Sem-2

Paper-2

Vander waal's equation of state :⇒

Derivation of equation of real gas which is known as vanderwaal's equation of state based on two assumption from ideal gas

(i) Correction of volume :⇒ This is corrected by assuming finite Size of the gaseous molecule. (volume occupied by)

let b be the number of gaseous molecule per mole. which is called Co-volume. or excluded volume. So for n mole. gaseous molecule. The volume occupied is nb So. total volume free for available motion of molecule. is $(V-nb)$ where V = Total volume of Container.

(ii) Correction in Pressure :⇒ This is Corrected on the assumption that there is force of attraction between molecule.

∴ No of attraction force $\propto$ molecular density (m)

No of attraction force $= K_1 m$ —(i)

Molecule striking the unit area of Surface $\propto$ molecular density (m)

$= K_2 m$ —(ii)

Total force on molecules striking unit area $= K_1 K_2 m^2$.

i.e. P_i = internal Pressure $\propto m^2 \propto \left(\frac{N}{V}\right)^2$; where N = Total number of molecules, So $P_i \propto \frac{1}{V^2}$ or $P_i = \frac{a}{V^2}$, where a is Constant, a = attraction Co. efficient

This is vander waal's equation.

$$\left(P + \frac{a}{V^2}\right)(V-nb) = RT$$