Chapter – 13

Fun With Magnets

Magnetic and Non-magnetic Materials

Magnetic Materials: The material which gets attracted towards a magnet is called a magnetic material.

For example: Iron, nickel or cobalt.

Non-magnetic Materials: The materials which are not attracted towards a magnet are called non-magnetic materials.

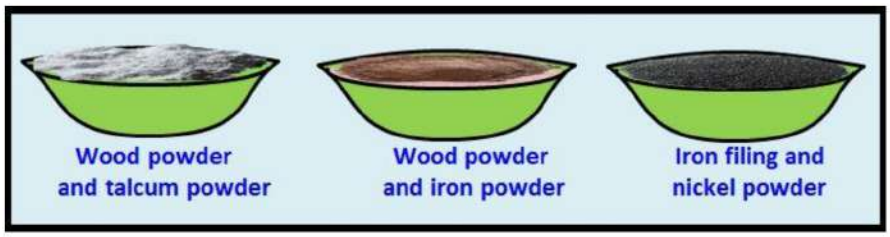
For example: Wood, Plastic, Rubber etc.

Example: Brijesh has three different mixtures and the combination of mixtures are listed below

1) Wood powder and talcum powder

2) Wood powder and iron filing

3) Iron filing and nickel powder



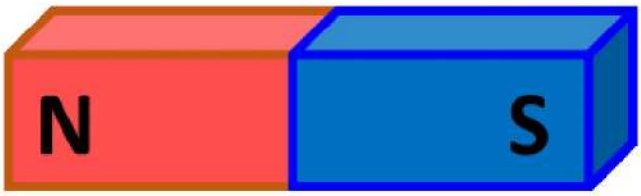
Which mixture contains the highest magnetic material among them?
Solution: Wood powder and talcum powder does not contain any magnetic material because these powders cannot get attracted by a magnet, these are non-magnetic material.

The iron filing is a magnetic material and wood powder is non-magnetic, which means a magnet could be used to attract the iron filings out of the mixture, leaving the wood powder.

Iron filing, as well as nickel powder both, are magnetic materials which means a magnet could be used to attract the iron filing as well as nickel powder out of the mixture hence it contains maximum magnetic material.

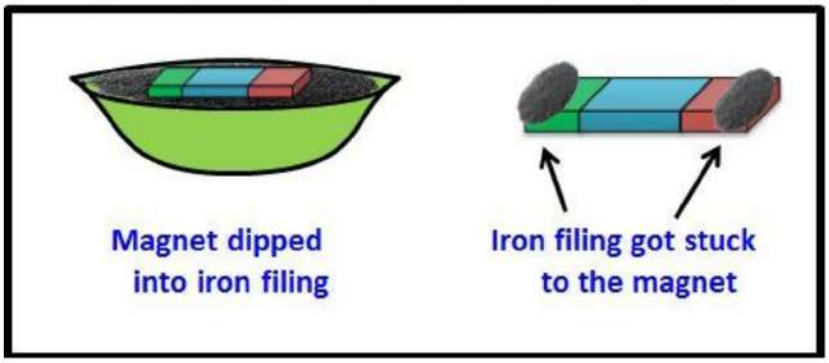
Poles of magnet

Poles of magnet: The two ends of a bar magnet are called poles of a magnet. One is the north pole and the other is the south pole.



Tip: Magnetic strength of a bar magnet is maximum at the poles.

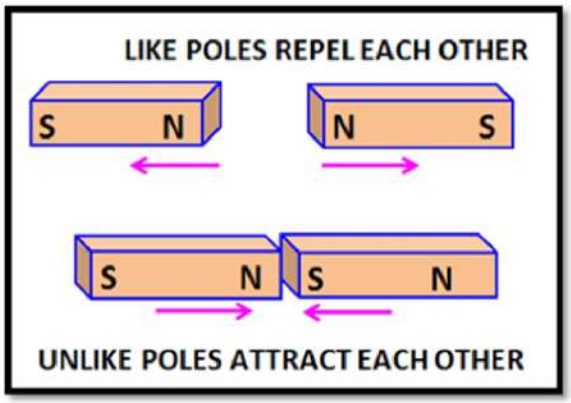
Example: If you dip a magnet in a pool of iron filing and pull it out, you will observe most iron filings get stuck to the two ends of the bar magnet. The regions of the magnet where more iron filing sticking to it are called the poles of the magnet.



