

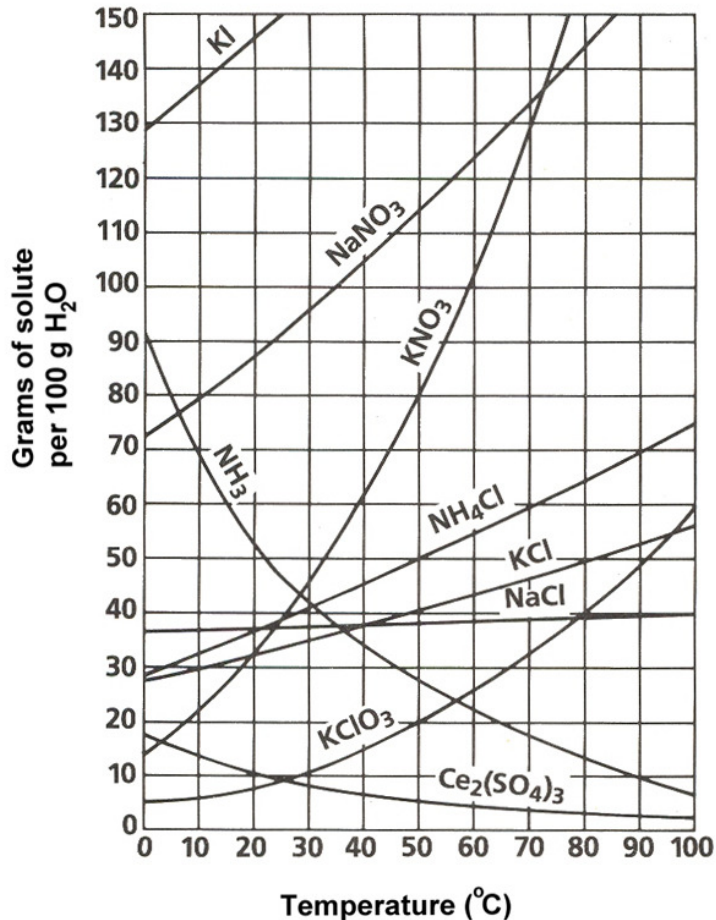
Answer the following question based on the solubility curve below. REMEMBER UNITS for measurements!

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?

\_\_\_\_\_ & \_\_\_\_\_

2. Here's an example of how to read the graph. Find the curve for  $\text{KClO}_3$ . At  $30^\circ\text{C}$  approximately 10g of  $\text{KClO}_3$  will dissolve in 100g of water. If the temperature is increased to  $80^\circ\text{C}$ , approximately \_\_\_\_\_ of the substance will dissolve in 100g (or 100mL) of water.

3. What mass of solute will dissolve in 100mL (or 100 g since 1 g of water = 1 mL of water) of water at the following temperatures?
- $\text{KNO}_3$  at  $70^\circ\text{C}$  = \_\_\_\_\_
  - $\text{NaCl}$  at  $100^\circ\text{C}$  = \_\_\_\_\_
  - $\text{NH}_4\text{Cl}$  at  $90^\circ\text{C}$  = \_\_\_\_\_
  - Which of the **above** three substances is most soluble in water at  $15^\circ\text{C}$ . = \_\_\_\_\_



### Types of Solutions

On a solubility curve, the lines or curves indicate the concentration of a **saturated solution** - the maximum amount of solute that will dissolve at that specific temperature. Values on the graph *under* a curve represent **unsaturated solutions** - more solute could still be dissolved at that temperature. Values above the line represent **supersaturated solutions**, which means more is dissolved than should be, possible resulting in the formation of a precipitate (a solid) so that the amount dissolved returns to the line.

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

Solution Description	Sat. or Unsat.?	If Unsat., How much more?
4. A solution of 70g of $\text{NaNO}_3$ at $30^\circ\text{C}$ (in 100 mL $\text{H}_2\text{O}$ )	_____	_____
5. A solution of 50g of $\text{NH}_4\text{Cl}$ at $50^\circ\text{C}$ (in 100 mL $\text{H}_2\text{O}$ )	_____	_____
6. A solution of 20g of $\text{KClO}_3$ at $50^\circ\text{C}$ (in 100 mL $\text{H}_2\text{O}$ )	_____	_____
7. A solution of 70g of $\text{KI}$ at $0^\circ\text{C}$ (in 100 mL $\text{H}_2\text{O}$ )	_____	_____

## Solubility Curves (cont.)

Answer the following question based on the solubility curve below.

