

Name: _____

Study Guide: Solutions-Acid/Base

solubility curves



Factors affect solubility



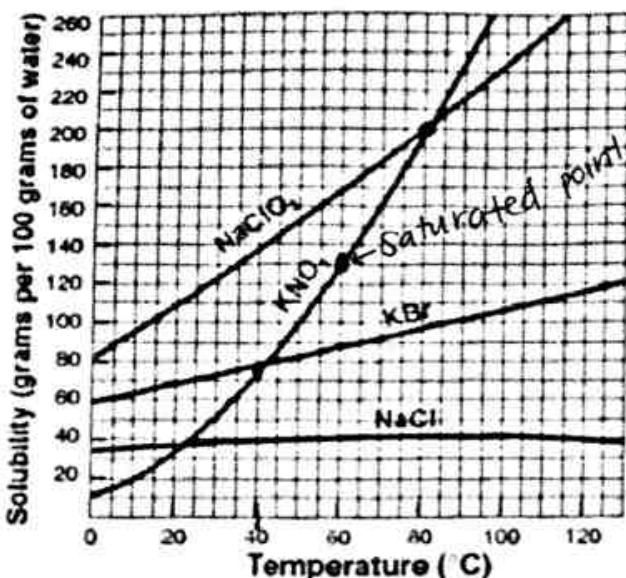
Polarity



Electrolytes



Dilution



1. Looking at the graph to the left, if one dissolved 130 grams of potassium nitrate in 100g grams of water at 60°C would it be unsaturated, supersaturated, or saturated?

$$130\text{ g}/100\text{ g H}_2\text{O} = \text{Saturated}$$

2. Looking at the graph to the left, what is the mass of sodium chloride that will dissolve in 25 grams of water at 80°C.

$$200\text{ g}/100\text{ g H}_2\text{O} = ?\text{ g}/25\text{ g H}_2\text{O} = 50\text{ g}$$

3. Looking at the graph to the left, what is the solubility of potassium nitrate at 40 °C?

$$72\text{ g} - 76\text{ g}$$

4. Looking at the graph to the left, which compound is the most soluble at 90 °C?

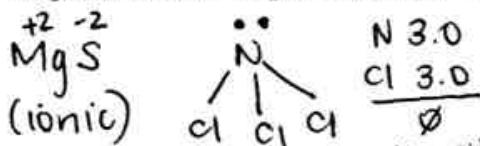
KNO₃ = potassium nitrate

5. Why would you expect a packet of sugar to dissolve faster in hot tea than in iced tea? What other variables can be changed to increase the rate of dissolving?

Temp: ↑ collisions = ↑ rate of dissolving / Stir, & increase surface area

6. Explain why ethanol will dissolve in water and not in carbon tetrachloride.
ethanol must be polar so it will dissolve in polar water
not in nonpolar CCl₄.

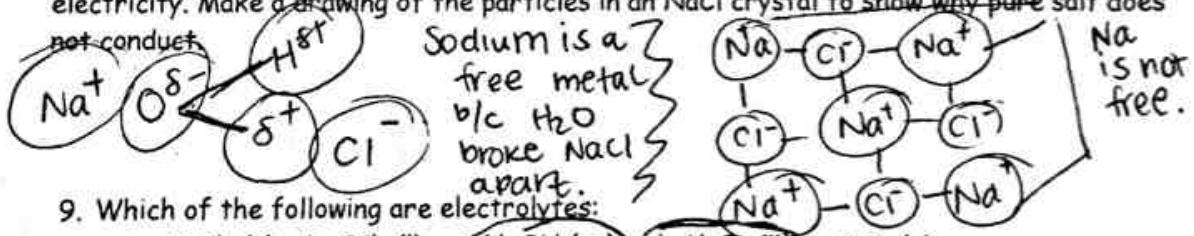
7. Will magnesium sulfide dissolve in nitrogen trichloride? (electronegativities for magnesium-1.2, nitrogen-3.0, sulfur-2.5, & chlorine-3.0)



NO, likes dissolve like ionic & nonpolar are not alike.

nonpolar bond = nonpolar molecule

8. Make a drawing of the particles in NaCl solution to show why this solution conducts electricity. Make a drawing of the particles in an NaCl crystal to show why pure salt does not conduct.



