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.

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

Molarity = M = 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 concentrationof 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 sf!

= step by step procedure

55.85
$Fe^{3+}Cl^{1-} = FeCl_3$ 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!

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

$FeCl_3 = 118.5\,g$

- mass 118.5 g 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?

24.3 14×2=28 16×6=96

$Mg^{2+}(NO_3^{1-})_2 = Mg(NO_3)_2$

$Mg(NO_3)_2$

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

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

1×6=6 16×4=64

$Be^{2+}(C_2H_3O_2^{-})_2 = Be(C_2H_3O_2)_2$

9 12×4=48

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

$Cu^{2+}SO_4^{2-} =$

$CuSO_4$ 32 16×4=64

63.55

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

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

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