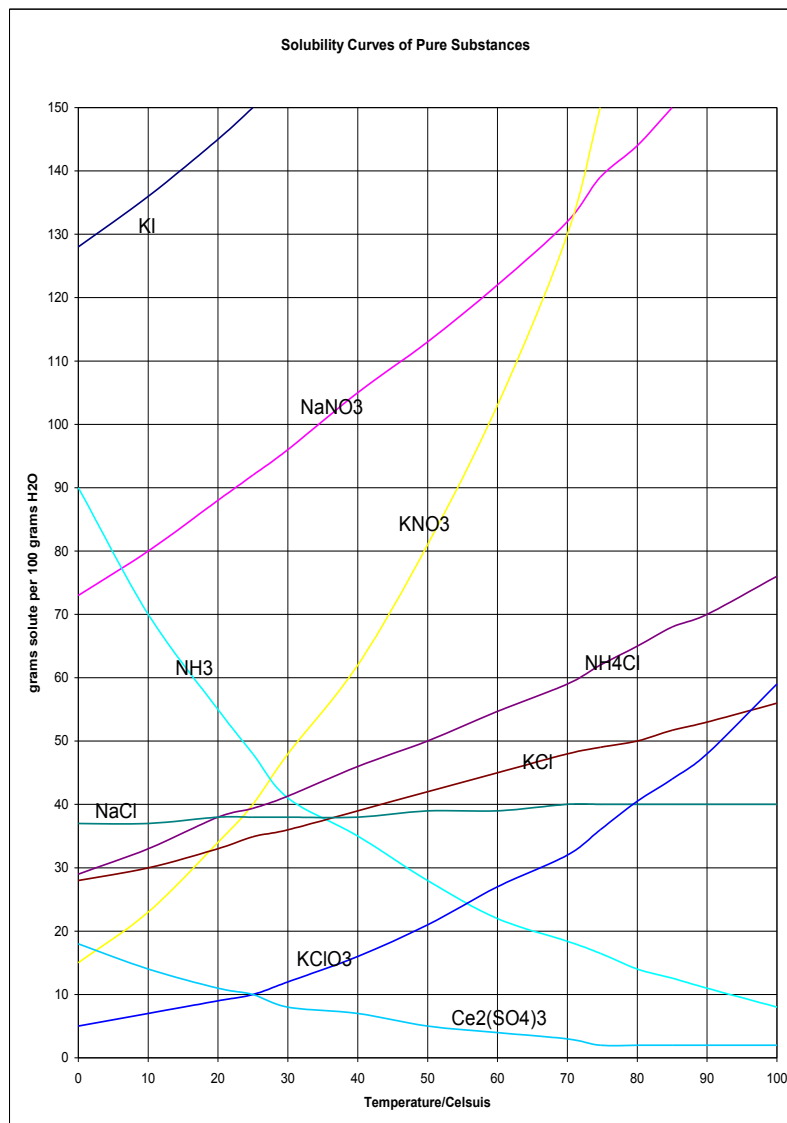


Reading a Solubility Chart

- 1) The curve shows the # of grams of solute in a saturated solution containing 100 mL or 100 g of water at a certain temperature.
- 2) Any amount of solute below the line indicates the solution is unsaturated at a certain temperature
- 3) Any amount of solute above the line in which all of the solute has dissolved shows the solution is supersaturated.
- 4) If the amount of solute is above the line but has not all dissolved, the solution is saturated and the # grams of solute settled on the bottom of the container = total # g in solution – # g of a saturated solution at that temperature. (according to the curve)
- 5) Solutes whose curves move upward w/ increased temperature are typically solids b/c the solubility of solids increases w/ increased temperature.
- 6) Solutes whose curves move downward w/ increased temperature are typically gases b/c the solubility of gases decreases with increased temperature.



Solubility Problems to solve

1. At 10°C, 80 g of NaNO₃ will dissolve in 100 mL (a saturated solution)
2. To find the # grams needed to saturate a solution when the volume is NOT 100 mL use the following strategy to find answer:

Start w/ known vol. x Solubility/100mL at set temp. = amount of Solute needed to saturate

$$\text{Ex. } 60 \text{ mL H}_2\text{O} \times \frac{80 \text{ g NaNO}_3}{100 \text{ mL H}_2\text{O}} = 48 \text{ g NaNO}_3 \text{ needed to saturate solution}$$

or if the chart is in units of 100 g of H₂O use the density of water conversion 1mL H₂O= 1 g H₂O

$$\text{Ex. } 60 \text{ mL H}_2\text{O} \times \frac{1 \text{ g H}_2\text{O}}{1 \text{ mL H}_2\text{O}} \times \frac{80 \text{ g NaNO}_3}{100 \text{ g H}_2\text{O}} = 48 \text{ g NaNO}_3$$

WS - Reading the Solubility Chart Problems

1. Which of the salts shown on the graph is the least soluble in water at 10°C? _____
2. Which of the salts shown on the graph has the greatest increase in solubility as the temperature increases from 30 degrees to 60 degrees? _____
3. Which of the salts has its solubility affected the least by a change in temperature? _____
4. At 20°C, a saturated solution of sodium nitrate contains 100 grams of solute in 100 ml of water. How many grams of sodium chlorate must be added to saturate the solution at 50°C? _____
5. At what temperature do saturated solutions of potassium nitrate and sodium nitrate contain the same weight of solute per 100 mL of water? _____
6. What two salts have the same degree of solubility at approximately 19°C? _____
7. How many grams of potassium chlorate must be added to 1 liter of water to produce a saturated solution at 50°C? _____
8. A saturated solution of potassium nitrate is prepared at 60°C using 100 mL of water. How many grams of solute will precipitate out of solution if the temperature is suddenly cooled to 30°C? _____
9. What is the average rate of increase for the solubility of KNO₃ in grams per 100 mL per degree Celsius in the temperature range of 60°C to 70°C? _____
10. If 50 mL of water that is saturated with KClO₃ at 25°C is slowly evaporated to dryness, how many grams of the dry salt would be recovered? _____
11. Thirty grams of KCl are dissolved in 100 mL of water at 45°C. How many additional grams of KCl are needed to make the solution saturated at 80°C? _____
12. What is the smallest volume of water, in mL, required to completely dissolve 39 grams of KNO₃ at 10°C? _____
13. What is the lowest temperature at which 30. grams of KCl can be dissolved in 100 mL of water? _____
14. Are the following solutions saturated, unsaturated or supersaturated (assume that all three could form supersaturated solutions)
 - a. 40. g of KCl in 100 mL of water at 80°C _____
 - b. 120. g of KNO₃ in 100 mL of water at 60°C _____
 - c. 80. g of NaNO₃ in 100 mL of water at 10°C _____
15. Assume that a solubility curve for a gas such as ammonia, at one atmosphere of pressure, was plotted on the solubility curve graph. Reading from left to right, would this curve would _____
 - a. slope upward
 - b. slope downward
 - c. go straight across

