Solving numerical problems related to concentration of solutions

1. 6 g of solid magnesium sulphate, $MgSO_4$ is added into a beaker containing 200 cm^3 of water. Calculate the concentration in g dm^{-3}, for the solution produced.

Volume of water = $\frac{200}{\square}$ = $\square$ dm^3

Concentration = $\frac{\text{mass (g)}}{\text{Volume } (dm^3)}$

= $\frac{\square \text{ g}}{\square \, dm^3}$ = $\square$ g dm^{-3}

2. 0.4 mol of zinc chloride, $ZnCl_2$ is dissolved in water to produce 2 dm^3 of solution. Calculate the molarity of the solution prepared.

Molarity = $\frac{\text{no of mol of } ZnCl_2}{\text{volume of water } (dm^3)}$ = $\frac{\square \text{ mol}}{\square \, dm^3}$ = $\square$ mol dm^{-3}.

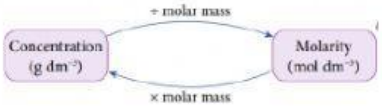
3. What is the concentration of 0.5 mol dm^{-3} sulphuric acid, H_2SO_4 in g dm^{-3}?
[Relative atomic mass: H = 1, O = 16, S = 32]

Molarity = ☐ mol dm^{-3}

Molar mass of H_2SO_4 = 2H + 1S + 4O
= 2( ) + 1( ) + 4( )
= ☐ g mol^{-1}

Concentration of H_2SO_4 = ☐ mol dm^{-3} x ☐ g mol^{-1}
= ☐ g dm^{-3}

4. The concentration of sodium chloride solution, NaCl is 1.989 g dm^{-3}. Calculate the molarity of the solution in mol dm^{-3}.
[Relative atomic mass: Na = 23, Cl = 35.5]



Concentration = g dm^{-3}

Molar mass of NaCl = 1 Na + 1 Cl
= ☐ + ☐
= ☐ g mol^{-1}

Molarity of NaCl = ☐ g dm^{-3} / ☐ g mol^{-1}
= ☐ mol dm^{-3}

5. Calculate the number of moles of sodium hydroxide, NaOH in 2.5 dm^3 of 0.2 mol dm^{-3} sodium hydroxide solution, NaOH.

Volume in dm — Molarity

$n = MV$

Volume of solution is in **dm^3**.

Number of mole Of NaOH, n = Molarity X Volume
= ☐ X ☐
= ☐ mol

6. Given the molarity of 250 cm^3 of barium hydroxide solution, $Ba(OH)_2$ is 0.1 mol dm^{-3}. How many moles of hydroxide ion, OH^- is in the solution?

Molarity,M

$n = \frac{MV}{1000}$ ← Volume of solution is in **cm^3**.

Number of mole of Ba(OH)2 = $\frac{\text{Molarity X Volume}}{1000}$

= $\frac{\square \text{ X } \square}{1000}$

= $\square$ mol