Electricity & Magnetism – A Dynamic Duo!

When you use a compass to see which way is north, south, east, and west, you are really using a magnet. The little moving pointer in a compass is actually a small magnet! Electricity in a wire can also be used to make a magnet. If you set up a wire and a compass correctly, you can make the magnetism from the electricity in the wire move the magnet in the compass. Let's try it!

Materials:

- Compass
- Flashlight battery (1.5 volts D cell)
- Insulated wire

Teacher or Parent Preparation:

Cut 1 piece of wire about 30 centimeters (cm) long. Carefully strip off about 1 cm of insulation from both ends of the wire. If the exposed wire is frayed, twist it together.

Procedures:

1. Tape one end of your wire to the negative (flat end) end of the battery. Be sure that the metal part of the wire is firmly attached to the battery.
2. Tape the wire down on both sides of the compass so that the wire does not move.
3. Tape one end of the wire to the negative end of the battery.

4. Watch the compass needle as you quickly touch the other end of the wire to the positive end of the battery. After touching the wire to the positive end of the battery, quickly remove it so the wire does not become hot.

Think about this ...

The movement of the compass needle lets you know that the circuit is complete. Do you think the compass needle would move differently if the battery was a little stronger or a little weaker? Can you imagine a meter made with a little magnet that moves by different amounts depending on how much electricity flows through a wire?

Where's the Chemistry?

The circuit detector is actually most of a circuit but not all. Every electric current produces magnetism. When you completed the circuit with the battery and wire, electricity flowed through the wire. This electricity produced an area of magnetism around the wire called a magnetic field. Since the compass needle is also a magnet, the magnetic field around the wire attracted and repelled the ends of the compass magnet and caused it to move.

You have seen that electricity flowing through a wire can cause a magnet to move. This is called the motor effect. Electricity and magnetism are even related in another way. Believe it or not, moving a magnet through a coil of wire can cause electricity to flow in the wire! This is called the generator effect.

The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".