

CLASSIFICATION OF MAGNETIC MATERIALS

The magnetic materials are generally classified into three types based on the behavior of materials in a magnetising field. They are diamagnetic, paramagnetic and ferromagnetic materials which are dealt with in this section.

Diamagnetic materials

When placed in a non-uniform magnetic field, the interaction between induced magnetic moment and the external field creates a force which tends to move the material from stronger part to weaker part of the external field. It means that diamagnetic material is repelled by the field. This action is called diamagnetic action and such materials are known as diamagnetic materials. Examples: Bismuth, Copper and Water etc.

The properties of diamagnetic materials are

- i. Magnetic susceptibility is negative.
- ii. Relative permeability is slightly less than unity.
- iii. The magnetic field lines are repelled or expelled by diamagnetic materials when placed in a magnetic field.
- iv. Susceptibility is nearly temperature independent.

Paramagnetic materials

When placed in a non-uniform magnetic field, the paramagnetic materials will have a tendency to move from weaker to stronger part of the field.

Materials which exhibit weak magnetism in the direction of the applied field are known as paramagnetic materials. Examples: Aluminium, Platinum and chromium etc.

The properties of paramagnetic materials are:

- I. Magnetic susceptibility is positive and small.
- II. Relative permeability is greater than unity.
- III. The magnetic field lines are attracted into the paramagnetic materials when placed in a magnetic field.
- IV. Susceptibility is inversely proportional to temperature.

Ferromagnetic materials

When placed in a non-uniform magnetic field, the ferromagnetic materials will have a strong tendency to move from weaker to stronger part of the field. Materials which exhibit strong magnetism in the direction of applied field are called ferromagnetic materials. Examples: Iron, Nickel and Cobalt.

The properties of ferromagnetic materials are:

- I. Magnetic susceptibility is positive and large.
- II. Relative permeability is large.
- III. The magnetic field lines are strongly attracted into the ferromagnetic materials when placed in a magnetic field.
- IV. Susceptibility is inversely proportional to temperature.