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NATURAL AND ARTIFICIAL MAGNETS

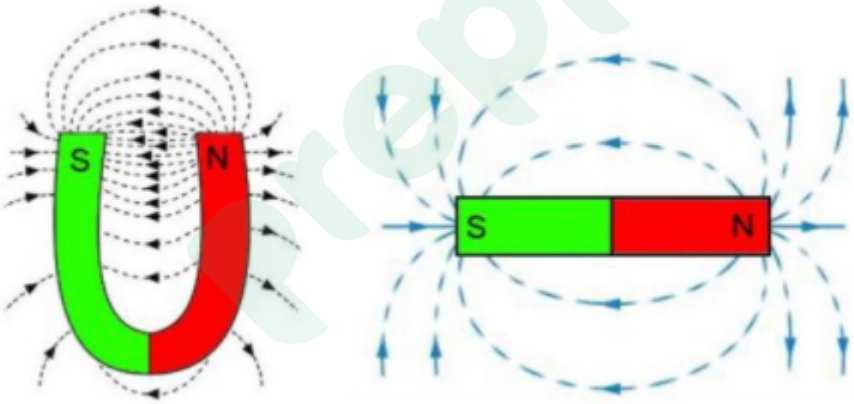
Magnet is a material that has the property to attract certain materials. It has an invisible field around it, which is called the magnetic field. A magnet has two poles.

Poles

- The ends of a magnet where the magnetic field is concentrated are called poles. Every magnet has exactly two poles. The two poles of a magnet are the North (N) and South (S) poles.
- N pole of one repels or pushes away the N pole of another magnet. The same happens with S poles. The N pole of one attracts the S pole of another magnet

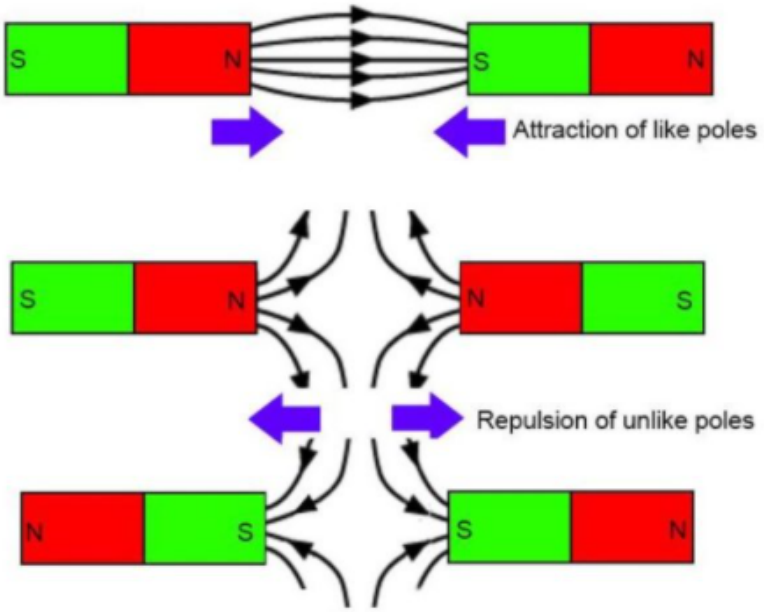
Magnetic Field

- It is a region in space surrounding a magnet where the magnet has an influence. If an iron piece comes within this field, it gets attracted.
- The magnetic field is a vector quantity that means it has a direction.
- A magnetic field line is an imaginary line that emerges from the North Pole and enters the magnet through the South Pole.
- The field exists within the body of the magnet also. So, the field line is a closed loop.



Properties Of Magnets

- Magnets have the property of attracting certain metals. Hence, it is called attractive property.
- Similar or like poles (N and N, or S and S) of two magnets repel or move away from each other.
- Dissimilar or unlike poles (N and S) of two magnets attract each other.
- A magnet always aligns itself in the North-South direction. Therefore, it is called directive property.
- The poles cannot be isolated from each other, and they exist in pairs. They are called magnetic dipoles. When a magnet breaks in half it becomes two separate magnets with their own two poles, this is called the pair property of the magnets.



Natural Magnets

- The magnets that are found naturally is termed Natural Magnet.
- Natural magnets are Permanent Magnets, which means they do not lose their magnetic power.
- Natural Magnets are found in different places such as sandy deposits.
- The strongest natural magnet is Lodestone called Magnetite or Iron oxide which is the ore of iron.
- Some other natural magnets are Minerals such as Pyrrhotite or Iron Sulphide, Ferrite and Columbite.
- There are three types of Iron ores as Hematite (69% of Iron), Magnetite (72.4% of Iron) and Siderite (48.2% of Iron).
- Among the Iron ores, Magnetite (Fe_2O_4) has the strongest Magnetic property.

