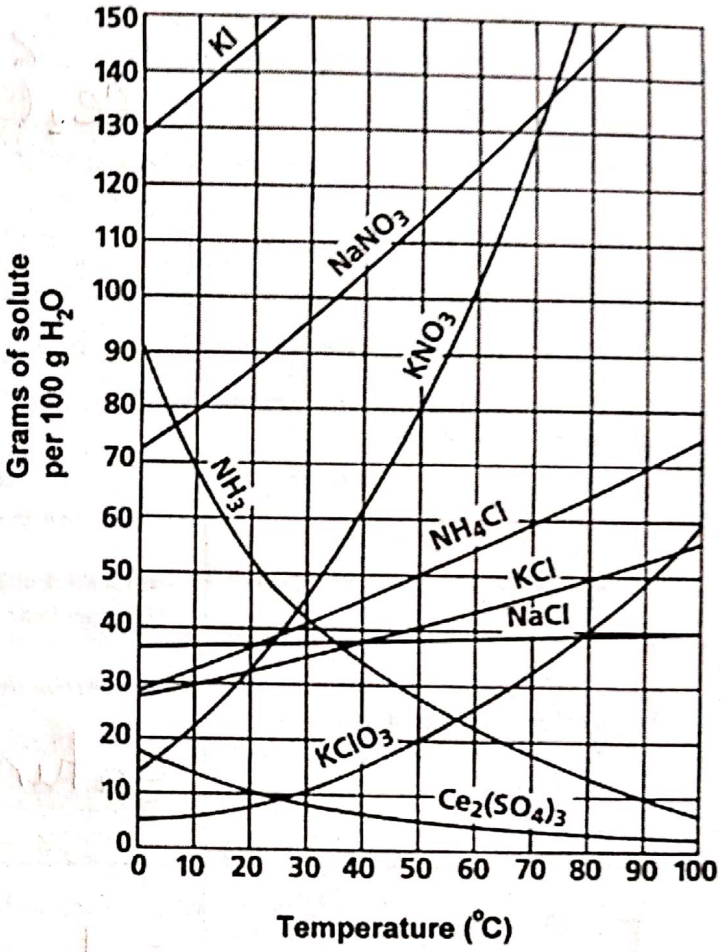
Name: _____ Date: _____ Class _____

Solubility Curve Worksheet

Part 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. What exceptions can you find on the graph? NH_3, $Ce_2(SO_4)_3$

Here's an example of how to read the graph. Find the curve for $KClO_3$. At 30°C approximately 10g of $KClO_3$ will dissolve in 100g of water. If the temperature is increased to 80°C, approximately 40g 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°C = 130g
   b. NaCl at 100°C = 40 g
   c. NH_4Cl at 90°C = 70g
   d. Which of the **above** three substances is most soluble in water at 15°C. = NaCl
2. On a solubility curve, the lines indicate the concentration of a saturated **solution** - the maximum amount of solute that will dissolve at that specific temperature.

   Values on the graph below / underneath a curve represent **unsaturated solutions** - more solute could be dissolved at that temperature.
3. Answer the following:
   a. What is the solubility of KCl at 5°C? 28 g
   b. What is the solubility of KCl at 25°C? 33g
   c. What is the solubility of $Ce_2(SO_4)_3$ at 10°C? 15 g
   d. What is the solubility of $Ce_2(SO_4)_3$ at 50°C? 5g

4. At 90°C, you dissolved 10 g of KCl in 100. g of water. Is this solution saturated or unsaturated?

unsaturated

How do you know? 52g is saturated, according to graph

5. A mass of 100 g of $NaNO_3$ is dissolved in 100 g of water at 80°C.
   a. Is the solution saturated or unsaturated? unsaturated
   b. As the solution is cooled, at what temperature should solid first appear in the solution?
   35° Explain: that is when 100g meets the curve

6. Use the graph to answer the following two questions:
   a. Which compound is most soluble at 20 °C? KI
   b. Which is the least soluble at 40 °C? $Ce_2(SO_4)_3$

