

Chapter 7 : **Electricity and Magnetism**

Section 3: Magnetism

Why are Magnets useful?

- Magnets can exert forces on objects that are made from, or contain, magnetic materials.
- Magnets also exert forces on other magnets. It is the forces exerted by magnets that make them so useful.



[Click image to view movie.](#)

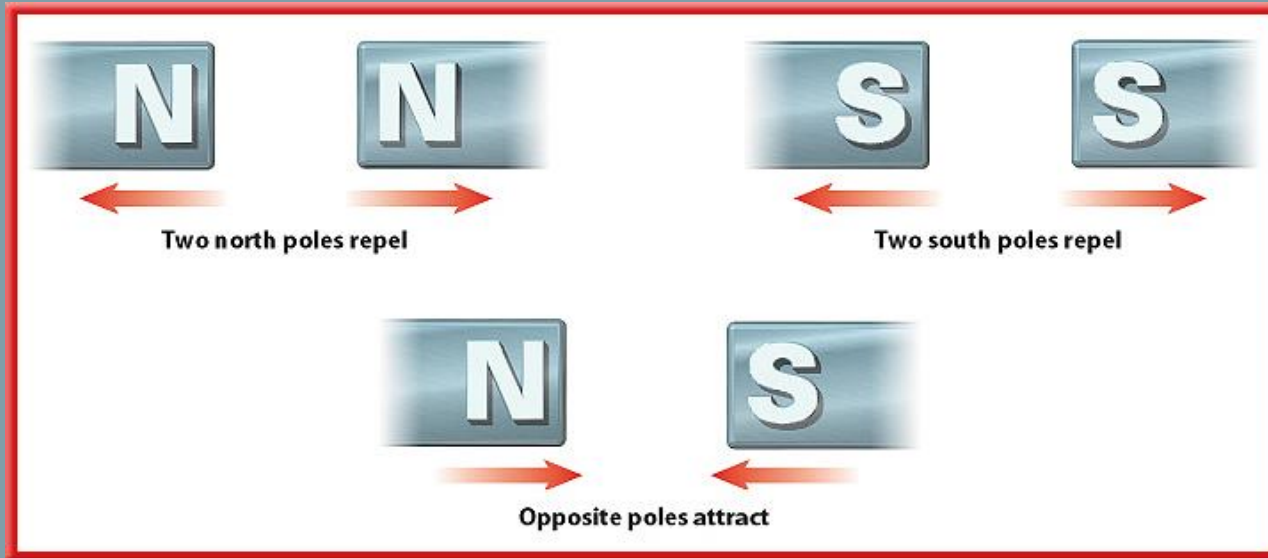
Where are Magnetic Poles located?

- Every magnet has two ends or sides.
- There are two types of magnetic poles. One is a north pole and the other is a south pole.
- For a magnet in the shape of a disc or a ring, one side is a north pole and the other side is a south pole.

The Forces Between Magnetic Poles

What is the general rule that describes the attraction between two magnets?

- The magnetic poles of a magnet exert forces on the magnetic poles of other magnets.
- Like poles repel and unlike poles attract.



- **What happens to the forces between two magnets when they are placed very close to each other and when they are placed farther apart?**

- The magnetic forces between two magnets become **stronger** as the magnets move closer together .
- **Weaker** as they move farther apart.

Magnetic Field x Electric Field

- Poles of a magnet are surrounded by a magnetic field that exerts a force on other magnets.
- Electric charges are surrounded by an electric field that exerts forces on other electric charges.

Why certain metals are considered magnetic material and others not?

