Weiss theory of ferromagnetism , lec -4

Let us now consider in the region well above the ferromagnetic Curie temperature .

In this region magnetisation occurs only when an external magnetic field H is applied because there is no spontaneous magnetisation

From (10)

$$M = N g J \mu_B (J+1) \chi / 3$$

From (7)

$$\chi = g_J \mu_B (H + \gamma M) / KT$$

$$\therefore \quad M = (N g J \mu_B (J+1) / 3) \; X \; (g_J \mu_B (H + \gamma M) / KT)$$

$$M = N g^2 \mu_B^2 J(J+1) (H + \gamma M) / 3KT$$

$$M = N \mu^2 (H + \gamma M) / 3KT \qquad (15)$$

Where $\mu^2 = g^2 \mu_B^2 J(J+1)$

$$\therefore \quad M/H = N \mu^2 (1 + \gamma M/H) / 3KT$$

Or $\chi = N \mu^2 (1 + \gamma \chi) / 3KT$

Where $\chi = M/H$ = susceptibility

Or $\chi [1- N\mu^2 \gamma / 3KT] = N\mu^2 / 3KT$

Or $\chi (1- T_f / T) = C / T$

Where $T_f = N\mu^2 \gamma / 3K$

$C = N\mu^2 / 3K$

$\therefore \chi = C/T / (1- T_f / T) = C / T((1- T_f / T)$

$\therefore \chi = C / (T- T_f)$ (16)

Hence we can say Weiss Curie temperature theory does not distinguish the para and ferromagnetic .