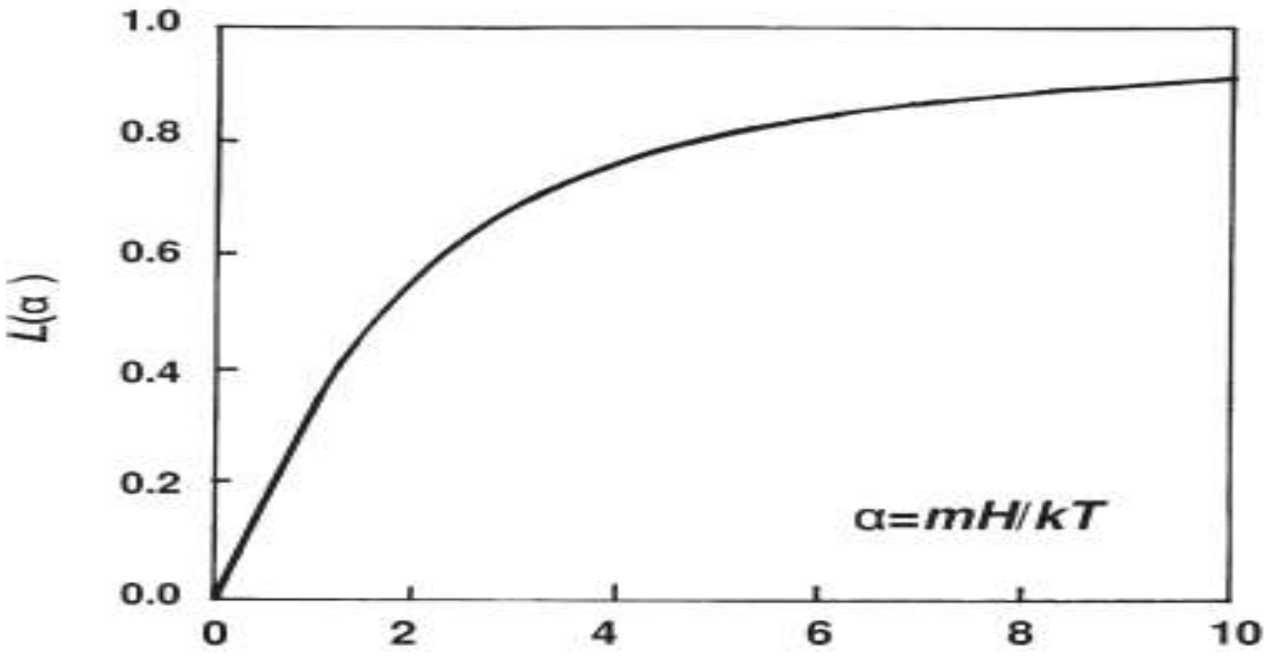

Figure 1 : The Lengevin function L(α), expressed in *M/Nm* vers. α = µ*H/KT* .

For large value of a i.e , for high field strength and for low temperature L (a) approaches unity .

When $a \ll 1$ i.e , for low field strength and for high temperature ,

$$\mu H / KT \ll 1$$

or $\mu H \ll KT$, then

$$L(a) = a/3 = \mu H / 3KT \qquad (8)$$

Using (8) in (7) , we get

$$\langle \mu \cos\theta \rangle = \mu^2 H / 3KT \qquad (9)$$

Using (9) in (1) , we get

$$M = n\mu^2 H / 3KT$$

Hence the magnetic susceptibility

$$\chi = M/H = n\mu^2/3KT = C/T \quad (10)$$

Where $n\mu^2/3K = C$

If we consider a gram – molecule of the gas , the molar susceptibility

$$\chi_M = N\mu^2/3KT$$

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If we consider a gram – molecule of the gas , the molar susceptibility

$$\chi_M = N\mu^2/3KT \quad (N\mu)^2/3NKT = = \sigma_0^2 / 3KT = C_m / T \qquad (11)$$

Where $\sigma_0 = N\mu =$ gram – molecular magnetic moment

If $a >> 1$, i.e , $\mu H / KT >> 1$

Then , $L(a) = 1$

$\therefore\ M = n\mu$

The Eq .(11) shows that the paramagnetic susceptibility χ_M varies inversely as absolute temperature T,

which explains the results obtained by curie on his extensive experimental research and is expressed as

$$\chi_M T = C_m \quad (12)$$

Where C_m = Curie Constant for gram – molecule