

Name: \_\_\_\_\_

Key

### Molarity

1. What is the molarity of an aqueous solution prepared by dissolving 4 moles of solute in 8 liters of solution?

$$M = \frac{4 \text{ mol}}{8 \text{ L}} = \boxed{0.5 \text{ mol/L}}$$

2. How many moles of solute are needed to prepare 2.5L of a 0.6M solution?

$$M = \frac{\text{mol solute}}{\text{L solution}}$$

$$M \times V = \text{mol}$$
$$(0.6 \frac{\text{mol}}{\text{L}})(2.5 \text{ L}) = \boxed{2 \text{ mol}}$$

15 of.

3. A person wishes to prepare a 2.0 molar solution using 2.5 moles of solute. Calculate the final volume of the solution.

$$\frac{2.0 \text{ M}}{1} = \frac{2.5 \text{ mol}}{x} \quad \boxed{x = 1.3 \text{ L}}$$

4. How many grams of KOH are needed to prepare 250mL of a 2.00M solution of KOH?

$$g = M \times V \times \text{g.f.m.}$$

$$g = 2.00 \text{ M}(0.25 \text{ L})(56.1 \text{ g/mol})$$
$$= \boxed{28 \text{ g KOH}}$$

5. How many grams of ammonium chloride are contained in 0.500L of a 2.00M solution?

$\text{NH}_4\text{Cl}$

$$g = M \times V \times \text{g.f.m.}$$

$$g = 2.00 \text{ M}(0.500 \text{ L})(53.5 \text{ g/mol})$$
$$= \boxed{53.5 \text{ g NH}_4\text{Cl}}$$

6. What is the molarity of a solution of  $\text{KNO}_3$  that contains 404 grams of  $\text{KNO}_3$  dissolved in 2.00L of solution?

$$M = \frac{(404 \text{ g} / 101.1 \text{ g/mol})}{2.00 \text{ L}} = \boxed{2.00 \text{ mol/L}}$$

7. What is the molarity of a solution that contains 20.0 grams of calcium bromide dissolved in 0.50L of solution?

$\text{CaBr}_2$

$$M = \frac{(20.0 \text{ g} / 199.9 \text{ g/mol})}{0.50 \text{ L}} = \boxed{0.20 \text{ mol/L}}$$

8. If 0.50L of 12M HCl is diluted down to 6M HCl, how many liters of 6M HCl will you have?

DILUTION

$$M_1 V_1 = M_2 V_2$$

$$(12 \text{ M})(0.50 \text{ L}) = (6 \text{ M})(x)$$

$$\boxed{x = 1 \text{ L}}$$

9. If you want to dilute 18M  $\text{H}_2\text{SO}_4$  down to 6M  $\text{H}_2\text{SO}_4$  and you want to have 1L of 6M  $\text{H}_2\text{SO}_4$  as your final volume, how many liters of the 18M  $\text{H}_2\text{SO}_4$  would you need to dilute?

DILUTION

$$M_1 V_1 = M_2 V_2$$

$$(18 \text{ M})(x) = 6 \text{ M}(1)$$

$$\boxed{x = 3 \text{ L}}$$