Experiment:

Induce a current with a magnet and coil

1. You can produce a small electrical current by a process called electromagnetic induction. This will require the use of a coil of wire and a magnet. A galvanometer will be required to detect the electrical flow.

2. Background: British scientist Michael Faraday discovered perhaps the most useful property of electrical currents. He found that a moving magnet can actually cause electrons to move in a conductor. An American scientist, Joseph Henry, discovered this effect about the same time as Faraday.

This ability of a magnet to move electrons is called electromagnetic induction. It is the principle of how most electricity is generated.

Faraday made a solenoid (coil or wire) and connected it to a galvanometer, a device similar to Oerstead's wire and compass, which could detect the movement of electrons in a wire by observing its magnetic field. Faraday found when he moved the magnet one way through the solenoid (down) the electrons moved one way through the wire. When he moved the magnet the other way (up) electrons in the wire moved in the opposite direction.

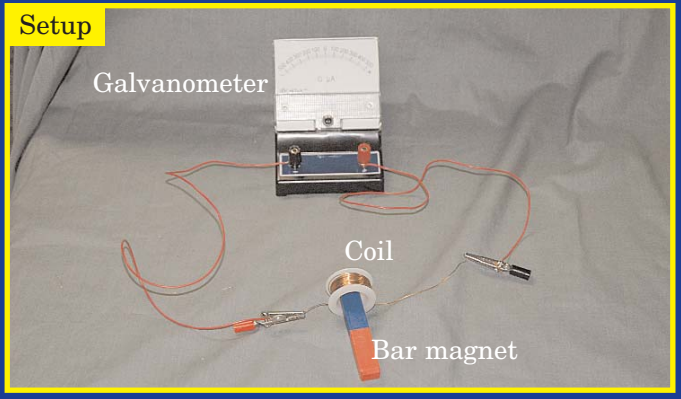
3. Start this experiment by obtaining a coil of wire. A spool is easy to obtain and works well. Thin wire helps since there are more turns on the spool—the more turns, the greater effect of the induction. You will also need a bar magnet that will fit inside the spool. The strength of the magnet will affect the strength of the induced current.

Connect the two ends of the coil to the poles of a galvanometer. When you push the magnet down through the coil, the galvanometer needle will turn in one direction. Pulling the magnet back up will cause the needle to tilt to the opposite direction.

Note: If you use a compass-type of galvanometer for this experiment, insure that the wire leads from the coil to the magnet are long enough to locate these two pieces of equipment far enough from each other so that the magnet does not affect the compass needle instead of the magnetic field of the induced current. If the experiment fails to perform properly, check the connections. Then try using a different coil or stronger magnet.

Variations: Repeat this experiment with coils of various sizes and diameters of wires. Try with different sizes of magnets. Try moving magnets past the outside of the coil and observe the strength of the induced current. Record your observations.

Setup



Compass galvanometer