

# INSULATION CHALLENGE

Insulation helps keep your house warm in the winter and cool in the summer, which reduces energy costs. The Earth's atmosphere is also an insulator—it absorbs heat from the Sun and keeps heat inside the atmosphere, helping the Earth to stay warm. Experiment with insulation to see if you can keep an ice cube from melting.



## MATERIALS

- Four small paper cups (3-ounce cups work well)
- Four clear plastic cups (16-ounce cups work well)
- Aluminum foil
- Newspaper
- Felt, wool, bubble wrap, fabric or other insulating materials
- Plastic wrap
- Rubber bands
- Tape
- Scissors
- Four ice cubes that are the same size
- Timer
- Marker

## INSTRUCTIONS

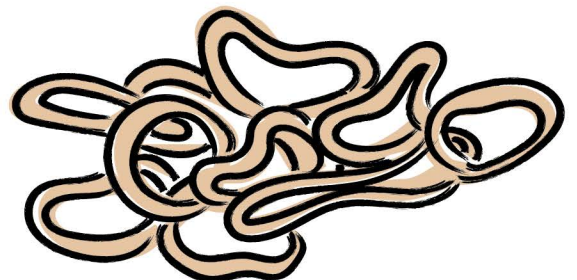
Test which materials work best to keep an ice cube from melting. Cover the outside of one 3-ounce paper cup with aluminum foil, trimming it to fit and taping it into place. Cover another paper cup with newspaper, and a third with a different material you would like to test. Leave the fourth paper cup uncovered.

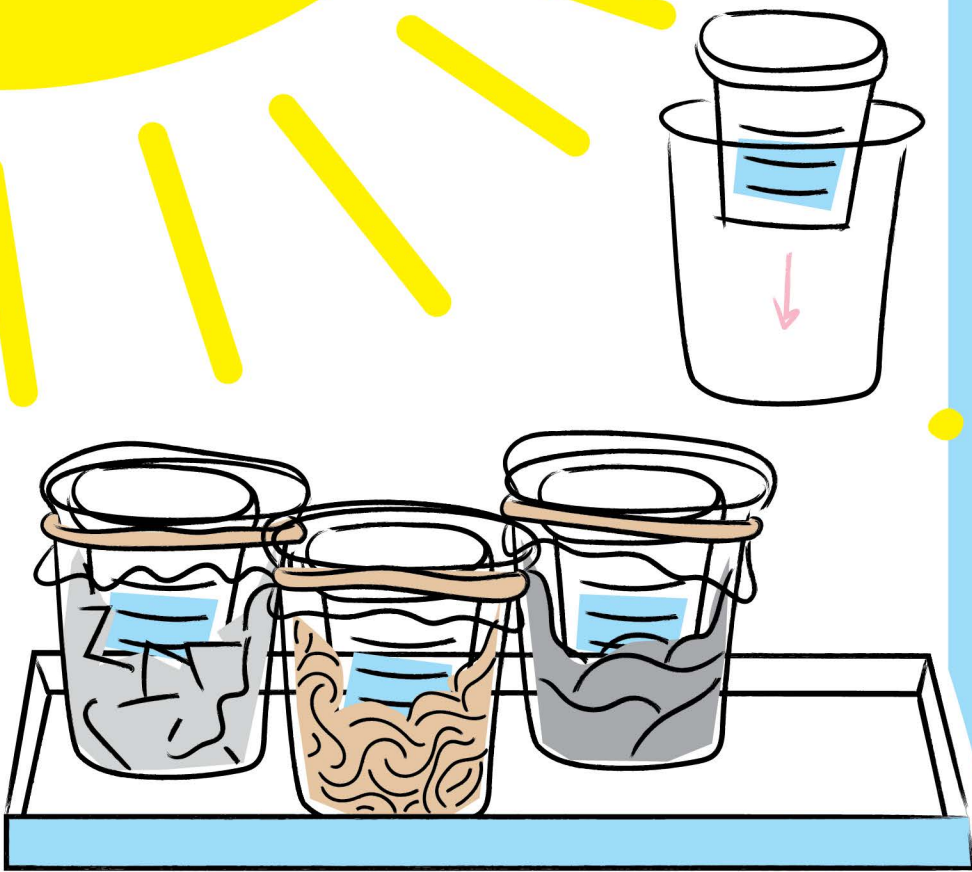
Place each paper cup into a larger plastic cup. If needed, add more insulation material to fill the gap between the cups. Add an ice cube to each paper cup. Cover the top of each large cup with plastic wrap, using a rubber band to hold it in place.

Put your cups in a warm place like a sunny ledge or place them in a shallow pan of warm water. This will help your experiment go faster.

Set a timer for five minutes. Observe the cups and note how much water has melted. Take the small cups out of the big cups and draw a line at the level of melted water. Place the small cups back into the larger cups and set the timer for another five minutes and observe again.

The insulator material that resulted in the least amount of melting worked the best.





## WHAT'S HAPPENING?

Insulators stop the transfer of energy from an object to its surroundings. They hold temperatures constant, keeping cold objects cold and warm objects warm. With good insulation, the speed at which an ice cube melts is slowed down. A good insulating material will not let warmer surrounding air reach the ice cube and will keep the cool air of the ice cube from escaping, allowing the ice cube to hold its shape for a longer time.

Insulation in your home works the same way. It keeps cool air conditioning from escaping while at the same time keeping hot air outside from getting in. The same idea applies to your coat in winter. The coat keeps the cold outside air from reaching your body and also keeps the heat of your body from escaping, so you stay nice and warm.

## EXTENSIONS

Try this experiment again using different insulators. Wrap the cups with felt, wool, fabric or bubble wrap. Add a thicker layer of insulation between the paper cup and the surrounding clear plastic cup. Does adding more layers of insulation change the time it takes for the ice cube to melt? What effect does different insulation have on melting speed?

## LEARN MORE

See dramatic images of the pace of the world's glaciers melting in MSI's *Extreme Ice* exhibit.

## RECOMMENDED READING

*Sizzling Science Projects with Heat and Energy*, by Robert Gardner

*Ice Boy*, by David Ezra Stein