HOMEWORK PROBLEMS:

1a. How many moles of H_2SO_4 are dissolved in 4.95 liters of a 2.33 *M* H_2SO_4 solution?

Answers:

If you are given the volume and molarity, and you KNOW the value of these two values – START with the volume. This will allow you to cancel out the volume unit and be left with the unit moles. This is a practice you must MASTER !!!

$$\frac{4.95\ L}{} \times \frac{2.33\ mol\ H_2SO_4}{L} = 11.5\ mol\ H_2SO_4$$

1b. How many moles of sodium chloride are dissolved in 1.75 liters of a 1.40 *M* NaCl solution?

Answers:

$$\frac{1.75\ L}{} \times \frac{1.40\ mol\ NaCl}{L} = 2.45\ mol\ NaCl$$

1c. How many grams are in 1.25 liters of a 1.64 *M* copper(II) sulfate solution?

Answers:

$$\frac{1.25\ L}{} \times \frac{1.64\ mol\ CuSO_4}{L} \times \frac{159.61\ g}{1\ mol\ CuSO_4} = 327\ g\ CuSO_4$$

1d. How many grams of HCl are in 1.56 liters of a 9.32 *M* HCl solution?

Answers:

Again, solving for this type of problem is the same as above, we are just adding one more step – converting the moles to mass (grams)…

$$\frac{1.56\ L}{} \times \frac{9.32\ mol\ HCl}{L} \times \frac{36.458\ g}{1\ mol\ HCl} = 530.\ g\ CuSO_4$$

1e. What is the molarity of a NaOH solution where 10.3 g of sodium hydroxide is dissolved in a 300. mL volume?

Answers:

You have two options for solving this problem: The first is demonstrated below – the "build it" technique… First find the number of moles and then determine the volume and then place the two values together… I highly recommend this method until you fully understand molarity…

$$\frac{10.3\ g\ NaOH}{} \times \frac{1\ mol\ NaOH}{39.998\ g\ NaOH} = 0.2575\ mol\ NaOH$$

$$\frac{300.\ mL}{} \times \frac{1\ L}{1000.\ mL} = 0.300\ L$$

$$M = \frac{mol}{L} = \frac{0.2575\ mol\ NaOH}{0.300\ L} = 0.858\ \frac{mol}{L} = 0.858\ M\ NaOH$$

The second method is to place all the values together and then solve. ONLY do this once you understand molarity…

$$\frac{10.3\ g\ NaOH}{300\ mL} \times \frac{1\ mol\ NaOH}{39.998\ g\ NaOH} \times \frac{1000\ mL}{1\ L} = 0.858\ M\ NaOH$$

1f. What is the molarity of a solution where 23.4 g of nickel(II) carbonate is dissolved in a solvent with 1.72 liters of volume?

Answers:

$$\frac{23.4\ g\ NiCO_3}{} \times \frac{1\ mol\ NiCO_3}{118.94\ g\ NiCO_3} = 0.1967\ mol\ NiCO_3$$

$$M = \frac{mol}{L} = \frac{0.1967\ mol\ NiCO_3}{1.72\ L} = 0.114\ \frac{mol}{L} = 0.114\ M\ NiCO_3$$

OR

$$\frac{23.4\ g\ NiCO_3}{1.72\ L} \times \frac{1\ mol\ NiCO_3}{118.94\ g\ NiCO_3} = 0.114\ M\ NiCO_3$$