7. Which substance on the graph is **least** soluble at 10°C? $KClO_3$

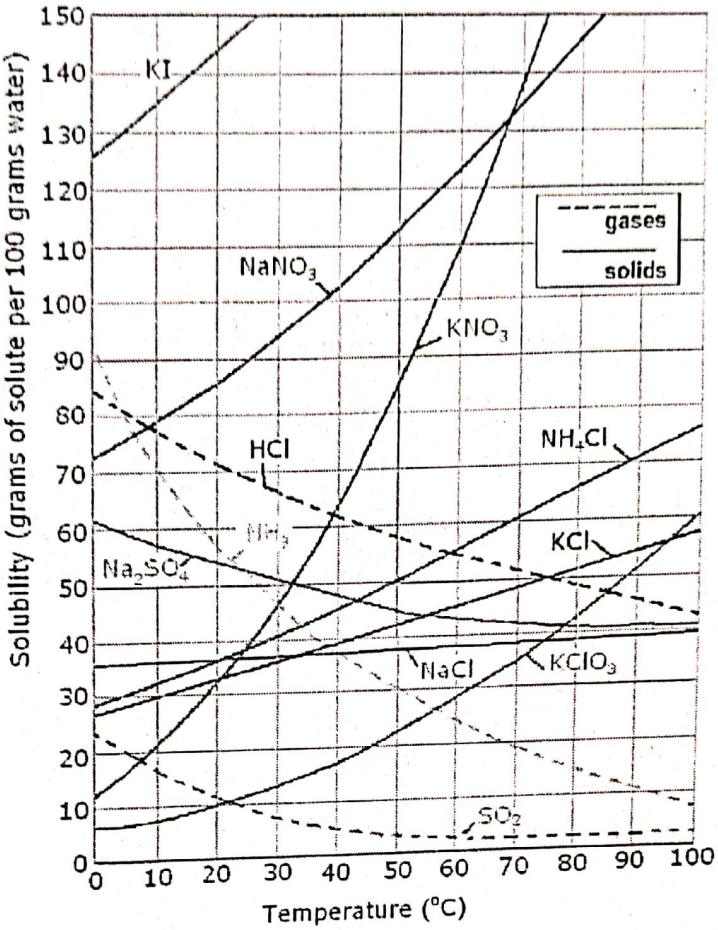
8. A mass of 80 g of KNO_3 is dissolved in 100 g of water at 50 °C. The solution is heated to 70°C. How many more grams of potassium nitrate must be added to make the solution saturated? 50g more

9. Explain your reasoning (*See question #2 on the other side for a hint*) 130g = saturated
   130 - 80 = 50

10. 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 $NaNO_3$ at 30°C (in 100 mL H_2O)	Saturated	—
a solution that contains 50g of NH_4Cl at 50°C (in 100 mL H_2O)	Saturated	—
a solution that contains 20g of $KClO_3$ at 50°C (in 100 mL H_2O)	saturated	—
a solution that contains 70g of KI at 0°C (in 100 mL H_2O)	unsaturated	130 - 70 = 60g

Part 2:



11. Look at the graph above. In general, how does temperature affect solubility for gases?
as temp increases, solubility decreases

12. Look at the graph above. In general, how does temperature affect solubility for solids?
as temp increases, solubility increases

13. Which compound is least soluble at 20°C? $KClO_3$ At 80°C? SO_2

14. Which compound is the most soluble at 10°C? KI 50°C? $NaNO_3$ 90°C? NH_4Cl

15. The solubility of which substance is most affected by changes in temperature? KNO_3

16. The solubility of which substance is least affected by changes in temperature? NaCl

17. Are the following solutions saturated, unsaturated, or supersaturated? n(Assume all are dissolved in 100 grams of water.)

    a. 50 grams of KN0 3 at 50 °C unsaturated
    b. 100 grams of NaN0 3 at 80 °C unsaturated
    c. 30 grams of KN0 3 at 25 °C unsaturated
    d. 50 grams of KCI at 80 °C Supersaturated (since all dissolves)
    e. 65 grams of NH4CI at 70 °C supersaturated (since all dissolves)
    f. 90 grams of KN0 3 at 60 °C unsaturated