This week has been a bit of a shock – weather wise that is! Only in southern Alberta can we go from plus temperatures wearing light sweaters to bone chilling temperatures in a matter of hours. What has really affected us this week though are the wind chill factors. The wind chill factor is not an actual temperature, but a measure of how quickly heat is lost from an object. An algebraic formula is used to determine wind chill. The wind chill formula was revised and implemented by the National Weather Service and the Canadian Weather Service in 2001. To learn more about wind chill, check out this website: http://www.ec.gc.ca/meteo-weather/default.asp?lang=n&n=5FBF816A-1#wc6 . This week we are going to investigate which material(s) protect us best against the wind chill. Let's get started.

***Remember to ask an adult before doing this experiment.**

Materials

fan
250 mL styrofoam cup
250 mL glass cup
250 mL ceramic coffee mug
250 mL insulated travel cup
250 mL plastic cup
five thermometers
measuring cup
kettle
boiling water
stop watch or timer
tray to hold the cups together
ruler
helper
notebook to store results

Procedure

1. In your notebook make a chart to track your results; you will have each of the five cups and will check the thermometer every 30 seconds.
2. Check and record the room temperature.
3. Plug in the kettle and boil the water. Make sure you have enough water to fill all of the cups at the same time.
4. Place the fan on a sturdy surface. Note: the fan must also be at the same level as the cups so the "wind" is blowing directly over them.
5. Measure 50 cm away from the fan and mark this spot. This is where you will have to place the cups.
6. Put the tray on the spot you marked. Place the cups side by side on the tray.

7. Once the kettle has boiled, using the measuring cup, measure 150 mL of water and pour into each of the five cups. Have a helper assist you in pouring the water into the cups as it will allow you to get it done quickly and to have more consistent results. **Be careful – the water can burn you!**
8. Immediately place a thermometer in each of the cups.
9. Turn the fan onto the highest setting.
10. Start your stop watch.
11. Check the thermometers ever 30 seconds and record the temperatures. Repeat until each cup reaches room temperature. Record this time and temperature.
12. A good scientist will repeat their experiment a couple more times to ensure their data is accurate!
13. Compare your results. Which cup was the best insulator?

Explanation

The fan is simulating the wind blowing on a cold day. By having the fan blow on the cup, you increase the movement of the air around it, which lets heat escape from the surface of the water. The fan also creates an interesting action to occur within the cup. As the heat escapes from the top layer of the cup, now the slightly cooler, denser liquid sinks to the bottom of the cup. This causes the hotter, less dense liquid to rise to the top of the cup, creating a convection current.

It is the wind chill caused by the fan blowing on your cups that helped the water to cool off. This is similar to the wind chill you will feel on your skin when you are outside. It feels much colder than the temperature you read on the thermometer.

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