Molarity
Chemistry

Name _____

**1. Calculate the mass percent of the following solutions:**

(a) 15.0 g KCl + 100.0 g $H_2O$

(b) 2.50 g $Na_3PO_4$ + 10.0 g $H_2O$

(c) 0.20 mol $NH_4C_2H_3O_2$ + 125 g $H_2O$

N = 14
7H = 7
2C = 24
2O = 32
79 g/mol

0.20 mol × 77 g/mol = 15.4 g $NH_4C_2H_3O_2$

$\frac{15.4}{140.4}$ = 11% $NH_4C_2H_3O_2$

$\frac{125}{140.4}$ = 89% $H_2O$

(d) 1.50 mol NaOH in 33.0 mol $H_2O$

**2. Determine the volume percent of a solution made by dissolving:**

(a) 50.0 mL of hexanol in enough ethanol to make 125 mL of solution

$\frac{50\ mL}{125}$ = 40% hexanol

$\frac{75\ mL}{125\ mL}$ = 60% ethanol

(b) 2.0 mL of ethanol in enough methanol to make 15.0 mL of solution

**3. Calculate the molarity of the following solutions:**

(a) 0.25 mol of solute in 75.0 mL of solution

(b) 1.75 mol of KBr in 0.75 L of solution

(c) 0.50 mol of solute in 125 mL of solution

(d) 2.25 mol of $CaCl_2$ in 1.50 L of solution

(e) 1.5mol HF in 2.5L of solution

(f) 95.4g $KNO_3$ in 750mL of solution

K = 39.1
N = 14
3O = 48
101.1 g/mol

95.4 g × $\frac{mol}{101.1\ g}$ = 0.943 mol

$M = \frac{0.943\ mol}{0.750\ L}$ = 1.26 M $KNO_3$

(g) 35.0 g of $NaC_2H_3O_2$ in 1.25 L of solution

(h) 275 g $C_6H_{12}O_6$ in 775 mL of solution

**4. Calculate the number of moles of solute in each of the following solutions:**

(a) 1.5 L of 1.20 *M* $H_2SO_4$

(b) 25.0 mL of 0.0015 *M* $BaCl_2$

(c) 125 mL of 0.35 *M* $K_3PO_4$

$0.35M = \frac{n}{0.125L}$

$n = 0.125L \times 0.35M = \boxed{0.44 mol}$

(d) 175 mL of 0.50 *M* LiBr

(e) 0.75 L of 1.50 *M* $HNO_3$

(f) 10.0 mL of 0.75 *M* $NaClO_3$

**5. Calculate the grams of solute in each of the following solutions:**

(a) 2.5 L of 0.75 *M* $K_2CrO_4$

(b) 400mL of 0.35 *M* $Na_3PO_4$

$.35M = \frac{n}{0.400L}$

$\Rightarrow n = 0.35 \times 0.400 = 0.14 mol$

$3Na = 69$

$P = 31$

$4O = 64$

$164 g/mol$

$0.14 mol \times \frac{164 g}{mol} = \boxed{23 g\ Na_3PO_4}$

(c) 250 mL of 16 *M* $HNO_3$

(d) 75 mL of 0.050 *M* $HC_2H_3O_2$

**6. What will be the molarity of the resulting solutions made by mixing the following?**
*Assume that volumes are additive.*

(a) 125 mL of 5.0 *M* $H_3PO_4$ with 775 mL of $H_2O$

(b) 250 mL of 0.25 *M* $Na_2SO_4$ with 750 mL of $H_2O$

(c) 75 mL of 0.50 *M* $HNO_3$ with 75 mL of 1.5 *M* $HNO_3$

(d) 175 mL of 3.0 *M* $H_2SO_4$ with 275 mL of $H_2O$

(e) 350 mL of 0.10 *M* $CuSO_4$ with 150 mL of $H_2O$

(f) 50.0 mL of 0.250 *M* HCl with 25.0 mL of 0.500 *M* HCl

**6. What will be the molarity of the resulting solutions made by mixing the following?**
*Assume that volumes are additive.*

(a) 125 mL of 5.0 *M* $H_3PO_4$ with 775 mL of $H_2O$

(b) 250 mL of 0.25 *M* $Na_2SO_4$ with 750 mL of $H_2O$

(c) 75 mL of 0.50 *M* $HNO_3$ with 75 mL of 1.5 *M* $HNO_3$

(d) 175 mL of 3.0 *M* $H_2SO_4$ with 275 mL of $H_2O$

(e) 350 mL of 0.10 *M* $CuSO_4$ with 150 mL of $H_2O$

(f) 50.0 mL of 0.250 *M* HCl with 25.0 mL of 0.500 *M* HCl

**7. Calculate the volume of concentrated reagent required to prepare the diluted solutions indicated:**

(a) 15 *M* $H_3PO_4$ to prepare 750 mL of 3.0 *M* $H_3PO_4$

(b) 16 *M* $HNO_3$ to prepare 250 mL of 0.50 *M* $HNO_3$

**7. Calculate the volume of concentrated reagent required to prepare the diluted solutions indicated:**

(a) 15 *M* $H_3PO_4$ to prepare 750 mL of 3.0 *M* $H_3PO_4$

(b) 16 *M* $HNO_3$ to prepare 250 mL of 0.50 *M* $HNO_3$