

Super Plastic

Student Handout



Introduction

Many building materials have a high R-value, which is the measure of the material's ability to resist the flow of heat through it. Some examples of typical R-values recommended for home construction are listed below.

Location	R-value
Ceiling	R-44
Outside Wall	R-22
Basement	R-11

In the following activity you will compare the R-value of 3 similar appearing sheets of clear plastic. Clear plastic has been used for years in and around the home. Plastic wrap is very versatile and is used in a variety of applications. Each year many South Dakotans place plastic on windows and the sides of their homes to help reduce the amount of energy needed to maintain a comfortable environment. Plastic is used in new construction as a vapor barrier, increasing the R-value. Special types of plastic can be used to cover foods for potlucks and picnics.

Materials:

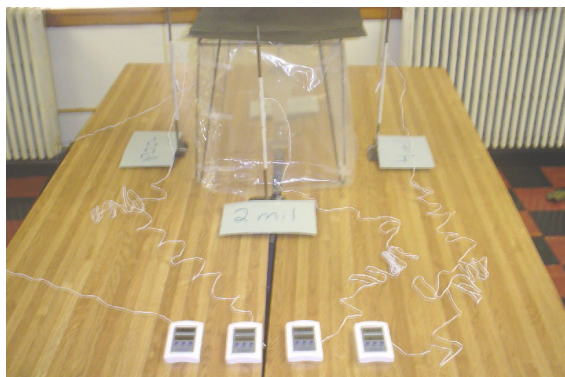
- 3 - Different types of clear plastic (indicate the type using a marker)
- 1 - Heat source (lamp and bulb) - ***Careful risk of burn***
- 1 - Device to hold the plastic wrap
- 4 - Thermometers (optional if choose qualitative approach of feeling difference with skin)
- 1 - Stopwatch (optional - could use a clock)
- 1 - Roll of tape
- 1 - Permanent marker

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Procedure

1. Gather all of the materials.
2. Use a marker to indicate the type of plastic used.
3. Attach three different sheets of clear plastic to the holder using the tape. (4th side is the control - no plastic)
4. Place the heat source in the center of the holder – the heat source should be approximately 12 inches from the sheets of plastic.
5. Place the bulb of thermometers approximately 1-2 inches from the outside edge of the plastic. (estimated distance for control)
6. Record an initial temperature reading. (Data table 1)
7. Turn on the light.
8. Take a temperature reading every minute for ten minutes (data table 1)
9. Clean your area per teacher's request.

A typical setup is shown below (your setup may look different)



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Data Table #1

Trial #	Control	Material #1	Material #2	Material #3
1. (Initial)				
2. (1min)				
3. (2min)				
4. (3min)				
5. (4min)				
6. (5min)				
7. (6min)				
8. (7min)				
9. (8min)				
10. (9min)				
11. (10min)				

Data analysis (questions)

1. Use the information from Table #1 to construct a line graph. Construct the graph using graph paper or construct it using the computer (teacher preference.) Time should be used for the independent variable (X-axis); the temperature change is the dependent variable (Y-axis). The data obtained for the control and the three separate sheets of plastic should be graphed on the same graph. Four lines will be graphed.

2. Which piece of plastic had the highest R-value? _____
Explain your choice. _____

3. What are some practical uses for clear plastics with higher R-values? _____

Extension

4. Many South Dakotans use plastic to cover the ground in their rock gardens to prevent weed growth. A dark black plastic is a better choice for this type of application than a clear plastic. Why? _____

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