Relation between magnetic susceptibility and magnetic moment :-

Curie law states that $\chi_M^{corr.} = \frac{C}{T}$

where χ_M = Molar susceptibility of the substance after diamagnetic and TIP (Temperature Independent Paramagnetism) correction

T = Absolute temperature

C = Curie Constant, characteristics of the substance

$$C = \frac{N_A \mu^2}{3K}$$

where N_A, μ, K are Avogadro's no., magnetic moment and Boltzmann Constant respectively

Hence,
$$\chi_M^{Corr.} = \frac{N_A \mu^2}{3KT}$$

or, $$\mu^2 = \chi_M^{Corr.} \frac{3KT}{N_A}$$

or, $$\mu = \sqrt{\frac{3K}{N_A}} \sqrt{\chi_M^{Corr.} \cdot T}$$

or, $$\mu = 2.84 \sqrt{\chi_M^{Corr.} \cdot T}$$

Bohr magneton :- (For electron)

The unit in which the magnetic moment of a substance is expressed is called Bohr magneton (BM or β) and is defined by

$$\beta = \frac{eh}{4\pi mc}$$

e = charge of $e^{\ominus}$
h = Planck's constant
m = mass of $e^{\ominus}$
c = velocity of light

$$\beta = 0.927 \times 10^{-20} \text{ ergs/gauss}$$

Diamagnetic Correction for some ligands :-

Pyridine (C_5H_5N) (Data Collected from Pascal's constant table)

Atom Correction (χ_A) (cgs unit / gram)	Constitutive Correction (λ) (cgs unit / gram)
$5 \times C = -5 \times 6 \times 10^{-6}$	$5 \times C(\text{ring}) = -5 \times 0.24 \times 10^{-6}$
$5 \times H = -5 \times 2.93 \times 10^{-6}$	$= -1.20 \times 10^{-6}$
$1 \times N(\text{ring}) = -4.61 \times 10^{-6}$	
-49.26×10^{-6}	

We have the relation,

$$\chi_{M(dia)} = \sum n_A \chi_A + \sum \lambda$$

(Derivation excludes)

$$= (-49.26 \times 10^{-6} - 1.20 \times 10^{-6}) \text{ cgs unit}$$

$$= -50.46 \times 10^{-6} \text{ cgs units}$$

The experimental value is $= -49 \times 10^{-6}$ cgs units

The experimental data holds good with the theoretical data. However, for heavy ligands the theoretical data and the experimental data do not fit well.