Measurement of magnetic moment
- Gouy Method — Faraday method.

Relationship between magnetic susceptibility and Magnetic moment.

$$\chi_M = \frac{N_0 \mu^2}{3KT}$$

K is Boltzmann constant
No is Avogadro number
T is absolute temp.

$$\mu^2 = \frac{3K}{N_0} \cdot \chi_M \cdot T$$

$$\mu = \sqrt{\frac{3K}{N_0}} \cdot \sqrt{\chi_M \cdot T}$$

$$= K\sqrt{\chi_M \cdot T}$$

$$\sqrt{\frac{3K}{N_0}} = 2.828$$

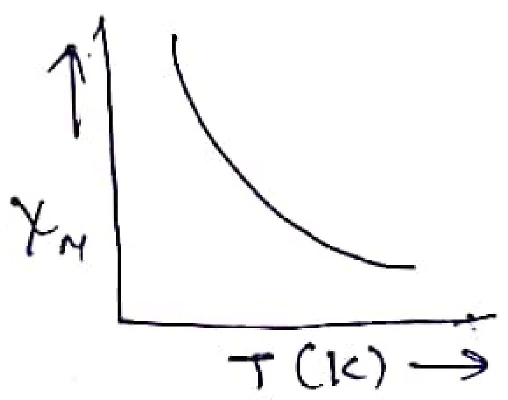
$$\mu = 2.828\sqrt{\chi_M \cdot T} \text{ B.M.}$$

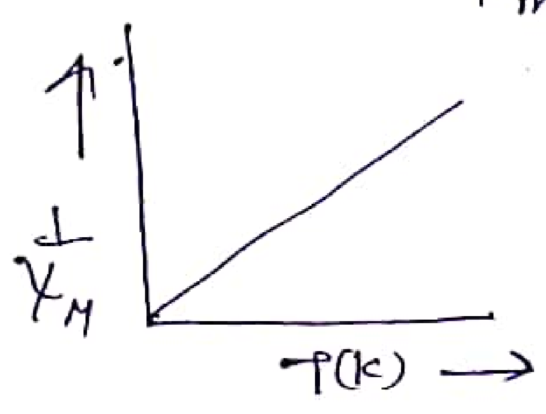
<u>Magnetic susceptibility with temp:</u>

$$\mu = 2.828\sqrt{\chi_M(T-\theta)}$$ θ = Weiss constant

Eq is Weiss law.

$$\chi_m = \frac{C}{T-\theta}$$

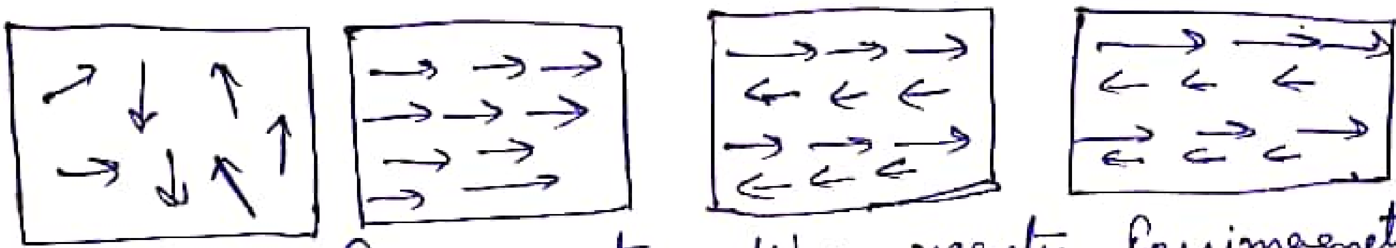




Ferromagnetism and Anti Ferromagnetism:

antiferromagnetism, magnetic moment of the ions in the lattice tend to align themselves in a manner so as to cancel one another and give zero magnetic moment eg FeO, NiO, MnO, MnO_2

Ferromagnetic substance eg Ni, Co, CrO_2



Paramagnetic Ferromagnetic Antiferromagnetic Ferrimagnetic Fe_3O_4

Orbital Contribution of Magnetic Moment:

- Transition metal of first transition series gives a magnetic moment much higher than Ms.
- This is due to orbital contribution to Magnetic moment
- Spin moment of an unpaired e^- is unaffected by change in chemical bonding.
- Orbital contribution to magnetic moment change with chemical environment.
- The magnetic moment is quenched.
- d orbitals have five degenerate orbitals.
- For orbital contribution to magnetic moment the two degenerate orbitals that can be interconverted by rotation about a suitable axis and orbitals are unequally occupied.