Al-Mustaqbal University

Department of medical physics

Second stage

Magnetism

Fourth eight

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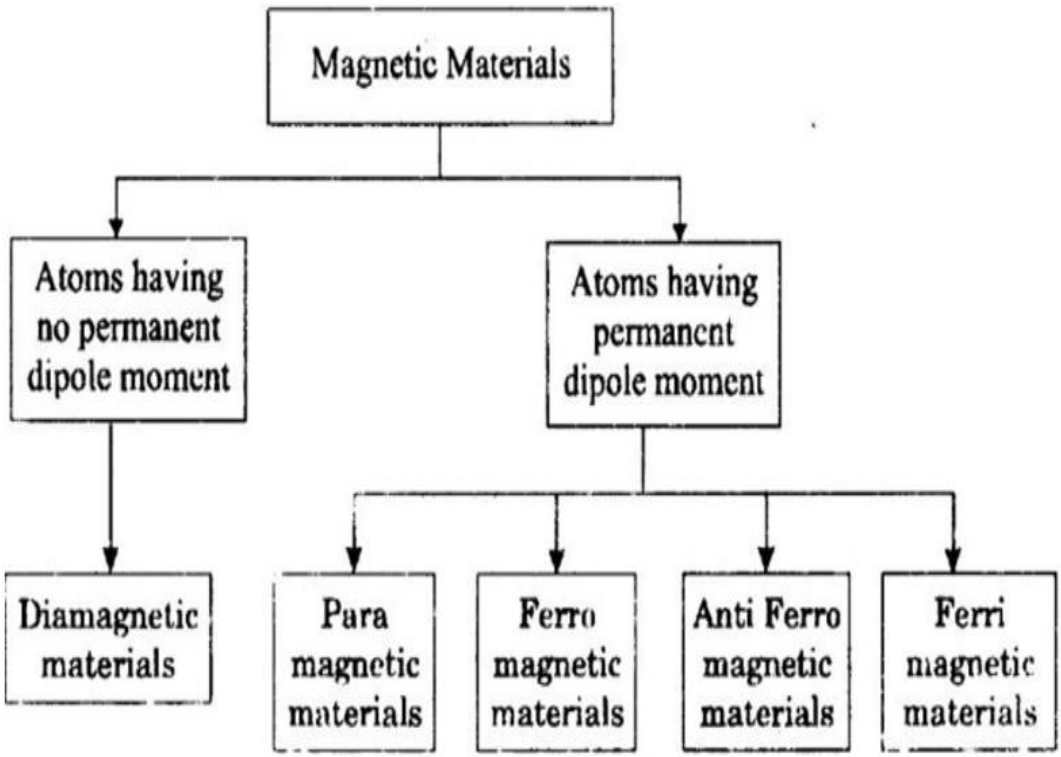
Classification of Magnetic Materials

Magnetic materials are classified into two categories based on existence of dipole moment and permeability and the response of magnetic material to external magnetic fields namely,

(i) **Diamagnetic materials** - no permanent magnetic moment.

(ii) **Paramagnetic, ferromagnetic, antiferromagnetic and ferrimagnetic materials** - having permanent magnetic moment.

Generally, diamagnetic and paramagnetic materials are known as non-magnetic materials, due to poor response to an external magnetic field. The ferromagnetic, antiferromagnetic and ferrimagnetic materials are known as magnetic materials. These materials strongly respond to an external magnetic



1-Diamagnetic Materials

Diamagnetic materials have a constant relative permeability of slightly less than 1, and that's why magnetic flux density inside diamagnetic materials is slightly reduced. Diamagnetic materials are feebly repelled in external magnetic fields. Bismuth is an example of diamagnetic material.

2-Paramagnetic Materials

Paramagnetic materials have a constant relative permeability slightly greater than 1, and that's why when a paramagnetic material is placed in an external field, it gets feebly magnetised in the direction of the magnetic field. Platinum is an example of paramagnetic material.

3-Ferromagnetic Materials

Ferromagnetic materials do not have constant relative permeability.

Pure iron and many alloys have relative permeability greater than 100000; as the magnetising field increases, the relative permeability increases. Therefore, ferromagnetic materials have the strongest magnetic properties. Iron is an example of ferromagnetic material.