

Answer Key

Molarity

watch your sf!

Concentration can be measured using different units.

If the concentration is measured in mol/L it is called the molarity of the solution.

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{Litres of solution}}$$

$$\text{Molarity} = M = \text{moles/L}$$

Remember: Grams and Particles are BAD—if you see them in a problem turn them into moles which are GOOD.

Always rewrite the molarity as # of moles over 1L of solution.

Set up ratios with moles on top and volume of solution on the bottom.

Or—use dimensional analysis!!

put a dp here

- 1) How many moles of solute are required to prepare 300 mL of a solution with a concentration of 0.50 mol/L?

$$300 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.50 \text{ mol}}{1 \text{ L}} = 0.15 \text{ mol}$$

- 2) What volume of a solution would be made if 0.40 mol of NaCl were dissolved to make solution of molarity 1.5 mol/L?

$$0.40 \text{ mol} \times \frac{1 \text{ L}}{1.5 \text{ mol}} = 0.27 \text{ L soln}$$

- 3) Calculate the number of litres of 3.33 mol/L sodium hydroxide solution that contain 100.0 g of sodium hydroxide.

$$100.0 \text{ g NaOH} \times \frac{1 \text{ mol NaOH}}{40 \text{ g}} \times \frac{1 \text{ L}}{3.33 \text{ mol}} = 0.751 \text{ L}$$

watch of!

= step by step procedure 55.85
 $Fe^{3+} Cl^{-} = FeCl_3$
 35.5×3

4)

Outline a preparation for 500.0 mL of a 1.46 mol/L iron (III) chloride solution.
Use English and Math!

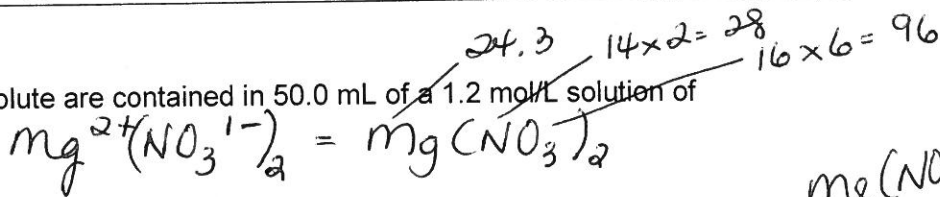
$FeCl_3$
 $= 118.5g$

$$500.0 \text{ mL} \times \frac{1L}{1000 \text{ mL}} \times 1.46 \text{ mol} \times \frac{162.35g}{1 \text{ mol } FeCl_3}$$

- mass 118.5g of $FeCl_3$
- place in 500. mL volumetric
- add some water + swirl to dissolve
- add water to the 500 mL mark.

5)

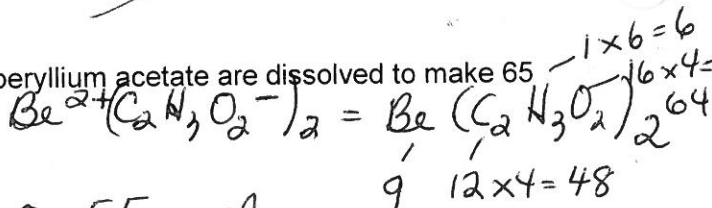
How many grams of solute are contained in 50.0 mL of a 1.2 mol/L solution of magnesium nitrate?



$$50.0 \text{ mL} \times \frac{1L}{1000 \text{ mL}} \times 1.2 \text{ mol} \times \frac{148.3g \text{ } Mg(NO_3)_2}{1 \text{ mol}} = 8.9g$$

6)

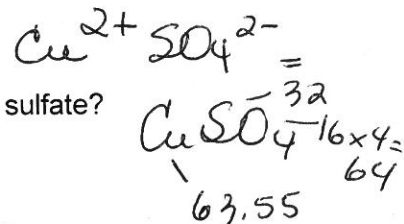
What is the concentration in mol/L if 4.5 g of beryllium acetate are dissolved to make 65 mL of solution?



$$\frac{4.5g}{65 \text{ mL}} \times \frac{1 \text{ mol}}{127g} \times \frac{1000 \text{ mL}}{1L} = 0.55 \text{ mol/L}$$

7)

How would you make 200.0 mL of a 0.25 mol/L solution of copper (II) sulfate?



$$200.0 \text{ mL} \times \frac{1L}{1000 \text{ mL}} \times 0.25 \text{ mol} \times \frac{159.55g}{1 \text{ mol}} = 8.0g \text{ } CuSO_4$$

- mass 8.0g $CuSO_4$
- put into 200 mL volumetric
- add some water + swirl to dissolve
- add water to the 200 mL mark.