Molar Concentration (MC)

$$\text{Molar concentration} = \frac{\text{moles } (n)}{\text{volume (L)}}$$

* $\frac{\text{moles } (n)}{\text{volume (L)}}$ is sometimes shown as M

e.g. what is the molar concentration of a salt solution made by dissolving 0.083 moles of NaCl in 175ml of H_2O?

v = 0.175 L

n = 0.083 moles NaCl

$$C = \frac{0.083 \text{ moles NaCl}}{0.175 \text{ L}}$$

$C = 0.47$ mol/L

* not correct volume of solution, however because the volume of the solute is so small, we use the solvent

∴ the molar concentration of the salt solution made by dissolving 0.083 moles of NaCl in 175ml H2O is **0.47mol/L**

What is the molarity (MC) of a salt solution formed by dissolving 1.5g of $CuSO_4$ in 250ml of H_2O?

$$M_{CuSO_4} = 63.55\text{g/mol} + 32.06\text{g/mol} + 4(16.00\text{g/mol})$$

$$= 159.62\text{g/mol}$$

v = 0.250 L

$$n = 1.5\text{g} \times \frac{1 \text{ mol } CuSO_4}{159.62\text{g } CuSO_4} = 0.0094 \text{ mol } CuSO_4$$

$$C = \frac{0.0094 \text{ mol } CuSO_4}{0.250\text{L } H_2O} = \mathbf{0.038 \text{ mol/L}}$$

e.g. what mass in grams of NaCl is needed to make 750ml of a 0.25mol/L solution?

v = 0.750 L $n = C \cdot v$

C = 0.25 mol/L $n = (0.25 \text{ mol} / \text{L}) \cdot 0.750\text{L}$

n = ? $n = 0.188 \text{ mol NaCl}$

$$M_{NaCl} = 23.0\text{g/mol} + 35.5\text{g/mol}$$

$$= 58.5\text{g/mol}$$

$$\text{Mass NaCl} = 0.188 \text{ mol NaCl} \times \frac{58.5\text{g NaCl}}{1 \text{ mol NaCl}} = \underline{\mathbf{11.0g\ NaCl}}$$

e.g. what mass of KI is necessary to prepare 100ml of a 0.50 mol/L solution?