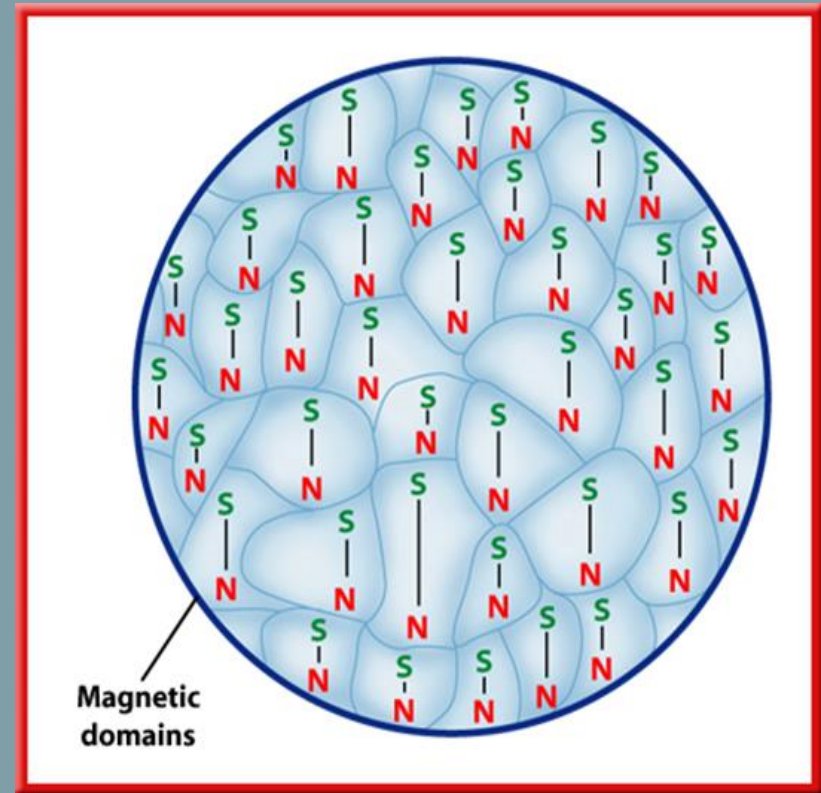
- magnetic materials are metals that contain the elements iron, nickel, cobalt, and a few other rare-earth elements
- Magnetic materials are attracted to magnets
- A magnet is material or object that produces a magnetic field. While a magnetic material can become a magnet.

How could you compare atoms with a bar magnet? (read the last paragraph on page 210)

- Atoms of the elements that are magnetic, such as iron, nickel, and cobalt, are themselves tiny magnets.
- Each atom has a north pole and a south pole.

What are Magnetic Domains?

- **One atom is like a tiny magnet**
- A group of atoms that have their magnetic poles pointing in the same direction is called a magnetic domain.

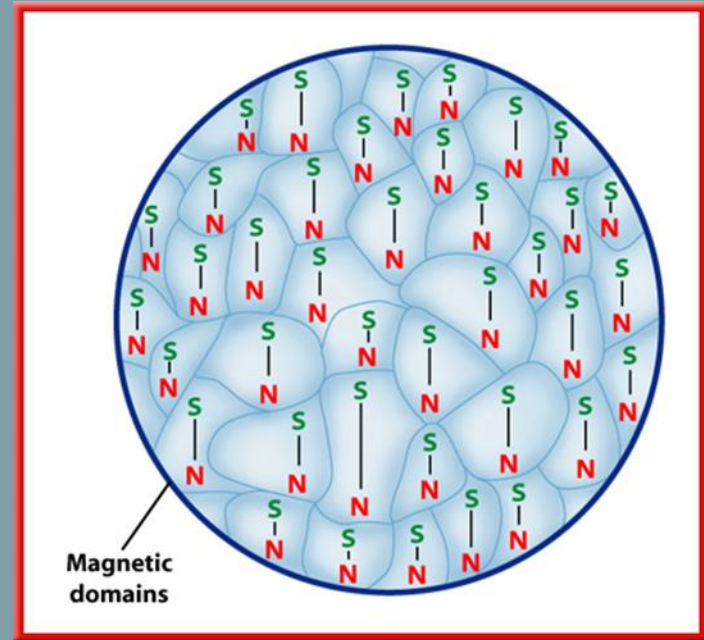


- **There are 3 types of magnets:**
- **Permanent**
- **Temporary – becomes a magnet when close to a magnet or a magnetic field**
- **electromagnet**

