Magnetism Through and Through

Magnets have the ability to attract certain metals like iron and steel. Metal paper clips are made from steel and should be attracted by a magnet. But can a magnet attract a paper clip through a liquid like water or even through a solid? Let's investigate to find out!

Materials:

- Strong magnet
- Thread
- Paper clip
- Clear plastic cup
- Water
- 2 index cards

Procedures:

Through a Gas

1. Cut a piece of thread so that it is about 15 centimeters (cm) long. Tie one end of the thread to a regular size paper clip.
2. Hold the piece of thread and allow the paper clip to hang down. Hold the magnet at the same level as the paper clip but about 30 cm away.

3. Very slowly move the magnet toward the paper clip. Move closer and closer and describe what happens.

Through a Liquid

1. Fill a clear plastic cup about 3/4 full of water.
2. Use your thumb and index finger to hold your magnet under the water on one side of the cup.

3. Place the paper clip into the water so that it is at about the same level as the magnet. Slowly bring the paper clip closer and closer toward the magnet and describe what happens.

Through a Solid

1. Hold the string and let the paper clip hang down. Hold your magnet against the back of an index card.
2. Slowly move the paper clip closer and closer to the index card. What happens?

3. What do you think would happen if you folded the index card in two? Do you think the magnetism could go through two thicknesses of index card? Try it and see.

4. Continue to fold the index card in half and see how many thicknesses of index card your magnetism can go through.

Think about this ...

Did you ever wonder how magnets are made? There are many different shapes for magnets and several common materials they are made from such as iron, nickel, cobalt, and some mixtures of other elements. But to make any magnet you need a lot of electricity. In order to make a magnet, the magnetic material is placed in a machine that creates a very large jolt of electricity. This electricity creates a very strong area of magnetism which magnetizes the material to create a magnet.

Where's the Chemistry?

Magnetism is a force that can work through a gas, a liquid, and even a solid. If the solid material is magnetic itself, then the effect of the magnet on an object on the other side is less. When you folded up the index card, the magnet had to work through a thicker piece of material but the magnet was also further from the paper clip which makes it harder for the magnet to attract it.

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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".

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