

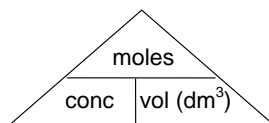


# CONCENTRATION OF SOLUTIONS

The concentration of a solution is usually measured in moles per cubic decimetre ( $\text{mol/dm}^3$ ). This is a measure of the number of moles in one cubic decimetre.

The volume must be in  $\text{dm}^3$  (there are  $1000 \text{ cm}^3$  in  $1 \text{ dm}^3$ ).  $\text{vol in dm}^3 = \frac{\text{vol in cm}^3}{1000}$

$$\text{concentration (mol/dm}^3) = \frac{\text{moles}}{\text{volume (dm}^3)}$$



- Calculate the concentration of the following solutions in  $\text{mol/dm}^3$ .
  - 0.10 moles of NaCl in  $200 \text{ cm}^3$  .....
  - 0.20 moles of  $\text{H}_2\text{SO}_4$  in  $100 \text{ cm}^3$  .....
  - 0.020 moles of NaOH in  $25 \text{ cm}^3$  .....
- Calculate the number of moles in the following solutions.
  - $100 \text{ cm}^3$  of  $0.20 \text{ mol/dm}^3 \text{ HNO}_3$  .....
  - $25 \text{ cm}^3$  of  $1.50 \text{ mol/dm}^3 \text{ KOH}$  .....
  - $50 \text{ cm}^3$  of  $0.10 \text{ mol/dm}^3 \text{ H}_2\text{SO}_4$  .....

Concentration can also be measured in grams per cubic decimetre ( $\text{g/dm}^3$ ). This is a measure of the number of grams in one cubic decimetre. [remember that  $\text{mass} = M_r \times \text{moles}$ ]

**1 dm<sup>3</sup>**

**2 moles of H<sub>2</sub>SO<sub>4</sub>**

**196 g of H<sub>2</sub>SO<sub>4</sub>**

Concentration =  $2 \text{ mol/dm}^3$

$M_r$  of  $\text{H}_2\text{SO}_4 = 98$

Concentration =  $2 \times 98 = 196 \text{ g/dm}^3$

A simple conversion is:  $\text{conc (g/dm}^3) = \text{conc (mol/dm}^3) \times M_r$

- Calculate the concentration of the following solutions in  $\text{g/dm}^3$ .
  - $0.100 \text{ mol/dm}^3 \text{ NaOH}$  .....
  - $0.250 \text{ mol/dm}^3 \text{ CH}_3\text{COOH}$  .....
  - $1.50 \text{ mol/dm}^3 \text{ HNO}_3$  .....
- $0.20$  moles of NaOH is dissolved in  $250 \text{ cm}^3$  of water.
  - Calculate the concentration in  $\text{mol/dm}^3$ . .....
  - Calculate the concentration in  $\text{g/dm}^3$ . .....
- $5.0 \text{ g}$  of  $\text{KNO}_3$  is dissolved in  $100 \text{ cm}^3$  of water.
  - Calculate the concentration in  $\text{g/dm}^3$ . .....
  - Calculate the concentration in  $\text{mol/dm}^3$ . .....