- **read figure 22 and explain why the paper clip can become a temporary magnet.**

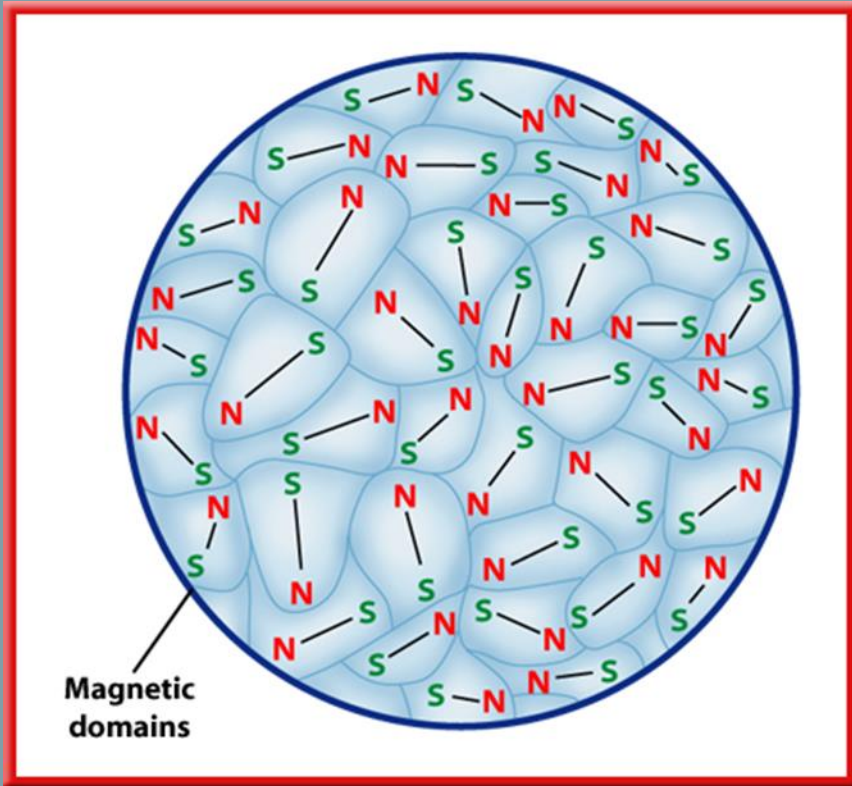
In a permanent magnet, such as a bar magnet, most of the domains are oriented in a single direction.

