Molarity Practice Worksheet

Find the molarity of the following solutions:

1) 0.50 moles of sodium chloride is dissolved to make 0.75 liters of solution.

$\frac{0.50 mol}{0.75 L} = 0.67 M$

2) 0.50 grams of sodium chloride is dissolved to make 0.075 liters of solution.

$(0.50 g\ NaCl)\left(\frac{1 mol NaCl}{58.5 g NaCl}\right) = 0.0086 mol$ $\quad \frac{0.0086 mol}{0.075 L} = 0.115 M$

3) 0.50 grams of sodium chloride is dissolved to make 0.075 mL of solution.

$(0.50 g NaCl)\left(\frac{1 mol NaCl}{58.5 g NaCl}\right) = \frac{0.0086 mol}{0.000075 L} = 0.000115 M = 1.15 \times 10^{2} M$

7.5×10^{-2} $\quad$ 0.00075 $\quad$ 114.6 M

4) 734 grams of lithium sulfate are dissolved to make 875 mL of solution.

$(734 g Li_2SO_4)\left(\frac{1 mol Li_2SO_4}{110 g Li_2SO_4}\right) = 6.67 mol$ $\quad \frac{6.67 mol}{0.875 L} = 7.62 M$

5) 6.7×10^{-2} grams of $Pb(C_2H_3O_2)_4$ are dissolved to make 3.5 mL of solution.

$(0.067 g\ Pb(C_2H_3O_2)_4)\left(\frac{1 mol\ Pb(C_2H_3O_2)_4}{443 g\ PbAc.}\right) = 1.5 \times 10^{-4} mol\ Pb(C_2H_3O_2)_4$

$1.50 \times 10^{-4} mol / 3.5 \times 10^{-3} L = 4.3 \times 10^{-2} M$

6) I have two solutions. In the first solution, 1.0 moles of sodium chloride is dissolved to make 1.0 liters of solution. In the second one, 1.0 moles of sodium chloride is added to 1.0 liters of water. Is the molarity of each solution the same? Explain your answer.

NO; Second solution will be slightly smaller, as volume should be slightly larger.

Concentration Worksheet

1) How many grams of beryllium chloride are needed to make 125 mL of a 0.050 M solution?

$(0.050\ \frac{mol}{L})(.125L) = 0.00625mol$ $(0.00625mol\ BeCl_2)(\frac{79.9\ g\ BeCl_2}{1\ mol\ BeCl_2})$

$= 0.50g\ BeCl_2$

2) How many grams of beryllium chloride would you need to add to 125 mL of water to make a 0.050 molal solution?

$\frac{0.050mol}{1000mL} \cdot 125mL = 0.00625mol$ $(0.00625mol\ BeCl_2)$ same as

$= 0.50g\ BeCl_2$

3) The density of ethanol is 0.789 g/mL. How many grams of ethanol should be mixed with 225 mL of water to make a 4.5% (v/v) mixture?

4.5% by volume $\times$ 225mL = 10.125mL

$(10.125mL)(0.789\ g/mL) = 8.0g$ Ethanol.

4) Explain how to make one liter of a 1.25 molal ammonium hydroxide solution.

$1.25m = \frac{1.25mole}{1kg\ H_2O}$ $1.25mol\ NH_4OH = (1.25mol)(\frac{34g}{mol}) = 42.5g\ NH_4OH$

added $42.5g\ NH_4OH$ to $1000g\ H_2O$ (1L)

5) What is the molarity of a solution in which 0.45 grams of sodium nitrate are dissolved in 265 mL of solution.

$(0.45g\ NaNO_3)(\frac{1mol\ NaNO_3}{85g\ NaNO_3}) = 0.0053mol\ NaNO_3$ $\frac{0.0053mol}{0.265L} = 0.02M$

6) What is the mole fraction of sulfuric acid in a solution made by adding 3.4 grams of sulfuric acid to 3,500 mL of water?

$(3.4g\ H_2SO_4)(\frac{1mol}{98g}) = 0.035mol\ H_2SO_4$ $(3500g\ H_2O)(\frac{1mol}{18g}) = 194.4mol$

$(3500mL)(\frac{1g}{1mL}) = 3500g\ H_2O$ $\frac{0.035}{194.4+0.035} = 1.8\times10^{-4}$

7) What will the volume of a 0.50 M solution be if it contains 25 grams of calcium hydroxide?

$25g\ Ca(OH)_2(\frac{1mol}{74g}) = 0.34mol$

$0.50\ \frac{mol}{L} = \frac{0.34mol}{xL}$ rearrange $xL = \frac{0.34mol}{0.50mol/L} = 0.68L$

8) How many grams of ammonia are present in 5.0 L of a 0.050 M solution?

$(0.050\ \frac{mol}{L})(5.0L) = 0.25mol$ $(0.25mol)(\frac{17g\ NH_3}{1mol\ NH_3}) = 4.25g\ NH_3$