

Blubber Gloves

It's all about insulation!



Materials Needed

- Large plastic sandwich bags or equivalent
- Materials to test
Examples: Shortening, lard, feathers, fabric scraps, paper and cotton balls
- Sink or container filled with ice water
- Duct tape or equivalent

Grade Range

3-5

Topics/Skills

Science: Properties of Materials; Observation Skills

Learning Standards

NGSS: [Physical Science](#); [Life Science](#); [Earth & Space Science](#)

Duration

20-45 minutes

Prep Time

10-20 minutes

Students test the insulative properties of materials packed in plastic bags to make “blubber gloves” that protect against extreme cold. This helps teach them about heat transfer, organisms and their environments and world climates.

Activity Challenge

Make multiple “gloves” out of plastic bags that are insulated with different materials. Test each glove in ice water to see if it prevents you from feeling the cold in an ice water bath.

Preparation

1. Review the Materials List and gather the materials with which to insulate the gloves. Plan on testing 2-3 materials.
2. Prepare the ice water bath in a sink or container. Have towels handy!
3. Set out the materials in an accessible place.
4. Fill one plastic bag with about $\frac{1}{2}$ cup of material (e.g., cotton balls).
5. Insert another plastic bag into the first, making sure the material is evenly distributed in between the two bags.
6. Fold the opening of the inner bag over the opening of the outer bag and secure this seam with tape so that the material is sealed between the two layers of plastic. This is a test glove.
7. Make two more test gloves, each with a different material between the plastic bags (e.g., feathers in one and shortening/lard in the other).
8. Prepare another glove but do not put material between the plastic bags. This is the control glove.

To Do

1. Put a test glove on one hand and the control glove on the other hand.
2. Submerge both gloves in the ice water at the same time. Be careful not to let water into the gloves! Keep the seams above the water line.
3. Feel the relative temperature difference between the gloves, that is, how the test glove feels compared to the control glove.
4. Remove the gloves and record your observations (see table below).
5. Repeat the procedure for the remaining test gloves, comparing relative temperature differences felt between them.

Use the following table to record your observations. Be sure to write in the material and circle the relative coldness number for each glove.

Control Glove	Test Glove 1	Test Glove 2	Test Glove 3
Material tested: NONE	Material tested: _____	Material tested: _____	Material tested: _____
Relative coldness (7 = extremely cold, 1 = not at all cold): 1 2 3 4 5 6 7	Relative coldness (7 = extremely cold, 1 = not at all cold): 1 2 3 4 5 6 7	Relative coldness (7 = extremely cold, 1 = not at all cold): 1 2 3 4 5 6 7	Relative coldness (7 = extremely cold, 1 = not at all cold): 1 2 3 4 5 6 7

Observations

- What did you notice about the relative temperatures felt between the gloves?
- Which test glove(s) prevented you from feeling the cold the most?
- What does this tell you about the insulative properties of the material in the test gloves? In other words, which material offered the most protection from the cold?

Think about whales, walruses and other animals that often live in cold environments. Which material did you test that most closely resembles the blubber (insulating fat) found on these animals? Explain how you know.

Extensions

- Test additional materials for insulative properties.
- Test gloves in different temperatures of water (e.g., cold with ice, cold without ice, room temperature and warm).
- Research an animal that lives in extreme environments and make an argument defending a glove design that might further protect the animal.

The Science behind the Activity

Because marine mammals are warm-blooded, they need to have some method of insulating themselves from the freezing cold water or they could not survive. A thick layer of fat (blubber) between their muscles and skin serves this purpose. Fat is an excellent insulator, keeping in their body heat, as students will discover in this activity. Blubber also serves as energy storage for the winter months when food sources are limited; some marine mammals do not eat at all during winter. Land mammals use a combination of fat and fur to help them survive cold winters.

One common misconception that students might have about insulation is that it “keeps the cold out”. Since energy flows in the direction from the warmer object to the cooler object (in other words, heat flows, not cold), it is more accurate to say that the insulating material keeps the heat in. Insulating materials greatly slow down the rate at which heat is conducted through the material, much in the same way that insulators prevents electricity from flowing through them. Different materials provide different insulating effects.