- There will be a magnetic field and two magnetic poles

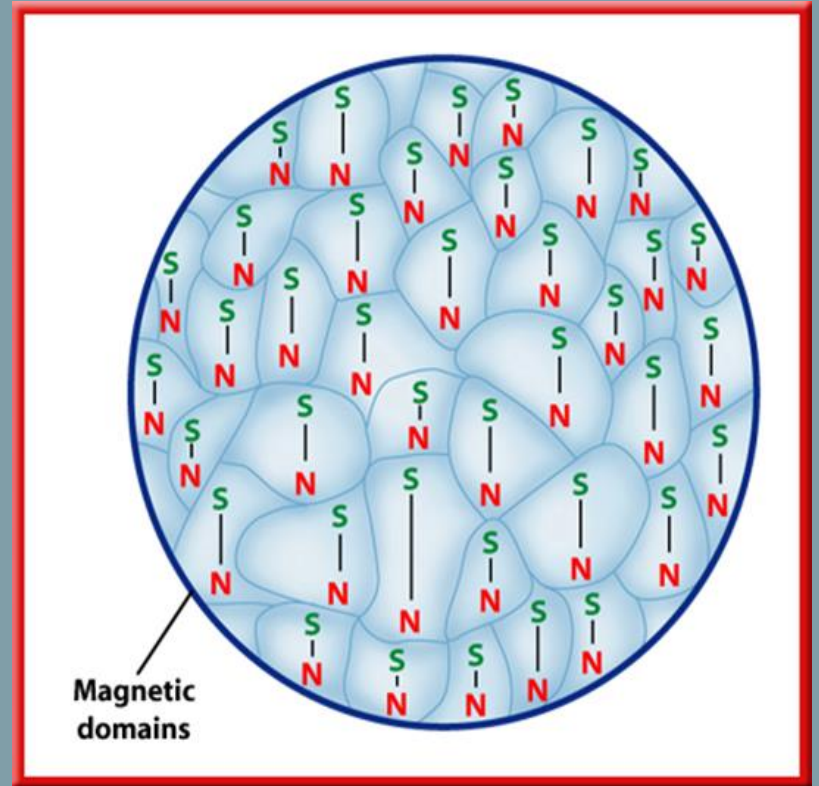


In a paper clip the **magnetic domains** (**groups of atoms**) are oriented in random directions.

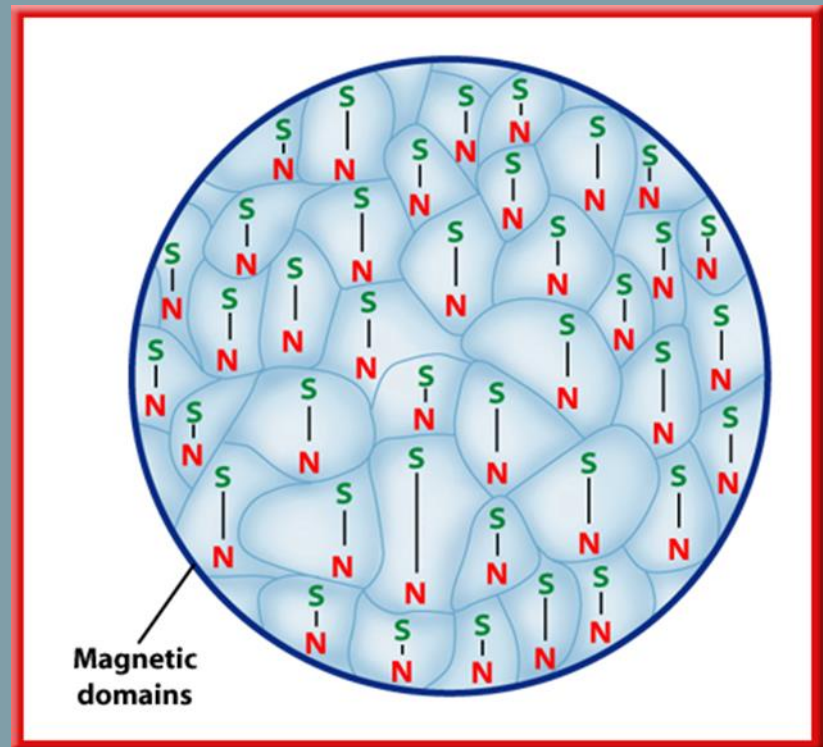
Paper clip



Permanent magnet



- **If there is a magnet nearby**, the magnetic domains will line up and point in a single direction, creating magnetic poles.
- And as long as the permanent magnet is close, the paper clip will be a **temporary magnet**.



***Earth's Magnetic Field**

Earth has a magnetic field. How???

Earth DOESN'T have a giant magnet bar inside it; instead, our planet's magnetic field is made by swirling motions of molten iron in Earth's outer layers.

The swirling motions of molten iron change all the time.

Lately they move about 25 miles per year.

That is why the magnetic poles are not located at the same place as the geographic poles.

****The Earth is surrounded by a magnetic field. The magnetic poles are located near the geographic north pole and south pole.**

A compass will point to the magnetic north pole, so you will know where the geographic north pole is because they are relatively close to each other.

****The compass will point to the magnetic north pole**

****A compass works according to the Earth's magnetic field but if another magnetic field is placed close to the compass, it will affect the reading.**

****The closer the magnets are, the stronger the attraction**