BEHAVIOUR OF GASES

Ideal Gas

Gases at low pressures and high temperatures much above that at which they liquefy (or solidify) approximately satisfy a simple relation between their pressure, temperature and volume given by

$$\mathbf{PV = N k_B T}$$

$\mathbf{k_B}$ is Boltzmann constant.

The perfect gas **PV = μ RT**

where μ is the number of moles and $R = N_A k_B$ is a universal gas constant. The temperature T is absolute temperature.

$$R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1} .$$

$$\mu = \frac{N}{N_A}$$

Real gases

Real gases approach ideal gas behaviour at low pressures and high temperatures.

A gas that satisfies perfect gas equation exactly at all pressures and temperatures is defined to be an ideal gas.

At low pressures or high temperatures the molecules are far apart and molecular interactions are negligible. Without interactions the gas behaves like an ideal one.

Dalton’s law of partial pressures

Keeping temperature constant, pressure of a given mass of gas varies inversely with volume. (Boyle’s law)

For a fixed pressure, the volume of a gas is proportional to its absolute temperature T (Charles’ law)

The total pressure of a mixture of ideal gases is the sum of partial pressures. This is Dalton’s law of partial pressures.