

Name: CALVIN

Date:

Hour:

Ch.4 Practice

- 1) An unknown substance dissolves readily in water but not in benzene (a nonpolar solvent). Molecules of what type are present in the substance?
- A) neither polar nor nonpolar
 - B) polar
 - C) either polar or nonpolar
 - D) nonpolar
 - E) none of these
- 2) The interaction between solute particles and water molecules, which tends to cause a salt to fall apart in water, is called
- A) hydration
 - B) polarization
 - C) dispersion
 - D) coagulation
 - E) conductivity
- 3) Consider two organic molecules, ethanol and benzene. One dissolves in water and the other does not. Why?
- A) They have different molar masses.
 - B) One is ionic, the other is not.
 - C) One is an electrolyte, the other is not.
 - D) Ethanol contains a polar O-H bond, and benzene does not.
 - E) Two of these are correct.
- 4) Which of the following is *not* a strong base?
- A) $\text{Ca}(\text{OH})_2$
 - B) KOH
 - C) NH_3
 - D) LiOH
 - E) $\text{Sr}(\text{OH})_2$
- 5) A 16.4-g sample of HF is dissolved in water to give 2.0×10^2 mL of solution. The concentration of the solution is:
- A) 0.82 M
 - B) 0.16 M
 - C) 0.08 M
 - D) 4.1 M
 - E) 8.2 M

$$\frac{16.4 \text{ g HF}}{20.01 \text{ g HF}} \times \frac{1 \text{ mol HF}}{1} = 0.820 \text{ mol}$$
$$\frac{0.820 \text{ mol}}{0.200 \text{ L}} = \boxed{4.1 \text{ M}}$$

6) 1.00 mL of a $3.50 \times 10^{-4} M$ solution of oleic acid is diluted with 9.00 mL of petroleum ether, forming solution A. Then 2.00 mL of solution A is diluted with 8.00 mL of petroleum ether, forming solution B. What is the concentration of solution B?

- A) $3.50 \times 10^{-6} M$
 B) $9.72 \times 10^{-6} M$
 C) $7.00 \times 10^{-5} M$
 D) $7.78 \times 10^{-5} M$
 E) $7.00 \times 10^{-6} M$

$$M_1 V_1 = M_2 V_2 \quad M_2 = \frac{M_1 V_1}{V_2} = \frac{(3.50 \times 10^{-4} M)(1.00 \text{ mL})}{(10.00 \text{ mL})} = 3.50 \times 10^{-5} M$$

$$M_2 = \frac{M_1 V_1}{V_2} = \frac{(3.50 \times 10^{-5} M)(2.00 \text{ mL})}{(10.00 \text{ mL})} = 7.00 \times 10^{-6} M$$

7) How many grams of NaCl are contained in 350. mL of a 0.287 M solution of sodium chloride?

- A) 16.8 g
 B) 5.87 g
 C) 11.74 g
 D) 100.5 g
 E) none of these

$$M = \frac{n}{L}$$

$$n = M \cdot L = (0.287 \frac{\text{mol}}{\text{L}})(0.350 \text{ L}) = 0.100 \text{ mol NaCl} \quad \frac{58.44 \text{ g NaCl}}{1 \text{ mol NaCl}} = 5.84 \text{ g NaCl}$$

8) Which of the following aqueous solutions contains the greatest number of ions?

- A) 400.0 mL of 0.10 M NaCl
 B) 300.0 mL of 0.10 M CaCl_2
 C) 200.0 mL of 0.10 M FeCl_3
 D) 200.0 mL of 0.10 M KBr
 E) 800.0 mL of 0.10 M sucrose

$$n = M \cdot L = .04 \times 2 = .08$$

$$.03 \times 3 = .09$$

$$.02 \times 4 = .08$$

$$.02 \times 2 = .04$$

$$.08 \times 1 = .08$$

9) A 74.28-g sample of $\text{Ba}(\text{OH})_2$ is dissolved in enough water to make 2.450 liters of solution. How many mL of this solution must be diluted with water in order to make 1.000 L of 0.100 M $\text{Ba}(\text{OH})_2$?

- A) 565 mL
 B) 177 mL
 C) 17.7 mL
 D) 4.34 mL
 E) 231 mL

$$M = \frac{n}{L} = \frac{(0.433 \text{ mol})}{(2.450 \text{ L})} = 0.177 M$$

$$n = \frac{74.28 \text{ g Ba}(\text{OH})_2}{171.35 \text{ g Ba}(\text{OH})_2} = 0.433 \text{ mol}$$

$$M_1 V_1 = M_2 V_2$$

$$V_2 = \frac{M_1 V_1}{M_2} = \frac{(0.100 M)(1.000 \text{ L})}{(0.177 M)} = 0.565 \text{ L}$$

10) What volume of 18 M sulfuric acid must be used to prepare 2.30 L of 0.145 M H_2SO_4 ?

