Molarity, Molality & Dilution Notes and Practice

Answer the questions below on a separate sheet of paper. SHOW ALL WORK, including units!! Watch your significant digits and CIRCLE YOUR ANSWERS.

Molarity

Just a reminder, molarity is one of the many ways to measure concentration or the strength of a solution. When using molarity to measure concentration you must follow the formula below and then put a capital M at the end of your answer to let the world know you used the molarity formula.

$$M = \frac{\text{moles of solute}}{\text{Liters of solvent}}$$

1. Calculate the molarity of a solution which contains 0.40 mol of a substance dissolved in 1.6 L of a solution.
2. What is the molarity of a solution containing 325 g of NaCl dissolved in 750. mL of solution?
3. 140 g of KCl is dissolved in 600. mL of water. What is the molarity?
4. 724.4 g of ammonium phosphate in 4500 mL of alcohol. What is the molarity of the solution?
5. You are making 2.2 L of 3.1 M silver nitrate solution. Who many moles of solute are there?
6. How many grams of $MgCl_2$ are needed to make 700.mL of a 1.4 M solution?
7. 93.2 g of copper (II) sulfate is mixed into 290. mL of water. What is the molarity?

Molality

Molality is an additional way to measure the strength or concentration of a solution. It is abbreviated with a little m and is calculate only slightly differently than molarity. Here is the formula.

$$m = \frac{\text{moles of solute}}{\text{kg of solvent}}$$

♣ You will be given two mass measurements and you must decide which is the solute and which is the solvent.
♣ Look for the phrases "dissolved in," "placed in," or "mixed with" to identify the two parts. The solute comes before the phrase and the solvent comes after.
- ♠ Change the solute into moles (factor label)
- ♠ Change solvent into kg (KHDBdcm)

♣ Molality and molarity can be very close if water is the solvent.

Example:
190 g of $CuSO_4$ are placed in 3500 g of water. Determine the molality.

Solute: $\frac{190\text{ g } CuSO_4}{} \times \frac{1\text{mole}}{159.9\text{ g}} = 1.2\text{ mole } CuSO_4$

Solvent: 3500 g = 3.5 kg water

$$\text{Molality} = \frac{1.2\text{ moles}}{3.5\text{ kg}} = 0.30\text{m}$$