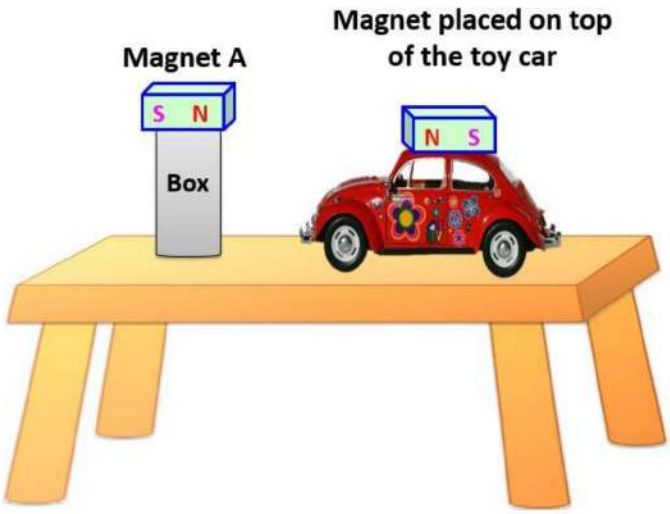
Tip: Remember the number of poles in a magnet is always two, even if we break a magnet into two magnets, still each magnet will have two poles i.e. their respective North pole and South pole.

Attraction and Repulsion between magnets:

- Like poles of two magnets attract each other i.e. the north pole of one magnet attracts the south pole of another magnet.
- Opposite poles repel each other i.e. the north pole repels the north pole and the south pole repels the south pole.



Example: Raghav has a toy car having a magnet fitted on top of the car. Another magnet, say magnet A is placed on a box as shown in the figure. If he keeps the north pole of a magnet. A near the car then the car will _____ by the magnet.

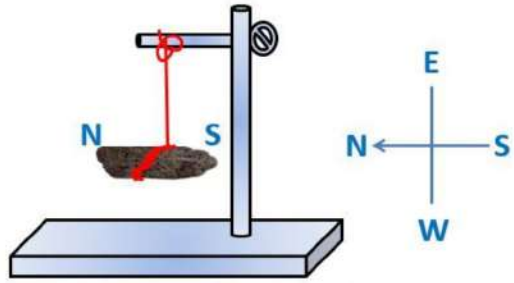


Solution: If Raghav keeps the north pole of magnet A heading towards the north pole of the magnet which is placed on top of the car then these two magnets repel each other because like poles of the magnet repel each other whereas unlike poles magnet attracts each other.

Finding direction

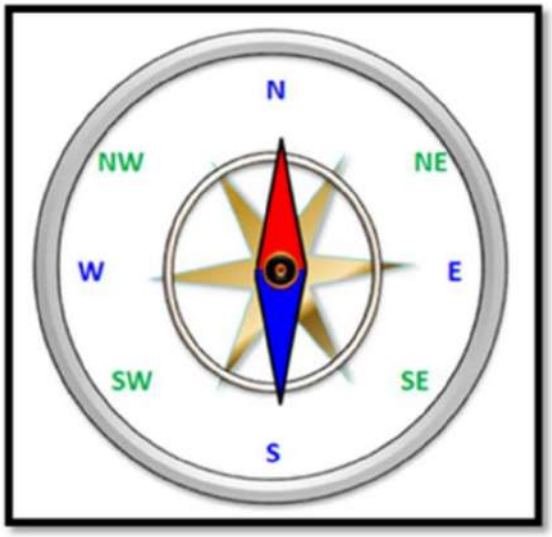
Finding direction: When we suspend a magnet as shown in the diagram below, the end of the magnet which points towards North is called it's **North seeking end** or the **North Pole** of the magnet and the end that points towards South is called **South seeking end** or the **South Pole** of the magnet.

Travellers used to find directions by suspending natural magnets with a thread they always carried with them.



Natural magnet suspended freely

Compass: A compass is a device used to find direction. A compass is made up of a small box with a glass cover on it. A magnetized needle is fixed inside the box, which can rotate freely. A needle indicates the north-south direction when it comes to rest. The compass also has a dial with direction marked on it. The compass is then rotated until the north and south marked on the dial are at the two ends of the needle.



Solution: A magnetised needle inserted in a cork when placed in water it starts moving towards the north-south direction of the earth and working as a compass.

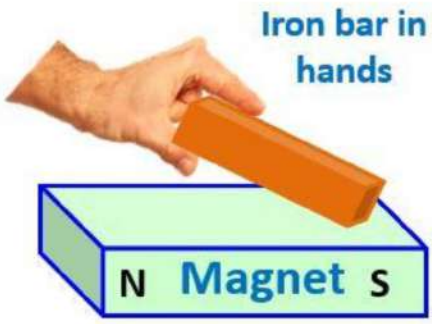
Tip: The compass needle deflects in any direction if the compass is open because the air exerts pressure on the needle. So, the compass without a glass cover may not give the correct direction.

