

Electromagnets

Leading questions:

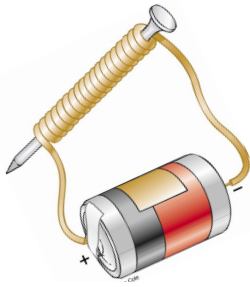
- How could you tell if an object is a magnet?
Explain: Magnets can be detected using a compass; they also attract certain materials.
- What is an electromagnet?
Explain: It is a magnet whose force is generated by electric current in a wire.

What to do:

1. Take the piece of wire and wind it around a steel nail. Hold the ends of the wire to the ends of the battery and move the nail near a compass.
 - What effect does it have on the compass?
 - What part of the nail has the greatest effect?
Explain: The greater effect will be at either end of the nail; one end is a N pole the other end is a S pole. Reversing the battery will reverse the poles.
 - What does this tell you about electric current in the wire?
Explain: Current in a wire produces a magnet (magnetic field).
2. Which of the materials are most affected by your electromagnet: steel wires, copper wires, and aluminum wires?
Explain: The electromagnet will only affect the steel wires.
3. Slide the nail out of the coil and re-connect the ends of the wire coil to the battery.
 - Does the coil without the nail have the same effect on the steel wires?
Explain: The magnetic force of the coil alone will not affect these materials; it is still there, but not very strong.
 - Does it still have any effect on the compass?
Explain: The coil alone, connected to the battery, will still affect the compass.
 - Can you make a theory why the effect of the coil is greater with a nail?
Explain: The force of the coil is strong enough to magnetize the nail, making a much stronger magnet.

Summary:

The device you have made is called an electromagnet – a magnet created by an electric current in a wire.



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