Name:	Date:	Class			
Solubility Curve Practice Problems Worksheet 1					
You'll notice that for most substances, solubility increases as temperature increases. As discussed earlier in					

solutions involving liquids and solids typically more solute can be dissolved at higher temperatures. Can you find any

exceptions on the graph? ____Cerium sulfate_____

Here's an example of how to read the graph. Find the curve for $KCIO_3$.

At 30°C approximately 10g of KClO₃ will dissolve in 100g of water. If the temperature is increased to 80°C, approximately 40 g of the substance will dissolve in 100g (or 100mL) of water.

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

- 1) What mass of solute will dissolve in 100mL of water at the following temperatures?
 - a. KNO_3 at $70^{\circ}C = 130 g$
 - b. NaCl at 100°C= ____40 g_____
 c. NH₄Cl at 90°C= ___70 g_____
 - d. Which of the **above** three substances is most soluble in water at $15^{\circ}C$. = NaCl



Types of Solutions

On a solubility curve, the lines indicate the concentration of a <u>saturated</u> solution - the maximum amount of solute that will dissolve at that specific temperature.

Values on the graph <u>below</u> a curve represent <u>unsaturated solutions</u> - more solute could be dissolved at that temperature.

Label the following solutions as saturated or unsaturated. If unsaturated, write how much more solute can be dissolved in the solution.

Solution	Saturated or Unsaturated?	If unsaturated: How much more solute can dissolve in the solution?
a solution that contains 70g of NaNO3 at 30°C (in 100 mL H2O)	Unsaturated	25 g
a solution that contains 50g of NH₄Cl at 50°C (in 100 mL H₂O)	Saturated	XXXXXXX
a solution that contains 20g of KClO3 at 50°C (in 100 mL H2O)	Saturated	XXXXXX
a solution that contains 70g of KI at 0°C (in 100 mL H2O)	Unsaturated	60 g

Use the Solubility Graphs on Page 1

- 1. a. What is the solubility of <u>KCl at 5°C? 28g KCl / 100 g H2O</u>
 - b. What is the solubility of <u>KCl</u> at 25°C? <u>34 g KCl / 10</u>0 g H2O
 - c. What is the solubility of $Ce_2(SO_4)_3$ at 10°C? <u>14 g $Ce_2(SO_4)_3$ / 100 g H2O</u>
 - d. What is the solubility of $\underline{Ce_2(SO_4)_3}$ at 50°C? <u>5 g Ce2(SO4)</u>3 / 100 g H2O
- 2. a. At 90°C, you dissolved 10 g of KCl in 100. g of water. Is this solution saturated or unsaturated?
 - b. How do you know? That point falls below the curve for KCl on the graph.
- 3. A mass of 100 g of NaNO3 is dissolved in 100 g of water at 80°C.
 - a) Is the solution saturated or unsaturated? <u>unsaturated</u>
 - b) As the solution is cooled, at what temperature should solid first appear in the solution? Explain. 35 °C
 That temperature marks the point on the graph that falls on the curve for NaNO₃ when 100 g of NaNO₃ is dissolved in 100 g of water.

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

Which compound is most soluble at 20 °C? _____KI____

Which is the least soluble at 40 °C? $Ce_2(SO_4)_3$

5. Which substance on the graph is **least** soluble at $10^{\circ}C_{2}$ KClO₃

6. A mass of 80 g of KNO₃ is dissolved in 100 g of water at 50 °C. The solution is heated to 70°C. How many more grams of potassium nitrate must be added to make the solution saturated? Explain your reasoning (See question #2 on the other side for a hint) 50 g KNO₃
According to graph, the saturation point for KNO₃ at 70 °C 130 g, which is 50 g more than 80 g.

Elements review: Fill in the chart below for some of the compounds on the graph:

Formula	# of atoms in formula	If the following amounts of solute are dissolved in 100 mL of water: Is the solution <u>SATURATED</u> OR <u>UNSATURATED</u>	
Example: NaCl	Na = 1	3 grams dissolved at 0°C	
	CI = 1	unsaturated	
Formula	# of atoms in formula	If the following amounts of solute are dissolved in 100 mL of water: Is the solution <u>SATURATED</u> OR <u>UNSATURATED</u>	
	K = 1	120 grams dissolved at 0°C	
KI	I = 1	unsaturated	
	Ce = 2	7.2 grams dissolved at 70°C	
Ce2(SO4)3	S = 3	saturated	
	O = 12		
	N = 1	11 grams dissolved at 46.7°C	
NH₄Cl	H = 4	unsaturated	
	<i>C</i> = 1		

1. How many grams of potassium chlorate will dissolve in 300 grams of water at 65°C?

90 grams of potassium chlorate

- If a solution is made using 400 grams of water at 20°C and 40 grams of potassium chlorate, would the solution be saturated?
 Saturated
- 3. To what temperature Celsius must you raise the 100 grams of water in order for all 80 grams of the potassium nitrate to dissolve?
 50 °C