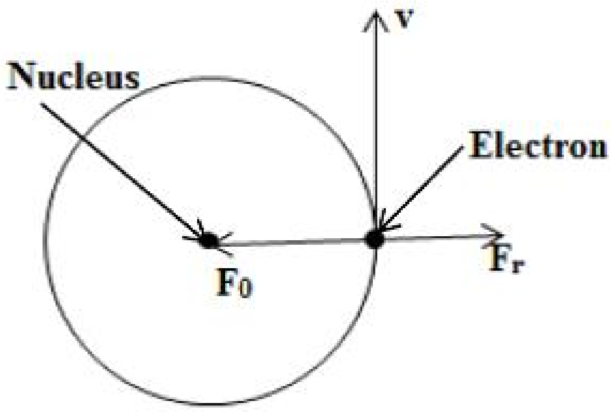

coulombs force between the nucleus and the electron and w_0 is the angular frequency. When the electric field is applied an additional force starts to act on the electron. This Lorentz force is given by $F_L = -e(E + \vec{v} \times \vec{B})$, $F_L = -e(E + \vec{v} \times \vec{B})$.

The resultant of these forces is radial outward and given by $F_r = eBwr$. Thus from $F_0 + F_r = mw^2r$, then $F_0 - eBwr = mw^2r$

$mw_0^2r - eBwr = mw^2r$

$mw_0^2r = mw^2r + eBwr$

$mw_0^2 = mw^2 + eBw$

$mw^2 + eBw - mw_0^2 = 0$ which is quadratic.

$\Rightarrow w = w_0 - \frac{eB}{2m}$.

The rotation of an electron is slowed down.

PARAMAGNETISM

This arises mainly from the magnetic dipole moments of the spinning electrons. The paramagnetic defect is temperature dependent being stronger at lower temperatures where there is less thermal collision. An external applied in addition to causing a very weak diamagnetic effect tends to align the molecular magnetic moments in the direction of the applied magnetic field thus increasing the magnetic flux density.

Materials with this kind of behaviour are said to be paramagnetic. They generally have very small positive values of magnetic susceptibility of the order 10^{-5} of aluminium. magnesium, titanium and tungsten. In general paramagnetic behaviour occurs when the magnetic moments of the various atoms are uncorrelated in the absence of the magnetic field.

FERROMAGNETISM

This is the phenomenon of spontaneous magnetisation i.e the electron spin and magnetic moments are arranged in a regular manner. Ferromagnetism appears only below a certain temperature which is known as the ferromagnetic transition temperature or simply the Curie temperature. Above this temperature the moments are oriented randomly resulting in a zero net magnetisation.

We can define the Curie temperature as the temperature above which spontaneous magnetisation vanishes. Ferromagnetism can be explained in terms of magnetised domains. When a specimen of a ferromagnetic material is placed in a magnetic field, the magnetic moments of its atoms tend to rotate into alignment with the direction of the applied field. Those domains in the specimen in which the magnetic moments are more or less aligned with the applied field increase in size at the expense of neighbouring domains that are more or less oppositely aligned to the applied field. This phenomenon is called Domain wall motion.

The consequence of this kind of motion is that the specimen of the material as a whole acquires a magnetic moment that may be considered as the result of all its atomic moments and the magnetic flux density in the material increases.