# Molarity/Dilutions Worksheet

Name:

Date:

1. **Molarity Problems** – Find the missing value.

| Chemical | Mass | Volume | Molarity |
|---|---|---|---|
| (a) $Na_2SO_4$ | 16.0g | 50.0mL | $\boxed{2.25M}$ |
| (b) HCl | 143.28g | $\boxed{0.924L}$ | 4.25M |
| (c) $Pb(NO_3)_2$ | $\boxed{149g}$ | 150.0mL | 3.00M |

(a) $\dfrac{16.0g}{1} \times \dfrac{1 mol}{142.1g} \times \dfrac{1}{0.0500L}$

(b) $\dfrac{143.28g}{1} \times \dfrac{1 mol}{36.5g} \times \dfrac{1L}{4.25 mol}$

(c) $\dfrac{0.1500L}{1} \times \dfrac{3.00 mol}{1L} \times \dfrac{331.2g}{1 mol}$

2. **Dilution Problems**

(a) 110.0mL of 3.00M sulfuric acid has 25.0mL of water added to it. What is the resulting concentration of the solution?

$$C_1V_1 = C_2V_2$$
$$(3.00M)(110.0mL) = C_2(135.0mL)$$
$$C_2 = \boxed{2.44M}$$

(b) How much water must be added to 50.0mL sample of 18.0M nitric acid to give a resulting concentration of 0.250M?

$$C_1V_1 = C_2V_2$$
$$(18.0M)(50.0mL) = (0.250M)V_2$$
$$V_2 = 3600mL$$

$$3600mL - 50.0mL$$
$$= \boxed{3550mL}$$

(c) Barium nitrate is purchased as a 17.0M concentration. Explain how you would prepare 500.0mL of a 5.00M solution.

$$C_1V_1 = C_2V_2$$
$$(17.0M)(V_1) = (5.00M)(500.0mL)$$
$$V_1 = \boxed{147 mL}$$

$$500mL - 147mL = 353mL$$

– Take 147mL of 17.0M solution and add 353mL of water.

(d) If 25.0mL of 4.0M $HNO_3$ solution is diluted to a volume of 600.0mL, what will be the molarity of the diluted solution?

$$C_1 V_1 = C_2 V_2$$
$$(4.0M)(25.0mL) = C_2(600.0mL)$$
$$C_2 = \boxed{0.167M}$$

(e) What initial volume of 18M hydrochloric acid is required to make 2.0L of 0.50M hydrochloric acid solution?

$$C_1 V_1 = C_2 V_2$$
$$(18M) V_1 = (0.50M)(2.0L)$$
$$V_1 = \boxed{0.056 L}$$

(f) 250.0mL of 0.20M phosphoric acid is added to 1.00L of water. What is the molarity of the resulting solution?

$$C_1 V_1 = C_2 V_2$$
$$(0.20M)(250.0mL) = C_2(1250mL)$$
$$C_2 = \boxed{0.040 M}$$