**Solubility Worksheet**

1. Name three factors that influence the rate at which a solute dissolves in a solvent
2. Define the following words
3. **Solubility**
4. **Saturated**
5. **Unsaturated**
6. **Supersaturated**

The graph below contains **solubility curves** and can be used to determine if a particular solution is saturated at a given set of conditions and how much of the solute is dissolved under those conditions.

Whenever you are given a graph to analyze the first thing you should do is look at each axis to determine what information the graph is showing.

X- axis – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Y-axis – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Each line represents the maximum amount of solute that can be dissolved in 100 g of H2O at a particular temperature to make a saturated solution.

* Below the line = the solution is \_\_\_\_\_\_\_\_\_\_
* On the line = the solution is \_\_\_\_\_\_\_\_\_\_
* Above the line and all the solute is dissolved = the solution is \_\_\_\_\_\_\_\_\_\_\_\_

For most substances, solubility increases as temperature increases. What are the exceptions on the graph below? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part One: Reading Solubility Curves**

Use the graph to answer the following questions. REMEMBER UNITS!

1. What mass of solute will dissolve in **100 g** of water at the following temperatures?
	1. KNO3 at 70°C \_\_\_\_\_\_\_\_\_\_\_\_
	2. NaCl at 100°C \_\_\_\_\_\_\_\_\_\_\_\_
	3. NH4Cl at 90°C \_\_\_\_\_\_\_\_\_\_\_\_
	4. Which of the **above** three substances is most soluble in water at 15°C. \_\_\_\_\_\_\_\_\_\_\_\_

**Part Two: Types of Solutions** (saturated, unsaturated, supersaturated)

On a solubility curve, the lines indicate the concentration of a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ solution** - the maximum amount of solute that will dissolve at that specific temperature.

Values on the graph \_\_\_\_\_\_\_\_\_\_\_\_ (below, above, on) a curve represent **unsaturated solutions** - more solute could be dissolved at that temperature.

Use the solubility curve on the second page to label the following solutions as supersaturated, saturated or unsaturated. If unsaturated, write how much more solute can be dissolved in the solution.

|  |  |  |  |
| --- | --- | --- | --- |
| **Solution** | **Supersaturated, Saturated or Unsaturated?** | **If unsaturated: How much more solute can dissolve?** | **Concentration of the solution in M (moles/ltre)** |
|  a solution that contains 70g of NaNO3 at 30°C (in 100 mL H2O) |  |  |  |
| a solution that contains 50g of NH4Cl at 50°C (in 100 mL H2O) |  |  |  |
| a solution that contains 20g of KClO3 at 50°C (in 100 mL H2O) |  |  |  |
| a solution that contains 30g of KClO3 at 40°C (in 100 mL H2O) |  |  |  |

**Additional Practice:**

1. At 30°C, you dissolved 90 g of KCl in 300 g of water. Is this solution supersaturated, saturated or unsaturated?

2. A mass of 100 g of NaNO3 is dissolved in 100 g of water at 80ºC.

a) Is the solution supersaturated, saturated or unsaturated? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) As the solution is cooled, at what temperature should solid first appear in the solution? Explain.

3. Use the graph to answer the following two questions:

 Which compound is most soluble at 20 ºC? \_\_\_\_\_\_\_\_

Which is the least soluble at 40 ºC? \_\_\_\_\_\_\_\_

4. Which substance on the graph is **least** soluble at 10°C? \_\_\_\_\_\_\_

5. A mass of 80 g of KNO3 is dissolved in 100 g of water at 50 ºC. The solution is heated to 70ºC. How many more grams of potassium nitrate must be added to make the solution saturated? Explain your reasoning