9. Which of the following are electrolytes:

- a. CaCl₂ (s) b. CCl₄ (l) c. NaOH (aq) d. Al₂O₃ (l) e. SO₂ (g)

10. What are the four possible units for molarity?

1) M 2) $\frac{\text{mole}}{\text{L}}$ 3) [value] 4) molar

11. What is the final concentration if 50.0 mL of a 2.00M solution is diluted to 500. mL?

$$M_1V_1 = M_2V_2$$

$$\frac{50.0\text{ mL} \times 2.00\text{ M}}{500.\text{ mL}} = 0.200\text{ M}$$

12. If 250.0 mL of a 0.96M solution of acetic acid are diluted to 800.0 mL, what will be the approximate molarity of the final solution?

$$\frac{250.0\text{ mL} \times 0.96\text{ M}}{800.0\text{ mL}} = 0.30\text{ M}$$

$$\frac{M_1V_1}{V_2} = M_2V_2$$

Molarity



13. Calculate the Molarity of 27.92 grams of potassium oxide dissolved in 250. mL.

$$M = \frac{\text{mole solute}}{L} = \frac{0.2964 \text{ mole}}{0.250 \text{ L}} = 1.19 \text{ M}$$

Molarity



14. If a student has 52.89 grams of FeCl_2 , and needs to make a 3.00 molar solution with it, what will the volume of the solution be?

$$M = \frac{\text{mole}}{L} \quad \text{or} \quad M = \frac{\text{mole}}{\text{M}} = \frac{0.4173 \text{ mole}}{126.75 \text{ g/mol}} = 0.139 \text{ M}$$

15. Which of the following solutions will have the greatest concentration?

a. 2.0 moles of solute dissolved in 1.00 liter of solution
 $2.0 \text{ mole} / 1.00 \text{ L} = 2.0 \text{ M}$

b. 0.30 mole of solute dissolved in 0.60 liter of solution
 $0.30 \text{ mole} / 0.60 \text{ L} = 0.50 \text{ M}$

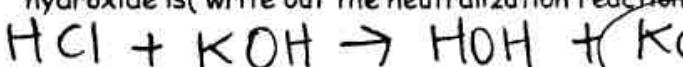
c. 2.0 moles of solute dissolved in 10. liters of solution
 $2.0 \text{ mole} / 10. \text{ L} = 0.20 \text{ M}$

d. 0.10 mole of solute dissolved in 500. mL of solution
 $0.10 \text{ mole} / 0.500 \text{ L} = 0.20 \text{ M}$

neutralization



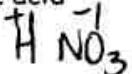
16. The name of the salt formed by the neutralization of hydrochloric acid and potassium hydroxide is (write out the neutralization reaction) Potassium chloride



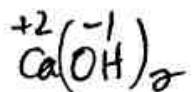
17. Name/Determine the formula for:

a. HCl Hydrochloric acid

b. Nitric acid

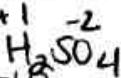


c. Calcium hydroxide



d. KOH Potassium hydroxide

e. Sulfuric acid



18. A 1.0M aqueous solution of which substance would have the lowest pH?

- a. NaF b. $\text{Ba}(\text{OH})_2$ c. HCl d. NH_3

Strong acid

19.	pH? (show work)	Acidic, Basic, or Neutral
$[\text{H}^+] = 1.0 \times 10^{-8}$	$\text{pH} = -\log(1.0 \times 10^{-8})$ $\text{pH} = 8$	Base
$\text{pOH} = 4.2$	$14 - 4.2 = 9.8$	Base
$[\text{H}^+] = 6.51 \times 10^{-4}$	$\text{pH} = -\log(6.51 \times 10^{-4})$ $\text{pH} = 3.19$	Acid
$[\text{OH}^-] = 3.25 \times 10^{-11}$	$\text{pOH} = -\log(3.25 \times 10^{-11})$ $\text{pOH} = 10.49$	Acid

20. Calculate the hydrogen concentration $[\text{H}^+]$: $\text{pH} = 14 - 10.49 = 3.5$

a. $\text{pH} = 6$

$$1 \times 10^{-6} \text{ M}$$

b. $\text{pOH} = 2$

$$\text{pH} = 12 \quad 1 \times 10^{-12} \text{ M}$$

Calculating pH, $[\text{H}^+]$, pOH , $[\text{OH}^-]$ 