

Name: Key
Blk: _____ Date: _____

CHEMISTRY 11 SUMMARY OF MOLARITY

THERE ARE FIVE BASIC TYPES OF MOLARITY PROBLEMS

TYPE 1: Determining the MASS of a compound required to make a certain concentration of a solution.

Example: What is the mass required to make 350.0 mL of 0.250 M NaCl?

$$\frac{0.250 \text{ mol NaCl}}{1 \text{ L}} \times 0.3500 \text{ L} = 0.0875 \text{ mol NaCl}$$

$$0.0875 \text{ mol NaCl} \times \frac{58.5 \text{ g NaCl}}{1 \text{ mol NaCl}} = \boxed{5.12 \text{ g NaCl}}$$

TYPE 2: CONVERTING a Density to a MOLARITY and or vice versa.

Example: What is the density of 12.4 M HCl?

$$\frac{12.4 \text{ mol HCl}}{1 \text{ L}} \times \frac{36.5 \text{ g HCl}}{1 \text{ mol HCl}} = \boxed{453 \text{ g/L HCl}}$$

TYPE 3: DILUTION of a SINGLE SOLUTION:

Example: What concentration of NaCl is made by diluting 30.0 mL of 0.250 M NaCl to 125 mL?

$$[\text{NaCl}]_f = \frac{0.250 \text{ M} \times 0.0300 \text{ L}}{0.125 \text{ L}} = \boxed{0.0600 \text{ M NaCl}}$$

TYPE 4: DILUTION when mixing TWO DIFFERENT concentrations of the SAME substance.

Example: What is the concentration of the solution produced when 125 mL of 2.55 M NaOH is mixed with 475 mL of 2.42 M NaOH?

$$[\text{NaOH}]_{F_1} = \frac{2.55 \text{ M} \times 0.125 \text{ L}}{0.600 \text{ L}} = 0.53125 \text{ M}$$

$$[\text{NaOH}]_{F_2} = \frac{2.42 \text{ M} \times 0.475 \text{ L}}{0.600 \text{ L}} = 1.91583333 \text{ M}$$

$$[\text{NaOH}]_{F_T} = 0.531 \text{ M} + 1.92 \text{ M} = \boxed{2.45 \text{ M}}$$

TYPE 5. Making a DILUTE solution from a concentrated one

Example: What volume of 3.00 M HCl is required to make up 5.00 L of 0.250 M HCl?

$$V_T = \frac{0.250 \text{ M} \times 5.00 \text{ L}}{3.00 \text{ M}} = \boxed{0.417 \text{ L}} \\ \text{or } \boxed{417 \text{ mL}}$$