9. MAGNETISM

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Ordinary magnets are familiar to everybody. The simple magnet consists of a magnetised bar of iron. A magnet attracts and holds pieces of iron but does not attract pieces of copper. Substances attracted by a magnet are described as magnetic and those not attracted are called as non-magnetic. Iron, cobalt, nickel and certain alloys are strongly magnetic whereas copper, wood, glass, etc. are non-magnetic. However, even non-magnetic substances show feeble magnetism in the presence of very strong magnets. Some are attracted while most are very strong magnets.

When a bar magnet is suspended with a thread tied exactly in its middle, the magnet oscillates for a little while and then comes to rest pointing approximately in the north-south direction. The end pointing towards the north is called the north-seeking or simply north pole of the magnet and that pointing towards the south is called the south-seeking or south pole of the magnet. Thus every magnet has two poles, which are the places near the ends where the resultant attractive force of the magnet appears to be concentrated.

It two bar magnets are brought near each other so that their north poles are close, the magnets repel. If the north pole of one magnet is brought near the south pole of the other; the two attract. Like poles repel and unlike poles attract.

Earth's Magnetism

As stated earlier, a bar magnet always points roughly in a north-south direction when freely suspended. This is due to the earth's magnetism. The origin of the earth's magnetism is still not very clear to scientists. It is, however, believed that the motion of charges (causing currents) in the molten outer core creates the magnetic field. Some geologists think that these currents are caused by the earth's motion. Another likely source of earth's magnetism may be heat arising from the earth's inner core. This heat may be the cause of convection currents in the molten outer core

The motion of ions and electrons in this molten material would produce a magnetic field. It is probably such convection currents in combinations with the rotational effects of the earth that produce the earth's magnetic field.

The earth behaves as if it contained a short bar magnet inclined at a small angle to its axis of rotation, with the south pole of the magnet in the northern hemisphere. At a particular place on the earth, the magnetic north is not usually in the directions is called the **declination.** Mariners and others who use compasses must allow for declination in determining the true north. The angle, which a freely suspended bar magnet makes with the horizontal, is called the dip of the place. Thus, on the equator, the value of the dip is zero and that on the poles is 90º.

Magnetic Resonance Imaging (MRI)

MRI is a non-invasive medical test that helps physicians diagnose and treat diseases that may not be assessed adequately with other imaging methods such as x-ray, ultrasound or CT scanning. MR imaging uses a powerful magnetic field, radio frequency pulses and a computer to produce detailed pictures of organs (heart, liver, kidney, spleen, pancreas etc.), soft tissues, bones and virtually all other internal body structures. The images can then be examined on a computer monitor, printed or copied on a compact disc. MRI does not use x-rays.