Chem 1020 Molarity worksheet, version 2

1. What is the molarity of a solution that contains 5.83 g LiCl in 1.50 L solution?

$$5.83\text{ g LiCl}\times\frac{1\text{ mol LiCl}}{42.389\text{ g LiCl}}=0.13754\text{ mol LiCl}$$

$$M=\frac{\text{mol solute}}{\text{L solution}}=\frac{0.13754\text{ mol LiCl}}{1.50\text{ L solution}}=0.0917\ M$$

2. What is the volume of a 0.300 *M* $CuSO_4$ solution that contains 12.4 g $CuSO_4$?

$$12.4\text{ g CuSO}_4\times\frac{1\text{ mol CuSO}_4}{159.6\text{ g CuSO}_4}\times\frac{1\text{ L solution}}{0.300\text{ mol CuSO}_4}=0.26\text{ L solution}$$

3. What mass of solid KBr would be needed to prepare 750.0 mL of 1.75 *M* KBr solution? How specifically would this solution be prepared?

$$750.0\text{ mL KBr soln}\times\frac{1\text{ L soln}}{1000\text{ mL soln}}\times\frac{1.75\text{ mol KBr}}{1\text{ L soln}}\times\frac{119.01\text{ g KBr}}{1\text{ mol soln}}=156\text{ g KBr}$$

Prepare this solution by measuring 156 g KBr into a 750 mL volumetric flask, and adding enough water to make 750 mL solution.

4. What is the % by mass of 28.3 g of solution which contains 3.56 g NaCl?

$$\%\text{ (mass)}=\frac{\text{mass solute}}{\text{mass solution}}\times100\%=\frac{3.56\text{ g NaCl}}{28.3\text{ g solution}}\times100\%=12.6\%$$

5. What volume of methanol is required to prepare 2.0 L of a 15.0% by volume solution?

$$\%\text{ (vol)}=\frac{\text{vol solute}}{\text{vol solution}}\times100\%$$

$$\text{vol solute}=\left(\frac{\%\text{ (vol)}}{100\%}\right)\times\text{vol solution}=\left(\frac{15.0\%}{100\%}\right)\times2.0\text{ L}=0.30\text{ L}$$

6. What volume of 12.0 *M* HCl is required to make 500.0 mL of 0.400 *M* HCl? How specifically would this solution be prepared?

$$M_1V_1=M_2V_2$$

$$V_1=\frac{M_2V_2}{M_1}=\frac{(0.400\ M)(500.0\text{ mL})}{(12.0\ M)}=16.7\text{ mL}$$

Prepare this solution by measuring 16.7 mL of 12.0 *M* HCl into a 500 mL volumetric flask, and adding water to make 500 mL of solution.

7. If 17.0 mL of 16.0 *M* H_2SO_4 solution is diluted to 100.0 mL, what is the diluted concentration?

$$M_1V_1=M_2V_2$$

$$M_2=\frac{M_1V_1}{V_2}=\frac{(16.0\ M)(17.0\text{ mL})}{(100.0\text{ mL})}=2.72\ M$$