p.481 # 11,12 p.487 #27,28
p.482 # 13,15 p.488 #29,30

Name: Key Period:

Concentration Problems from book (p. 481, 482, 487 & 488)

(*) mass solution = mass solute + mass solvent

(**) volume solution = vol. solute + vol. solvent

1. You have 1500.0 g of a bleach solution. The percent by mass of the solute sodium hypochlorite (NaOCl) is 3.62 %. How many grams of NaOCl are there?

$\%\,NaOCl = \frac{\text{mass NaOCl}}{\text{mass solution}} \times 100$ (solution)

$3.62\% = \frac{x}{1500} \times 100$

$x = \text{mass NaOCl} = 54.3\text{ g NaOCl}$

2. The percent by mass of calcium chloride in a solution is found to be 2.65 %. If 50.0 g of calcium chloride is used, what is the mass of the solution?

$\%\,CaCl_2 = \frac{\text{mass } CaCl_2}{\text{mass Solution}} \times 100$ (solute, solution)

$2.65\% = \frac{50\text{ g}}{x} \times 100$

$x = \text{mass solution} = 1886.8\text{ g}$

3. What is the percent by volume of ethanol in a solution that contains 35 mL of ethanol and 155 mL of water?

$\%\,\text{ethanol} = \frac{\text{vol. ethanol}}{\text{vol. solution}} \times 100 = \frac{35\text{ mL}}{(35\text{ mL} + 155\text{mL})} \times 100$ (solute, solvent)

$= 18.4\%\text{ ethanol}$

4. If 18 mL of ethanol is used to make an aqueous solution that is 15 % methanol by volume, how many milliliters of solution is produced?

$\%\,\text{ethanol} = \frac{\text{vol. ethanol}}{\text{vol. solution}} \times 100$ (solute)

$15\% = \frac{18\text{ mL}}{x} \times 100$

$x = \text{volume of solution} = 120\text{mL solution}$

5. What is the molality of a solution containing 10.0 g of Na_2SO4 dissolved in 1000.0 g of water?

$m = \frac{\text{moles solute}}{\text{Kg solvent}} = \frac{.0704\text{ mol}}{1\text{ kg}} = .0704\,m$ (solute, solvent)

$10\text{g } Na_2SO_4 \div 142\text{g/mole} = .0704\text{ mol}$

$1000\text{g} = 1\text{ kg}$

6. How much $Ba(OH)_2$, in grams, is needed to make a 1.00 *m* aqueous solution? (assume 1kg H_2O)

$m = \frac{\text{moles } Ba(OH)_2}{\text{Kg } H_2O}$

$1\,m = \frac{\text{moles } Ba(OH)_2}{1\text{ Kg } H_2O} = 1\text{ mol } Ba(OH)_2 \times 171.3\text{g/mole} =$

$171.3\text{g } Ba(OH)_2$

7. What is the mole fraction of NaOH in an aqueous solution that contains 22.8 % NaOH by mass?

(assume 100g sample)

22.8 g NaOH - solute $\div$ 40g/mole = .57 mol NaOH

77.2g H_2O - solvent $\div$ 18g/mol = 4.29 mol H_2O $\Big\rangle$ 4.86 total moles

$X_{NaOH} = \frac{\text{moles NaOH}}{\text{total moles}} = \frac{.57}{4.86} = .117$

8. If the mole fraction of sulfuric acid (H_2SO_4) is an aqueous solution is 0.325, what is the percent by mass of H_2SO_4?

$X_{H_2SO_4} = .325$

.325 mol H_2SO_4 × 98g/mole = 31.85g H_2SO_4

.675 mol H_2O × 18g/mol = 12.15g H_2O $\Big\rangle$ 44g total

total moles = 1 = .325 + x

x = .675 mol H_2O

$\%\,H_2SO_4 = \frac{\text{mass } H_2SO_4}{\text{mass solution}} \times 100$

$\frac{31.85\text{g}}{44\text{g}} \times 100 = 72.4\%$