



Temperature-controlling textiles investigation

Education in Chemistry

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Get a feel for the high-tech fabrics that can help us maintain our preferred temperature.

Make a smart jacket

Use the smart textile context to investigate the insulating properties of various materials including some mentioned in the article. Which material makes the warmest jacket? This activity can be used alongside teaching thermal insulation in physics, with a science club or as an activity to generate and evaluate data.

Teacher notes

In this activity students make jackets for glass bottles using sandwich bags and different materials.

Consumables needed:

- Glass bottles
- Sandwich bags (sealable)
- Elastic bands
- Thermometers

Insulating materials to investigate:

- Charcoal
- Corks
- Aluminium foil
- Hydrogel
- Sand

Suggested method

If time permits and students already have the necessary skills, students can plan the experiment for themselves and consider the appropriate control variables. Below is a suggested method:

1. Prepare the jackets for the bottles by filling the sandwich bags with each material and sealing them. Care should be taken to make sure the bags are sufficiently filled so that the materials don't fall to the bottom when they are stood up.
2. Decide on the volume of water to be used in the investigation, measure this volume of hot water out and place in the bottle. This will be the control experiment.
3. Take the temperature at time = 0 mins. Then take the temperature at 30-second intervals for 8 minutes. (These values can be plotted onto a prepared set of graph axes to allow a trend to be seen.)
4. Empty the bottle ready to begin a new experiment. Secure one of the smart jackets to the bottle using an elastic band. Measure out the same volume of hot water as in the control experiment. Take the temperature at time = 0 mins and at 30-second intervals for 8 minutes.
5. Repeat the above procedure for the other jackets.
6. Look at the data from the experiment. Which is the best jacket? Explain your answer making reference to your results.

Differentiation: A prepared results table is available to download to support students who find organising their results challenging.