ii. Helium gas

Dalton's Law

Total pressure = sum of partial pressure of all gases

Example:

A container is filled with the gases oxygen, neon and argon with partial pressure 10.0kPa, 30.0kPa and 15.0kPa. Calculate total pressure.

$$P_{tot} = PN_2 + PHe + PAr$$
$$= (10.0 + 30.0 + 15.0)kPa$$
$$= 55.0kPa$$

Ideal Gas Equation

$$PV = nRT$$

$$P\ in\ Pa \xleftarrow{\times 10^3} kPa$$

$$V\ in\ m^3 \xleftarrow{\times 10^{-3}} dm^3$$
$$\xleftarrow{\times 10^{-6}} cm^3$$

$$T\ in\ K \xleftarrow{+273} C$$

$$n = mol \rightarrow \frac{m}{M_r}$$

$R\ given\ as\ 8.31\ (\ gas\ constant)$

Example:

Liquid X is either ethanol C_2H_5OH or methanol CH_3OH.When 0.0800g of liquid X is heated in a syringe to 127°C,the vapour produced a pressure 1.00 x 10^5 Pa and occupies 81.0 cm^3. Given R = 8.31

a) Calculate relative molecular mass of X (2m)

b) Calculate M_r of C_2H_5OH. The identify X. (2m)

Chemistry Formulae

Final temperature	65.0 °C
Initial temperature	25.0 °C
Mass of ethanol	1.95 g
Density of water	1.00 gcm^{-3}
Volume of water in aluminium can	300 cm^3

Calculate the enthalpy change of combustion of ethanol in $kJmol^{-1}$ [$-1260kJmol^{-1}$]

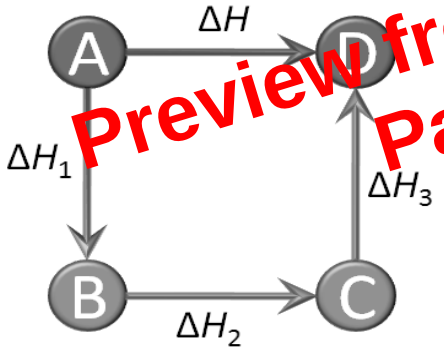
Hess Law

Definition:

Enthalpy change of reaction depends only on initial state and final state of chemicals

or

Enthalpy change of reaction does not depend on the number of steps for that change



$\Delta H = \Delta H_1 + \Delta H_2 + \Delta H_3$

$route\ 1 \quad A \rightarrow B \quad \Delta H_1$

$B \rightarrow C \quad \Delta H_2$

$C \rightarrow D \quad \Delta H_3$

$A \rightarrow D \quad \Delta H_4$

Example:

Given the following enthalpy change:

$H_2\ (g) + ½\ O_2\ (g) \rightarrow H_2O\ (l)$ **ΔH = -286**

$C\ (s) + O_2\ (g) \rightarrow CO_2\ (g)$ **ΔH = -394**

$CH_4\ (g) + 2O_2\ (g) \rightarrow CO_2\ (g) + 2H_2O\ (l)$ **ΔH = -890**

$C_2H_6\ (g) + 7/2\ O_2\ (g) \rightarrow 2CO_2\ (g) + 3H_2O\ (l)$ **ΔH = -1560**

Calculate the standard enthalpy for the reaction below

a) $C\ (s) + 2H_2\ (g) \rightarrow CH_4\ (g)$

b) $2C\ (s) + 3H_2\ (g) \rightarrow C_2H_6\ (g)$