

What is normal Zeeman effect?

Zeeman effect :- In 1896, Zeeman discovered that if a source of light producing line spectrum is placed in a strong magnetic field, the spectral lines are split up into components - doublets or triplet or even more complex arrangements. This is called "Zeeman effect".

For the study of this effect, a gas discharge tube is placed between the pole pieces of a strong electromagnet. Light from this source is studied with the help of a spectrograph of high resolving power. The Zeeman effect may be observed in two ways -

i) Perpendicular to the direction of the magnetic field: In this case a single spectral line is observed when no field is applied, splits up into three components when the magnetic field is applied i.e., a triplet consisting of three spectral lines is observed. The central line is found to be plane polarized. The two outer lines are also plane polarized but their vibrations are in a direction perpendicular to the field. This is known as normal transverse Zeeman effect.

ii) Parallel to the direction of the magnetic field: In this case a hole is bored through the pole pieces and the light coming from the source through the hole is examined with the

Spectrograph. In this case a single spectral line is split up into two components when the magnetic field is applied i.e.; a doublet consisting of two spectral lines is observed. Both the lines are equally displaced from the original position and are circularly polarized in opposite directions. This is known as Normal longitudinal Zeeman effect.

The displacement in the two cases are proportional to the strength of the magnetic field and are equal for the same value of magnetic field.

When a single spectral line is split up into four or more lines when observed in the direction perpendicular to that of the magnetic field, is known as Anomalous Zeeman effect.

Normal Zeeman effect is obtained from sources of element like Ca, Cu, Zn, Cd etc. and anomalous Zeeman effect is obtained from elements like Na, Cr, etc.