CONCEPT: MOLARITY & MOLALITY

The properties of solutions depend not only on the nature of the dissolved solutes in the solvent, but also on their concentrations. In order to express their concentrations chemists tend to use molarity (M) and molality (m).

$$M = \frac{\text{moles of solute}}{\text{Liters of Solution}} \qquad m = \frac{\text{moles of solute}}{\text{kg of solvent}}$$

EXAMPLE 1: A solution is prepared by mixing 20.00 g of $CdCl_2$ (MW of $CdCl_2$ is 183.317 g/mol) with 80.00 g of water has a density at 20 ^{o}C of 1.1988 g cm^{-3}. Compute the molarity of $CdCl_2$ in this solution.

EXAMPLE 2: In order to sterilize our drinking water, chlorine is routinely added to our water supply. If the water fountains at a park have a chlorine level of 185 ppm calculate the molarity in μM. (MW of Cl = 35.453 g/mol)

PRACTICE: MOLARITY & MOLALITY CALCULATIONS 1

EXAMPLE 1: A solution is prepared by dissolving 41.33 g nitric acid, HNO_3, in enough water to make 100.0 mL of solution. If the density of the solution is 1.380 g/mL, what is the molality of HNO_3 in the solution? (MW of HNO_3 is 63.018 g/mol).

EXAMPLE 2: If the mole fraction of ethanol, CH_3CH_2OH, in an aqueous solution is 0.090 what is the molality and molarity? Density of the solution is 1.35 g/mL.