

# Week # 12

## Unit 12 Activity Sheet

Chemistry 30A

A. For each of the following, circle the solute and underline the solvent.

- Air is a mixture of primarily 78% nitrogen and 21% oxygen.
- Household bleach is a 5% solution of NaClO dissolved in water.
- Vanilla extract consists of vanillin dissolved in ethanol.
- Household ammonia consists of ammonia gas dissolved in water.
- A physiological saline solution (normal saline) consists of 0.9 gram of sodium chloride (NaCl) dissolved in water.

B. Molarity Problems. remember:  $Molarity = M = \frac{\text{moles}}{\text{liter}}$

- Calculate the molarity of a sodium hydroxide solution containing 50 grams/liter.

$$MW \text{ of } NaOH = 40.0g/\text{mole}$$

$$\frac{50.0g}{1 \text{ liter}} \times \frac{1 \text{ mole}}{40.0g} = 1.25M$$

- Calculate the number of grams of  $H_2SO_4$  required to prepare 100 ml of 6M  $H_2SO_4$ .

$$MW \text{ of } H_2SO_4 = 98.0g/\text{mole}$$

$$\frac{6 \text{ moles } H_2SO_4}{1 \text{ liter}} \times \frac{98.0g}{1 \text{ mole}} \times 0.100 \text{ liter} = 58.8 \text{ grams}$$

- 10 grams of NaCl are dissolved in enough water to make 200 ml of solution. What is the molarity of the solution?  $MW \text{ of } NaCl = 58.5g/\text{mole}$

$$10g \text{ NaCl} \times \frac{1 \text{ mole}}{58.5g} = 0.171 \text{ moles}; \quad \frac{0.171 \text{ moles}}{0.200 \text{ liters}} = 0.855M \rightarrow 0.86M \text{ NaCl}$$

- Gatorade contains 14 grams of sugar per 0.946 liters. Calculate the molarity of sugar in Gatorade. (Molecular formula of sugar is  $C_6H_{12}O_6$ )  $MW = 180g/\text{mole}$

$$14g \times \frac{1 \text{ mole}}{180g} = 7.78 \times 10^{-2} \text{ mole}; \quad \frac{7.78 \times 10^{-2} \text{ mole}}{0.946 \text{ liter}} = 8.2 \times 10^{-2} M$$

- Calculate the number of grams of solute required to prepare:

a. 10 liters of 0.50M HCl.  $MW = 36.5g/\text{mole}$  (don't worry about sig figs here)

$$\frac{0.5 \text{ mole}}{1 \text{ liter}} \times 10 \text{ liters} \times \frac{36.5g}{1 \text{ mole}} = 182.5 \text{ grams}$$

calculate the molarity of

b. 60.0 grams of NaOH in 2 liters of water.  $MW \text{ of } NaOH = 40.0g/\text{mole}$

$$60.0g \times \frac{1 \text{ mole}}{40.0g} = 1.5 \text{ moles}; \quad \frac{1.5 \text{ mole}}{2 \text{ liters}} = 0.75M$$

C. Percent Solutions.

- Calculate the percent of solute on a weight/volume basis of the following solutions:

a. 50g of acetic acid/1 liter.

$$\frac{50g}{1 \text{ liter}} \Rightarrow \frac{50g}{1000ml} \rightarrow \frac{5g}{100ml} = 5\% \text{ acetic acid solution}$$

b. 7.5 g of sucrose/250 ml.

$$\frac{7.5g}{250ml} = \frac{x}{100ml}; \quad x = 3g; \quad \frac{3g}{100ml} \Rightarrow 3\% \text{ sucrose solution}$$

c. 0.5 g of NaCl/500 ml

$$\frac{0.5g}{500ml} = \frac{x}{100ml} ; x = 0.1g ; \frac{0.1g}{100ml} \Rightarrow 0.1\% \text{ NaCl solution}$$

d. 10 g of NaOH/100 ml

$$\frac{10g}{100ml} \Rightarrow 10\% \text{ NaOH solution}$$

#### D. Practice Quiz Problems.

1. "Seeding" of clouds with AgI crystals to produce more rainfall is a practical application of the principle

- a. decomposition
- b. forming a colloidal dispersion
- c. catalysis
- d. hydrate formation
- e. destabilizing a supersaturated solution.

2. All of the following are colligative properties of solution except

- a. vapor pressure
- b. boiling point
- c. freezing point
- d. heat of fusion
- e. osmotic pressure

know the definitions of each colligative properties.

3. It is difficult to cook pasta in water at Lake Tahoe because water boils there below 100°C. This difficulty might be overcome by:

- a. using a higher flame so as to boil the water faster.
- b. using distilled water.
- c. using an aluminum pot so as to distribute the heat more evenly.
- d. using a larger pot
- e. adding salt to the water.

(know why)

4. A solution is cooled without any salt precipitating out. The resulting solution is considered

- a. saturated
- b. supersaturated
- c. unsaturated
- d. dilute

5. How many grams of sulfuric acid are required to prepare 1 liter of 6M H<sub>2</sub>SO<sub>4</sub>?

- a. 294 g
  - b. 558 g
  - c. 600 g
  - d. 98 g
  - e. 980 g
- $6 \text{ moles} \times \frac{98.0g}{1 \text{ mole}} = 558g$

6. How many grams of NaCl are required to make 1 liter of a 0.9% solution of saline.

- a. 0.3 g
  - b. 0.9 g
  - c. 9 g
  - d. 10 g
  - e. 90 g
- $0.9\% \Rightarrow \frac{0.9g}{100ml} \Rightarrow \frac{9g}{1000ml}$

7. How many grams of HCl are in a 3 M solution of HCl?

- a. 3 g
  - b. 36.5 g
  - c. 73 g
  - d. 109.5 g
- MW =  $\frac{36.5g}{\text{mole}}$

$$\frac{3 \text{ moles}}{1 \text{ liter}} \times \frac{36.5g}{1 \text{ mole}} = 109.5g$$

\* KNOW THE INFORMATION ON THE HANDOUTS!!!!