in mL = mass of water in g = mH2O*

*Grams sodium acetate at saturation standard = X*

*Volume of water standard = 100 g*

*NaAcsat­  X*

=

*mH2O  100 g*

*X should equal about 57 – 62 grams of sodium acetate in 100 g of water*

**Answers to Questions:**

**Guiding Questions:**

1. In a solution of sugar water, which chemical is the solute and which is the solvent?

*Sugar is the solute and water is the solvent*

1. What factors will affect the speed of dissolving?

*Temperature (heating it speeds it up), agitation (stirring it speeds it up), surface area (increasing the surface area [crushing it] speeds it up)*

**Questions:**

1. How did the heating of the water affect the solubility of the sodium acetate?

*It allowed more sodium acetate to dissolve in the water since the molecules moved farther apart*

1. Why did the supersaturated solution begin to drop small crystals when the additional sodium acetate was added?

*There were more molecules of sodium acetate dissolved in the room temperature water than there should have been; so once one solid piece was added, more crystals formed.*

1. At what point will the crystallization of the supersaturated solution stop?

*It will stop when the solution reaches its saturation point.*

1. In your own words, define the following terms:
   1. Unsaturated

*Contains less solute than a saturated solution under the current conditions*

* 1. Saturated

*Contains as much solute as the solvent can hold under the current conditions*

* 1. Supersaturated

*Contains more solute than the solvent should be able to hold/dissolve under the current conditions*