These rules affirm that electrons will occupy orbitals in such a way that the ground state is characterised by the following:

1. The maximum value of the total spin, s is allowed by the exclusion principle and the coulomb repulsion between electrons.

2. The maximum value of the orbital angular momentum, L is consistent with the maximum value of the total spin, s.

3. The value of the total angular momentum, J is equal to (L-s) when the shell is less than half full and (L+s) when the shell is more than half full. This rule is a consequence of the origin of the spin-orbit interaction whereby for a single electron, the energy is lowest when the spin is anti parallel to the orbital angular momentum.

CURIE-WEISS LAW

In the mean-field approximation we assume that each magnetic atom experiences a field proportional to the magnetisation i.e $B_E \propto M$.

$$\Rightarrow B_E = \lambda M \tag{i}$$

where λ is a constant independent of temperature, B_E is the exchange field.

Consider a paramagnetic phase in which the applied field (B_a) will cause a finite magnetisation that in turn causes a finite exchange field. If χ_p is the paramagnetic susceptibility, then

$$M = \chi_p(B_a + B_E) \tag{ii}$$

From curie law, $M = \frac{CB}{T}$,

$$\Rightarrow \frac{M}{B} = \frac{C}{T} = \chi_p \tag{iii}$$

(iii) and (ii) into (i)

$M = \frac{C}{T}(B_a + \lambda M)$.

$MT = C(B_a + \lambda M)$.

$MT - C\lambda M = CB_a$.

$M(T - C\lambda) = CB_a$

$$\frac{M}{B_a} = \frac{C}{T - C\lambda} \tag{iv}$$

But $\frac{M}{B_a} = \chi_m$, $C\lambda = T_c$

$$\Rightarrow \chi_m = \frac{C}{T - T_c} \tag{v}$$

Equation (v) is the Curie-Weiss law.