Artificial Magnets

- These are man-made magnets, made from magnetic materials.
- These are commonly made by magnetising iron or steel alloys electrically.
- Artificial magnets are made by stroking a magnetic material with magnetite or with other artificial magnets.
- These kinds of process are called Magnetisation.
- The magnetisation is a process in which an object is turned to the permanent or temporary magnet by exposing it to an external maternal magnetic field.
- Artificial magnets normally have stronger magnetic fields than Natural Magnets.
- There are various shapes, and **artificial magnet examples** are made such as bar magnet, U-Shaped Magnets, Horseshoe Magnets, Cylindrical Magnets, disc magnets, ring magnets and electromagnets.
- The artificial magnets are made of Nickel, cobalt, steel, iron etc and made of alloys such as Neodynium and Samarium.

- Depending upon their magnetic power retaining nature, the artificial magnets are classified into two types, one per temporary and another one is a permanent magnet.

Temporary Magnets

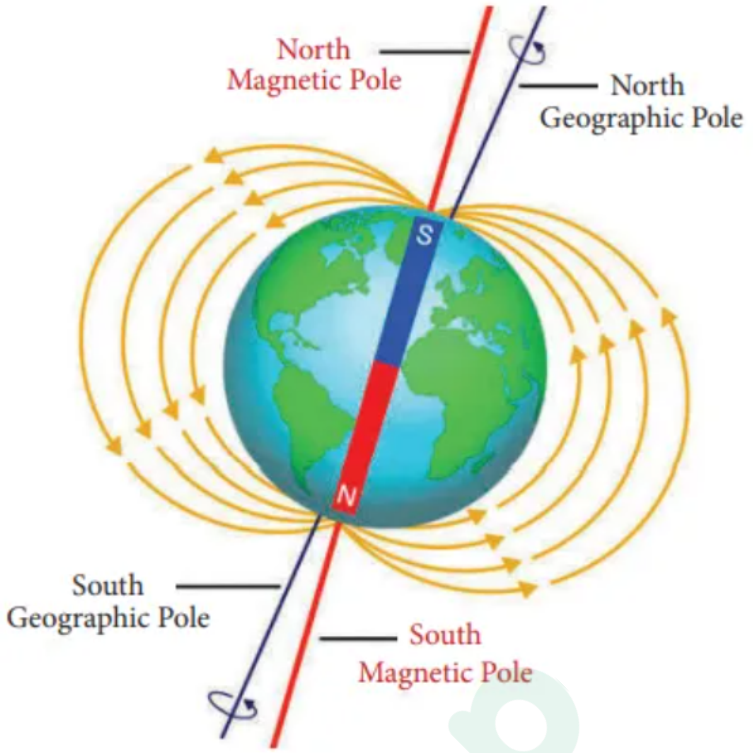
- Temporary Magnets are made by an external magnetic field.
- Temporary Magnets lose its magnetic property as soon as the external magnetic field is removed.
- Temporary Magnets made from soft iron.
- Soft iron acts as Magnets by the influence of an external magnetic field produced in a coil of wire carrying electricity.
- Soft iron loses its magnetic property as soon the electricity is stopped.
- Examples: Magnets used in Crane, Electric Bell.

Permanent Magnets

- Permanent Magnets are artificial magnets that retain its magnetic property even after the external magnetic field is taken off.
- The Permanent magnets are made from hardened steel and alloys of some metals.
- Generally, the alloy used to make permanent magnets are ALNICO (An alloy of aluminium, nickel, and cobalt).
- Examples of Permanent Magnet usages are Refrigerator, bar magnet, speaker magnet, fridge, and magnetic compass etc.
- Neodymium magnets are the strongest magnets in the earth.
- Alnico cow magnets are used to attract sharp iron objects such as wire, nail ingested by animals which grazing, that also damage to its digestive tract.
- There are four types of commercially available permanent magnets. They are made using alloys of ferromagnetic materials.
    - *AlNiCo* – Aluminium-Nickel-Cobalt magnets
    - *Fe* – Ferrite magnets made of Fe_3O_4
    - *NdFeB* – Neodymium-Iron-Boron. These are the strongest permanent magnets.
    - *SmCo* – Samarium-Cobalt magnets

Earth's Magnetism

- The Earth acts as a huge magnet with a field surrounding the entire globe.
- One of the theories about its existence is that the liquid molten iron outer core rotates around a solid inner core. This creates an electric field, thereby causing a magnetic field.
- The magnetic South Pole is in the direction of the geographic North Pole. The attractive property of magnets makes the North Pole of magnet orient in the direction of the magnetic South Pole of the earth (or the geographic North).



Uses of Earth's magnetic field:

- A compass makes use of this property to show directions to sailors, travellers, and pilots.
- There are theories that migratory birds use the earth's magnetic field to find their way as they fly for thousands of kilometres while migrating.
- The magnetic field of the earth is responsible for the protection of life. This field diverts away from the harmful radiations from the sun.