8. Which *salt\** is least soluble in water at 20° C? \_\_\_\_\_

*\*a salt is an ionic compound...*

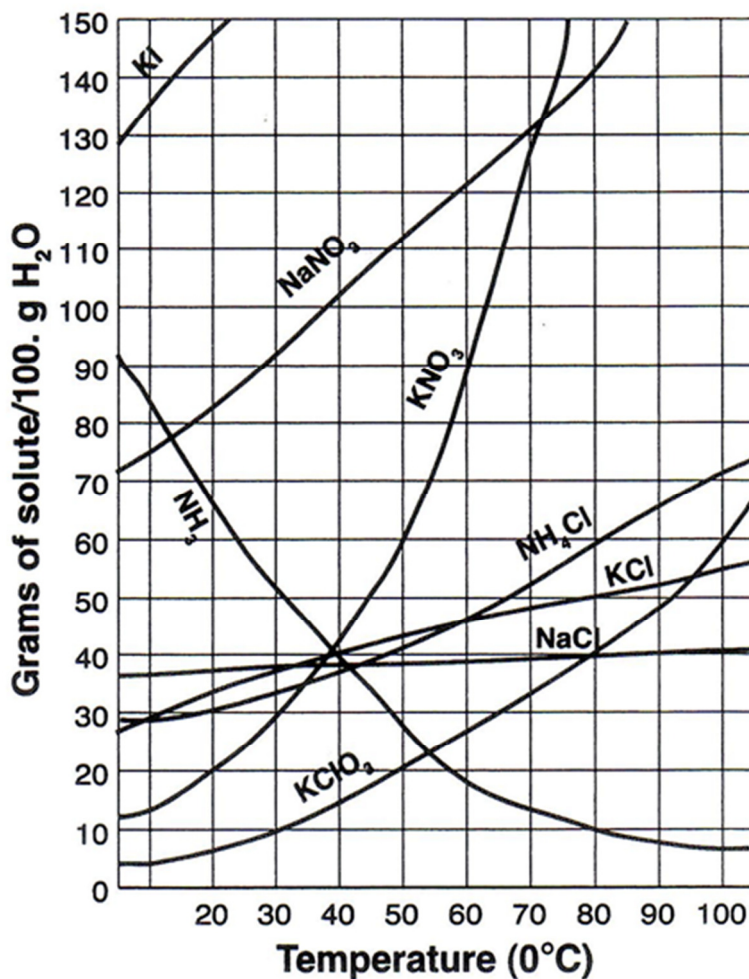
9. How many grams of potassium chloride can be dissolved in 100 g of water at 80° C?  
\_\_\_\_\_

*The graph only shows how much can be dissolved at a given temperature in 100 g of water. To find how much can be dissolved in 200g or 300g you would have to multiply by 2 or 3 respectively.*

10. How many grams of potassium nitrate can be dissolved in 200 g of water at 60° C?  
\_\_\_\_\_

11. At 90° C, how much sodium chloride can be dissolved in 300 g of water?  
\_\_\_\_\_

12. At 30° C, 80 g of sodium nitrate is dissolved in 100 g of water. Is this solution saturated, unsaturated, or supersaturated?  
\_\_\_\_\_



13. A saturated solution of potassium chlorate is formed from 100 g of water. If the saturated solution is cooled from 80° C to 50° C, how many grams of precipitate are formed? \_\_\_\_\_

*(This means how much solid cannot be dissolved since it cooled off?)*

14. Which compound on the chart shows a decrease in solubility from 0° C to 100° C? \_\_\_\_\_

*(By the way, this compound is not a "salt," it is a gas.)*

15. What type of solution (saturated, unsaturated, or supersaturated) are each of the following?

a. 100 g KNO<sub>3</sub> dissolved in 100 g water at 70° C? \_\_\_\_\_

b. 20 g NaCl dissolved in 100 g water at 30° C? \_\_\_\_\_

c. 140 g KI dissolved in 100 g water at 10° C? \_\_\_\_\_

16. Which salt is most soluble at 10° C? \_\_\_\_\_

17. Which salt is most soluble at 50° C? \_\_\_\_\_

18. Which salt is most soluble at 75° C? \_\_\_\_\_