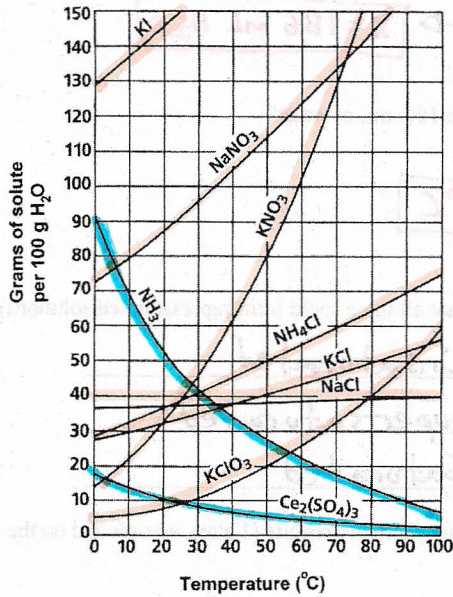


ANSWER KEY

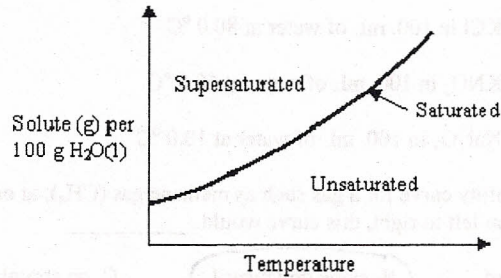
EXTRA PRACTICE: Interpreting Solubility Curves Practice #2

Name: _____



= Gas
 = Solid

* Density (H_2O) = 1 g/mL \therefore 1g = 1mL



- Which of the substances shown on the graph is the least soluble in water at 10.0 °C? \rightarrow KClO₃
- Which of the substances shown on the graph has the greatest increase in solubility as the temperature increases from 30.0 °C to 60.0 °C?
KNO₃
- Which of the substances have its solubility affected the least by a change in temperature from 0.00 °C to 100. °C? \rightarrow NaCl

At 20.0 °C, a saturated solution of sodium nitrate contains 88.0 grams of solute in 100. mL of water. How many grams of sodium nitrate must be added to saturate the solution at 50.0 °C?

@ 20°C \rightarrow 88 g NaNO₃ / 100 g H₂O

@ 50°C \rightarrow 115 g NaNO₃ / 100 g H₂O

115g - 88g = 27.0g NaNO₃ added

\rightarrow Unsaturated \rightarrow Saturated

- At what temperature do saturated solutions of potassium nitrate and sodium nitrate contain the same weight of solute per 100. mL of water?
72°C \pm 2°C
- What TWO substances have the same degree of solubility at approximately 19.0 °C? \rightarrow KNO₃ and KCl
- Calculate the Molarity (M) of a saturated solution of ammonium chloride at 90.0 °C.

① @ 90°C \rightarrow $\frac{70.0 \text{ g NH}_4\text{Cl}}{1} \times \frac{1 \text{ mol NH}_4\text{Cl}}{53.492 \text{ g NH}_4\text{Cl}} = 1.31 \text{ mol NH}_4\text{Cl}$

② $M = \frac{\text{mol solute}}{\text{L soln}} \rightarrow 100 \text{ g soln} = 100 \text{ mL soln} \rightarrow 0.100 \text{ L soln} \rightarrow M = \frac{1.31 \text{ mol NH}_4\text{Cl}}{0.100 \text{ L soln}} \rightarrow$ 13.1M NH₄Cl

- A saturated solution of potassium nitrate is prepared at 60.0 °C using 100. mL of water. How many grams of solute will precipitate out of solution if the temperature is suddenly cooled down to 30.0 °C?

@ 60°C \rightarrow 103g KNO₃ / 100g H₂O

@ 30°C \rightarrow 48g KNO₃ / 100g H₂O

103g - 48g = 55g KNO₃ precipitated

9. What is the smallest volume of water, in mL, required to completely dissolve 39.0 grams of KNO_3 at 10.0°C ?

$$\text{@ } 10^\circ\text{C} \rightarrow \frac{21 \text{ g KNO}_3}{100 \text{ g H}_2\text{O}} = \frac{39 \text{ g KNO}_3}{X} \rightarrow X = 186 \text{ g H}_2\text{O} \rightarrow \boxed{X = 186 \text{ mL H}_2\text{O}}$$

10. What is the lowest temperature at which 30.0 grams of KCl can be dissolved in 100. mL of water?

KCl is saturated at $30.0 \text{ g}/100 \text{ g H}_2\text{O}$ @ $\boxed{10^\circ\text{C}}$

11. Are the following solutions saturated, unsaturated or supersaturated (assume that all three could form supersaturated solutions)

a. 40.0 g of KCl in 100. mL of water at 80.0°C

Unsaturated

b. 120. g of KNO_3 in 100. mL of water at 60.0°C

Supersaturated

c. 80.0 g of NaNO_3 in 100. mL of water at 10.0°C

Saturated

12. Assume that a solubility curve for a gas such as methane gas (CH_4), at one atmosphere of pressure (1 atm), was plotted on the solubility curve graph. Reading from left to right, this curve would _____.

A. slope upward

B. slope downward

C. go straight across

13. At 30.0°C , 90.0 g of sodium nitrate is dissolved in 100. g of water. Is this solution saturated, unsaturated, or supersaturated? Explain why.

Unsaturated \rightarrow Below curved line @ 30°C

14. What TWO substances show a decrease in solubility from 0.00°C to $100.^\circ\text{C}$? \rightarrow NH_3 and $\text{Ce}_2(\text{SO}_4)_3$

15. Which salt compound is **MOST** soluble at 10.0°C ? Explain why. \rightarrow KI
Most saturated @ 10°C \rightarrow Able to dissolve most solute (g) at this temperature \rightarrow 137g

16. Which salt compound is **LEAST** soluble at 50.0°C ? Explain why. \rightarrow KClO_3

Solid salt compound with lowest solubility @ 50°C

17. Which substance is **LEAST** soluble at 90.0°C ? Explain why. \rightarrow $\text{Ce}_2(\text{SO}_4)_3$

Gassolubility \downarrow as Temperature \uparrow

18. At 40.0°C , how many grams of potassium nitrate can be dissolved in 300. grams of water?

$$\text{@ } 40^\circ\text{C} \rightarrow \frac{60 \text{ g KNO}_3}{100 \text{ g H}_2\text{O}} = \frac{X}{300 \text{ g H}_2\text{O}} \rightarrow \boxed{X = 180 \text{ g KNO}_3}$$

19. At what temperature would you need 100. g of water to dissolve 70.0 grams of NH_4Cl ? \rightarrow 90°C

@ 70g \rightarrow 90°C \rightarrow Saturated

20. A solution that holds 40.0 grams of KCl at 10.0°C can be described as what kind of solution? (saturated, unsaturated, or supersaturated) Explain why.

Supersaturated \rightarrow Above curved line @ 10°C