# Milli's Insulation Investigation

from **Celebrating Chemistry**

It is important to keep the temperature at home comfortable for living, no matter what the weather is like outside. When it is cold, we have to heat our homes to keep them warm. When summer comes, we turn on fans or air conditioning to keep our houses cool. Heat moves from a place where it is warmer to one where it is colder. To help keep your home comfortable inside and to save energy, insulation is placed in the walls, where it works like a jacket around your house. The most common types of insulation used in homes are made from fiberglass and cellulose. Fiberglass is extremely fine strands of glass. Cellulose insulation looks like a pulpy, puffy form of just what it is: recycled newspapers, boxes, and waste paper. In this activity you will test several different materials to find out which one is the best insulator.

## Materials

- Blunt-ended scissors
- Ruler
- Pencil or pen
- Aluminum foil
- Newspaper
- Plastic wrap
- Wax paper
- 5 identical ice cubes
- Rubber bands
- Paper towels
- Baking tray
- Watch or timer
- Wire rack (optional)

*NOTE: This activity can take between one and two hours to complete.*

**ADAPTATION** *Use small see-through ice packs instead of ice cubes and wrap in a small towel, bubble wrap, aluminum foil, and wax paper or brown paper. Observe the differences in the amount of melting of the material inside over time.*

**SAFETY!** *Be sure to follow Milli's Safety Tips and do this activity with an adult. Do not eat or drink any of the materials in this activity.*

## Procedure

1. Cut the aluminum foil, newspaper, plastic wrap, and wax paper to the same size for wrapping each ice cube.

2. Wrap one ice cube in each type of wrapper, being careful to wrap the cubes the same way each time.

3. Use a rubber band to hold each wrapper in place, and put a rubber band around the unwrapped cube as well.

4. Cover the baking tray with a paper towel as shown below. Place the cubes on the baking tray. A wire rack may be placed on the tray to observe the cubes more easily.

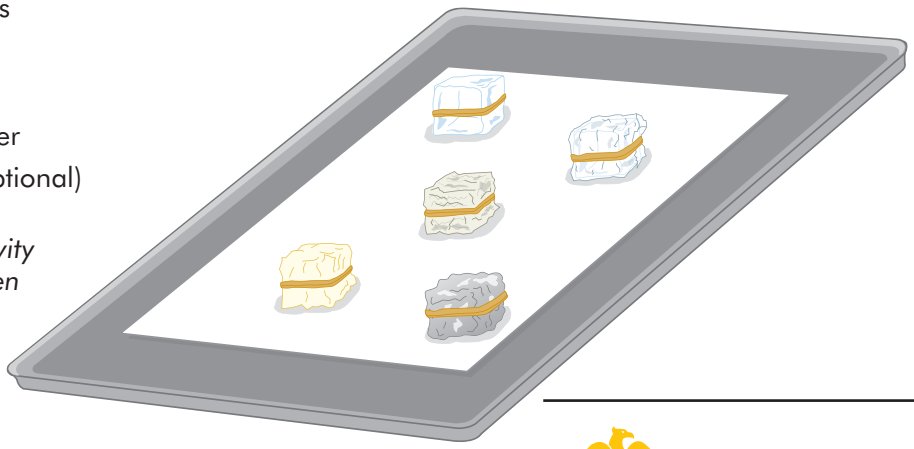
5. Check the cubes every fifteen minutes and record your observations in the "What Did You Observe?" section.

6. After the unwrapped cube has completely melted, or one and a half hours have passed, unwrap the cubes and observe how much ice is left inside each wrapper. Record your results in the "What Did You Observe?" section.

7. Throw away the wet wrappers and paper towels. Thoroughly clean the work area and wash your hands.

## Try this...

Try using other "wrappers" like heavy-duty foil, pieces of fabric, or bubble wrap. Try putting a set of cubes in the shade and a set in the sun. Put a set of wrapped cubes in the refrigerator and observe how the melting times differ when the surrounding temperature is lower.



## What Did You Observe?

Describe how the cube looks (if you can see it), or how big the damp circle on the paper towel has become.

| Time in Minutes | Unwrapped Cube | Aluminum Foil | Newspaper | Plastic Wrap | Wax Paper |
|---|---|---|---|---|---|
| 15 | | | | | |
| 30 | | | | | |
| 45 | | | | | |
| 60 | | | | | |
| 75 | | | | | |
| 90 | | | | | |

Which cube melted the fastest?

Which cube took the longest time to melt?

List the wrappers in order from worst to best insulator:

Why do you think some are better insulators than others?

## Where's the Chemistry?

The wrapper that allowed more heat through to the ice and melted it fastest is the worst insulator. The wrapper that kept the heat away from the ice and melted it the slowest is the best insulator. Metal tends not to be a good insulator because it transfers, or conducts, heat—in this case, it conducted the heat from the warmer air in the room to the cold ice.

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.

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# 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".**