- A) 19 mL
 B) 0.33 mL
 C) 1.1×10^3 mL
 D) 2.9 mL
 E) 6.0 mL

$$M_1 V_1 = M_2 V_2$$

$$V_2 = \frac{M_1 V_1}{M_2} = \frac{(0.145 M)(2.30 \text{ L})}{(18 M)} = 0.019 \text{ L} \rightarrow 19 \text{ mL}$$

11) Diabetics often need injections of insulin to help maintain the proper blood glucose levels in their bodies. How many moles of insulin are needed to make up 45 mL of 0.0062 M insulin solution?

- A) 0.00056 mol
 B) 0.14 mol
 C) 7.3 mol
 D) 0.28 mol
 E) 0.00028 mol

$$M = \frac{n}{L}$$

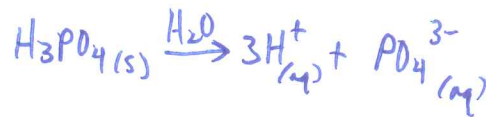
$$n = M \cdot L = (0.0062 \frac{\text{mol}}{\text{L}})(0.045 \text{ L}) = 2.8 \times 10^{-4} \text{ mol}$$

12) Phosphoric acid, H_3PO_4 , is a triprotic acid. What is the total number of moles of H^+ available for reaction in 2.50 L of 0.700 M H_3PO_4 ?

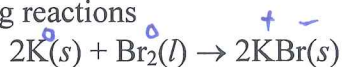
- A) 0.233 mole
- B) 2.10 mole
- C) 0.583 mole
- D) 3.00 moles
- E) 5.25 moles

$$M = \frac{n}{L}$$

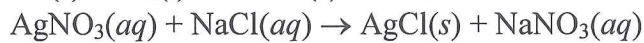
$$n = M \cdot L = (0.700 \frac{\text{mol}}{\text{L}})(2.50 \text{ L}) = 1.75 \text{ mol} \times 3 = \boxed{5.25 \text{ mol}}$$



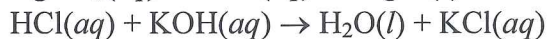
13) The following reactions



Redox



precip.



Acid/Base

are examples of

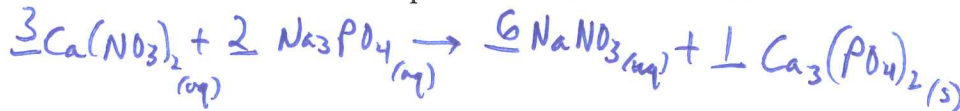
- A) precipitation reactions
- B) redox, precipitation, and acid-base, respectively
- C) precipitation (two) and acid-base reactions, respectively
- D) redox reactions
- E) none of these

14) Consider an aqueous solution of calcium nitrate added to an aqueous solution of sodium phosphate. What is the formula of the solid formed in the reaction?

- A) $\text{Ca}(\text{PO}_4)_2$
- B) CaPO_4
- C) $\text{Ca}_3(\text{PO}_4)_2$
- D) $\text{Ca}_3(\text{PO}_3)_2$
- E) none of these

15) Consider an aqueous solution of calcium nitrate added to an aqueous solution of sodium phosphate. Write and balance the equation for this reaction to answer the following question. What is the sum of the coefficients when the molecular equation is balanced in standard form?

- A) 4
- B) 5
- C) 7
- D) 11
- E) 12



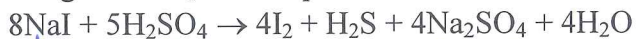
16) The oxidation state of chlorine in ClO^- is:

- A) 0
- B) +1
- C) -1
- D) +3
- E) -3

17) In the reaction $2\overset{0}{\text{Ca}}(s) + \overset{0}{\text{O}_2}(g) \rightarrow 2\overset{2+}{\text{Ca}}\overset{2-}{\text{O}}(s)$, which species is oxidized?

- A) O_2
- B) O^{2-}
- C) Ca
- D) Ca^{2+}
- E) none of these

18) In the following reaction, which species is oxidized?



- A) sodium
- B) iodine
- C) sulfur
- D) hydrogen
- E) oxygen

19) In which of the following does iodine have the lowest oxidation state?

- A) LiIO_3 $5+$
- B) IO_2 $4+$
- C) I_2O $+$
- D) NH_4I $-$
- E) I_2 0

Go Vikings!!