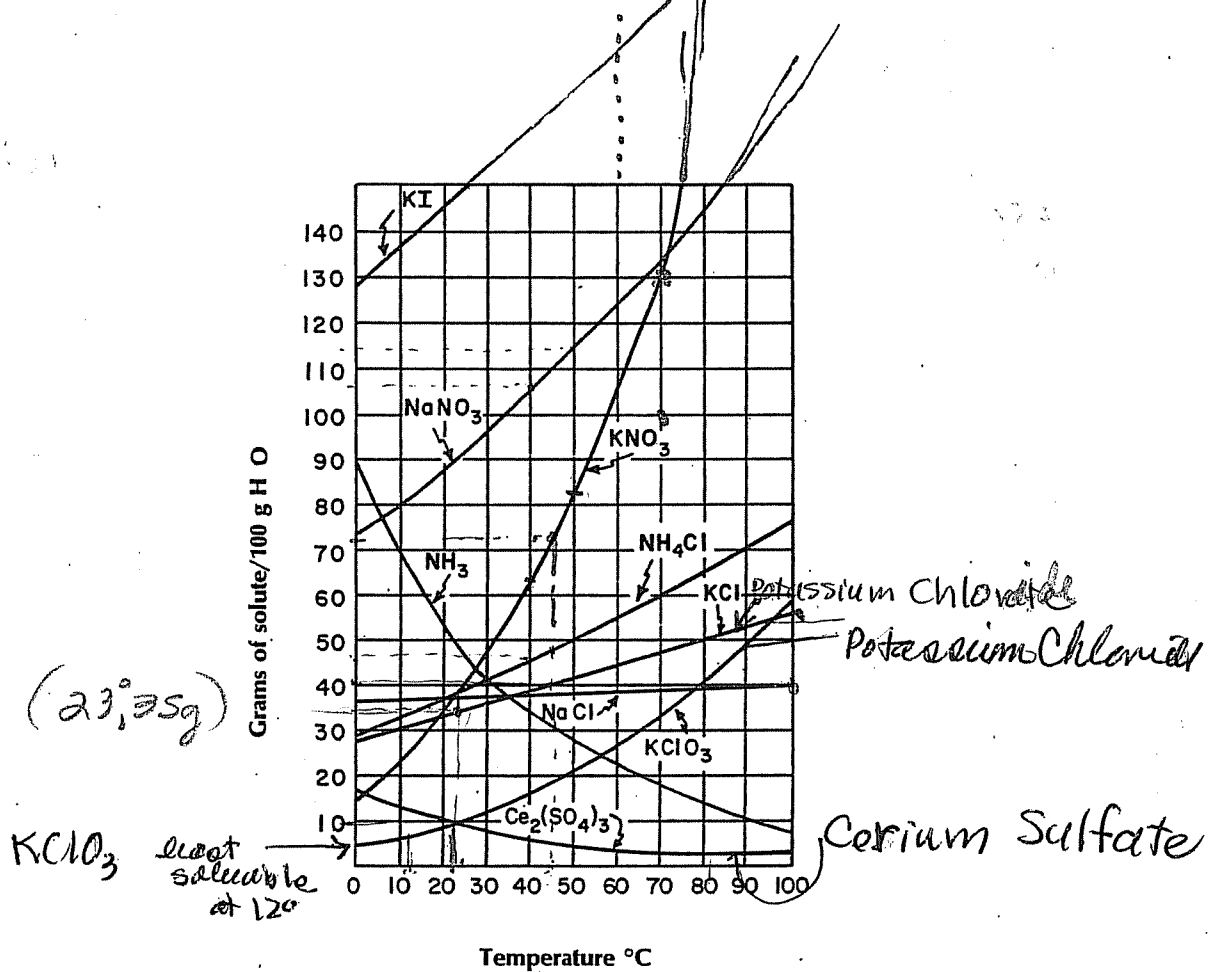


Key

Solubility Curves

Introduction

It is often convenient to describe solubility in the form of a graph. The graph below is a typical set of solubility curves. Note that the units on the y-axis express solubility in "grams of solute per 100 grams of water." (Other solubility curves may use different units.)



- Ammonia + Cerium Sulfate*
1. Most substances on this graph show increased solubility as temperature increases. What are the exceptions? NH₃, Ce₂(SO₄)₃
 2. Each curve shows how solubility for that substance changes as temperature changes. The solubilities of substances whose curves show greater (steeper) slopes are more affected by temperature changes than those that have more gradual slopes.

3. If 50 grams of water saturated with potassium chlorate at 23°C is slowly evaporated to dryness, how many grams of the dry salt will be recovered?

$$\frac{10g}{100g} = \frac{x}{50g H_2O} \quad x = 5g$$

3. 5g

4. What is the smallest mass of water required to dissolve completely 23 grams of NH_4Cl at 40°C?

$$\frac{45g}{100g H_2O} = \frac{23g}{x} \quad x = 51g H_2O$$

4. 51g H₂O

5. A saturated solution of $NaNO_3$ in 100 grams of water at 40°C is heated to 50°C. What is the rate of increase in solubility in grams per degree.

105 at 40°C
115 at 50°C

5. 1g/°C

6. Which salt has solubility values that are least affected by changes in temperature?

6. NaCl

7. If 30 grams of KCl is dissolved in 100 grams of water at 45°C, how many additional grams of KCl would be needed to make the solution saturated at 80°C?

$$50g \text{ in } 100g \text{ at } 80^\circ C$$

$$50 - 30 = 20g$$

7. add 20g

8. At what temperature do potassium chlorate and potassium chloride have the same solubility in water?

KCl

KClO₃

8. 96°C

9. At 50°C, 100 grams of water is saturated with cerium (III) sulfate. How many grams of cerium (III) sulfate must be added to saturate the solution at 0°C?

5g at 50°C

18g at 0°C

$$18g - 5g = 13g$$

9. add 13g

10. At 50°C, 100 grams of water is saturated with potassium nitrate. How many grams of potassium nitrate will precipitate when the solution is cooled to 40°C?

82g at 50°C
62 at 40°C

10. 20g will ppt out

11. How many grams of sodium chloride are required to saturate 500 grams of water at 100°C?

NaCl

$$\frac{40g}{100gH_2O} = \frac{x}{500gH_2O} \quad x = 200g$$

11. 200g

12. Which compound is least soluble in water at 12°C?

12. KClO₃

13. At 80°C, 100 grams of water is saturated with KCl at 80°C. How many grams of KCl will precipitate when the solution is cooled to 45°C?

Potassium Chlorate

50g at 80°C
40g at 45°C

13. 10g ppt

14. A saturated solution of which compound contains 130 grams of solute per 100 grams of water at 70°C?

14. KNO₃

15. How many grams of NaNO₃ are required to saturate 200 grams of water at 10°C?

Sodium Nitrate

$$\frac{80g}{100g} = \frac{x}{200g}$$

15. 160g

16. Which saturated solution of a chloride has the greatest percentage by mass of solute at 60°C?

16. KI