Molarity, Molality Quiz '10

1. What is the molarity of a solution that was prepared by dissolving 14.2 g of $NaNO_3$ in enough water to make 350 mL of solution?

$$\frac{14.2g\ NaNO_3}{1} \times \frac{1\ mol\ NaNO_3}{84.99g\ NaNO_3} = \frac{0.167\ mol}{.350\ L} = \boxed{0.477\ M}$$

2. How many grams of water are needed to form a .010 m solution of sucrose if 2.0 moles of sucrose are used?

200

$$\frac{2\ mole\ Sucrose}{1} \times \frac{1\ Kg\ H_2O}{.010\ mol\ sucrose} = 200\ Kg = \boxed{20,000g\ H_2O}$$

$$\boxed{200,000g\ H_2O}$$

3. What is the molality of a solution formed by dissolving 15.0 grams of glucose (molar mass = 180.18 g/mol) in 600.0 grams of water?

$$\frac{15.0g\ glucose}{1} \times \frac{1\ mol}{180.18g} = \frac{.0833\ mol}{.6\ Kg} = \boxed{0.139\ m}$$

4. How many grams of NaBr would be needed to prepare 700 ml of 0.230 M NaBr solution?

$$\frac{.700\ L}{1} \times \frac{.230\ mol}{1\ L} = .161\ mol$$

$$\frac{.700\ L}{1} \times \frac{.230\ mol}{1\ L} \times \frac{102.894g\ NaBr}{1\ mol\ NaBr} = \boxed{16.57g\ NaBr}$$

5. A reagent bottle is labeled 0.450 M K_2CO_3.

   a) How many moles of K_2CO_3 are present in 45.6 mL of this solution?

$$\frac{.0456\ L}{1} \times \frac{.450\ mol}{1\ L} = \boxed{0.0205\ mol}$$

   b) How many milliliters of this solution are required to furnish 0.800 mol of K_2CO_3?

$$\frac{.800\ mol\ K_2CO_3}{1} \times \frac{1\ L}{.450\ mol} = 1.778\ L = \boxed{1,778\ mL}$$

   c) If 50.0 mL of 0.450 M K_2CO_3 is added to enough water to make 125 mL of a diluted solution, what is the molarity of the diluted solution?

$$\frac{.050\ L}{1} \times \frac{.45\ mol}{1\ L} =$$

$$\frac{.0225\ mol}{.125\ L} = \boxed{.18\ M}$$

$$M_1 V_1 = M_2 V_2$$

$$\frac{(50.0\ mL)(.450\ M)}{125\ mL} = \frac{(M_2)(125\ mL)}{125\ mL}$$

$$\boxed{M_2 = 0.18\ M}$$