Make Your Own Magnet

Artificial Magnet: The magnets make from pieces of iron or other magnetic materials are known as artificial magnets. There are many ways to make a magnet.

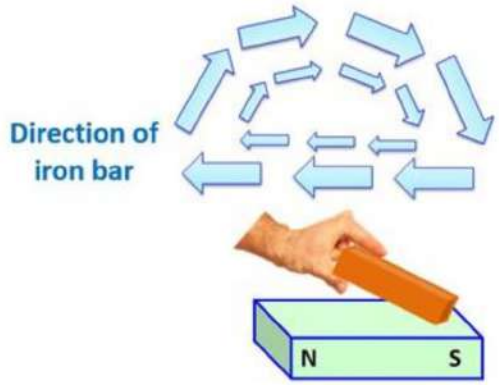
Process: Steps of making our own magnet are as follows:

(i) Take a bar magnet and hold the regular piece of an iron bar in your hands.

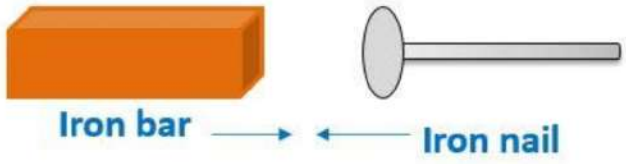


(ii) Without lifting the bar magnet, move the iron bar along the length of the bar magnet from S pole to N pole. In the following figure, an arrow indicates the direction of the initial movement of the magnet i.e., from S pole to N pole.

(iii) By lifting the iron bar and bringing the same end to the same pole of the bar magnet from which you began. Move the iron bar again along the bar magnet from S pole. Repeat this process about 30-40 times.



(iv) Bring an iron nail near the iron bar to check whether it has become a magnet.



Example: Raman making his own magnet by moving an iron nail on a bar magnet from north to south and then south to north. Does Raman succeed in making its own magnet?

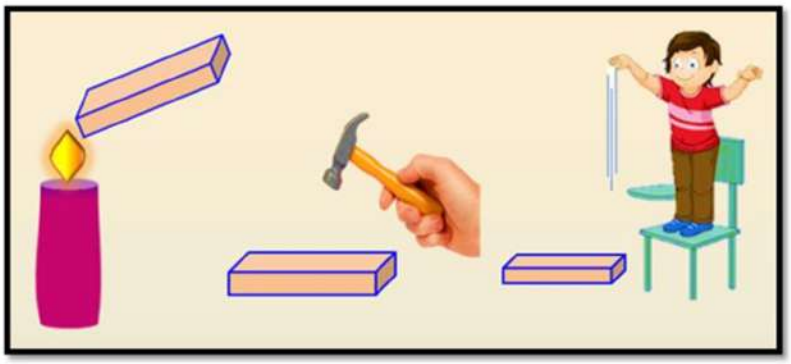
Solution: No, the iron nail does not behave as a magnet because its direction of movement on a bar magnet is continuously changing during this process. Therefore, an iron nail does not behave like a magnet.

Tip: Remember the direction of the iron bar's movement should not be changed during the process.

Cautions to the Magnets

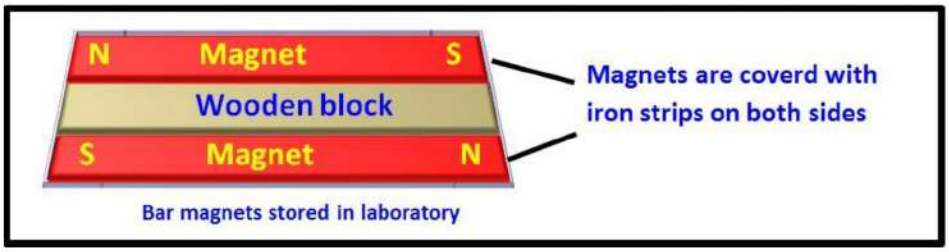
Cautions to the magnets:

1) Magnets lose their properties if they are heated, hammered or dropped from some height.



2) Magnets become weak if they are not stored properly.

- Bar magnets should be kept in pairs with their unlike poles on the same side. They must be separated by a piece of wood while two pieces of soft iron should be placed across their ends.



- For a horseshoe magnet, one should keep a piece of iron across the poles.
- Two pieces of soft iron should be placed across their ends.

3) Keep magnets away from cassettes, mobiles, television, music system, CD and the computer as magnets interfere with the magnetic field of these devices and this causes these devices to work abnormally.