Name Answer Key Hour ____

Understanding Molarity

Honors Chemistry

1. What is the molarity of NaCl in Sea Water if it contains roughly 54.7-g of NaCl per liter?

$$\frac{54.7\text{ g NaCl}}{1} \times \frac{1\text{ mol NaCl}}{58.5\text{ g NaCl}} = 0.94\text{ mol} \rightarrow \boxed{0.94\text{ M}}$$

2. What is the molarity of 372.3-g of H_2SO_4 dissolved in 1.00-L of solution?

$$\frac{372.3\text{ g } H_2SO_4}{1} \times \frac{1\text{ mol } H_2SO_4}{98\text{ g } H_2SO_4} = 3.8\text{ mol} \rightarrow \frac{3.8\text{ mol}}{\text{L}} = \boxed{3.8\text{ M}}$$

3. What is the molarity of 6.78-g of Na_2CO_3 dissolved in 456.0-mL of solution?

$$\frac{6.78\text{ g } Na_2CO_3}{1} \times \frac{1\text{ mol } Na_2CO_3}{106\text{ g } Na_2CO_3} = .064\text{ mol} \qquad \frac{.064\text{ mol}}{.456\text{ L}} = \boxed{0.14\text{ M}}$$

4. What is the molarity of 14.3-g of NaOH in 650.0-mL of solution?

$$\frac{14.3\text{ g NaOH}}{1} \times \frac{1\text{ mol NaOH}}{40\text{ g NaOH}} = 0.3575\text{ mol} \qquad \frac{.3575\text{ mol}}{.650\text{ L}} = \boxed{0.55\text{ M}}$$

5. How many moles of Na_2CO_3 are there in 8.0-L of 2.5-*M* solution?

$$n = M \times V = \frac{2.5\text{ mol}}{1.0\text{ L}} \times 8.0\text{ L} = \boxed{20.0\text{ moles}}$$

6. How many moles of Na_2CO_3 are in 145.0-mL of a 2.0-*M* solution?

$$n = M \times V = \frac{2.0\text{ mol}}{1.0\text{ L}} \times 0.145\text{ L} = \boxed{0.29\text{ moles}}$$

7. How many grams of NaCl are contained in 300.0-mL of a 0.50-*M* solution?

$$n = M \times V = \frac{0.50\text{ mol}}{1.0\text{ L}} \times 0.300\text{ L} = 0.15\text{ mol}$$

$$\frac{0.15\text{ mol NaCl}}{1} \times \frac{58.5\text{ g NaCl}}{1\text{ mol NaCl}} = \boxed{8.8\text{ grams}}$$

8. What weight (in grams) of H_2SO_4 would be needed to make 750.0-mL of 2.00-*M* solution?

$$n = M \times V = \frac{2.00\ mol}{L} \times 0.750\ L = 1.5\ mol$$

$$\frac{1.5\ mol\ H_2SO_4}{1} \times \frac{98\ g\ H_2SO_4}{1\ mol\ H_2SO_4} = \boxed{147\ grams}$$

9. What volume (in mL) of 18.0-*M* H_2SO_4 contains 3.73-g H_2SO_4?

$$\frac{3.73\ g\ H_2SO_4}{1} \times \frac{1\ mol\ H_2SO_4}{98\ g\ H_2SO_4} = .038\ mol$$

$$V = \frac{n}{M} = \frac{.038\ mol}{18.0\ mol/L} = \boxed{2.1\ mL}$$

10. What volume (in mL) of 12.0-*M* HCl contains 4.66 moles of HCl?

$$V = \frac{n}{M} = \frac{4.66\ mol}{12.0\ mol/L} = \boxed{388.3\ mL}$$

11. How many grams of $Ca(OH)_2$ are needed to make 125.0-mL of 0.55-*M* solution?

$$n = M \times V = \frac{0.55\ mol}{L} \times 0.125\ L = .069\ mol$$

$$\frac{.069\ mol\ Ca(OH)_2}{1} \times \frac{74\ g\ Ca(OH)_2}{1\ mol\ Ca(OH)_2} = \boxed{5.1\ grams}$$

12. What is the molarity of a solution containing 143.0-g of H_3PO_4 in 225.0-mL of solution?

$$\frac{143.0\ g\ H_3PO_4}{1} \times \frac{1\ mol\ H_3PO_4}{98\ g\ H_3PO_4} = 1.46\ mol \qquad \frac{1.46\ mol}{.225\ L} = \boxed{6.5\ M}$$

13. What weight (in grams) of KCl is in 2.40-L of 1.50-*M* KCl solution?

$$n = M \times V = \frac{1.50\ mol}{L} \times 2.40\ L = 3.6\ mol$$

$$\frac{3.6\ mol\ KCl}{1} \times \frac{74.5\ g\ KCl}{1\ mol\ KCl} = \boxed{268.2\ grams}$$

14. What is the molarity of a solution containing 24.7-g of NaOH in 355.0-mL of solution?

$$\frac{24.7\ g\ NaOH}{1} \times \frac{1\ mol\ NaOH}{40\ g\ NaOH} = 0.6175\ mol \qquad \frac{0.6175\ mol}{0.355\ L} = \boxed{1.7\ M}$$