PRELIMINARY ACTIVITY FOR

Insulation Study

Insulation is an important component of energy-efficient buildings. Insulation reduces both the energy required for wintertime heating and summertime cooling. Fiber glass, rock wool, cellulose, polyurethane foam, polystyrene foam, and foil-faced paper, polyethylene bubbles, and plastic film are common insulation materials. Basic insulation forms include blanket (batts or rolls), loose-fill, spray-applied, rigid insulation, and reflective systems.

In the Preliminary Activity, you will monitor the temperature of a bottle of warm water as it cools for three minutes and determine its cooling rate.

After completing the Preliminary Activity, you will first use reference sources to find out more about insulation before you choose and investigate a researchable question. Some topics to consider in your reference search are:

- insulation
- thermal insulation
- R-value
- energy efficiency
- energy-efficient technologies
- superinsulation

Later, you will use the class research results as you insulate the bottle in preparation for a contest to see which group can make the best-insulated bottle, as determined by lowest cooling rate.

PROCEDURE

1. Connect the Temperature Probe and the data-collection interface.
2. Obtain a small bottle and a one-hole rubber stopper that fits the bottle. Insert the Temperature Probe into the rubber stopper.
3. Fill the bottle with hot tap water. Insert the rubber stopper and Temperature Probe into the bottle.
4. Observe the temperature readings. When the readings begin to drop, start data collection.
5. When data collection stops, use the Linear Fit function to determine the cooling rate (slope). Record the cooling rate (in ºC/s).

QUESTIONS

1. What was the cooling rate of your water in the Preliminary Activity?

2. Identify two materials commonly used to insulate homes in your area.

3. List at least one researchable question for this experiment.