
HEAT CONDUCTION EXPERIMENT WITH HOT WATER

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CLASS DESCRIPTION

In this class, students will determine what classroom/household items that a good and poor heat conductors.

TOTAL CLASS TIME: 90 minutes

CLASS OUTCOME

By the end of this class, students will identify materials that that are good conductors of heat, the level of heat transfer through the materials and see how plastic, metal, and wood compare in their ability to conduct heat.

INTRODUCTION

Heat conduction is when heat is transferred through molecular agitation or vibrates without any movement of the object as a whole. Heat can also be conducted from one material to another, like water to a spoon, through the water molecules vibrating against the spoon's molecules.



Essentially, as a molecule heats up, it moves and shakes quickly, then moves the other nearby molecules, which move and shake in turn. Bit by bit, heat is transferred through those moving',

shaking' molecules in a chain reaction. This may seem complicated, but it's simple to demonstrate with this heat conduction experiment as illustrated below.

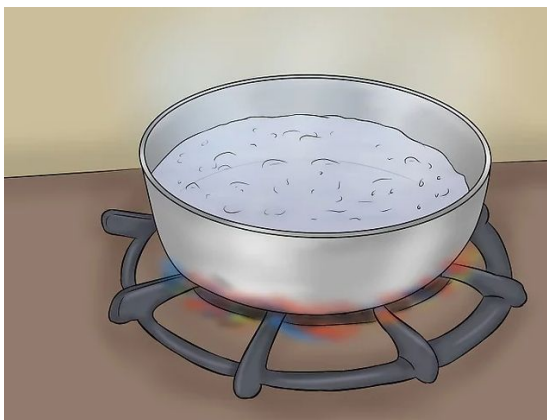
MATERIALS NEEDED

1. Hot water (at boiling or almost boiling point)
2. 3 spoons (wooden spoon, a plastic cooking spoon, and a regular metal spoon)
3. Butter
4. Container (pot, bowl etc)

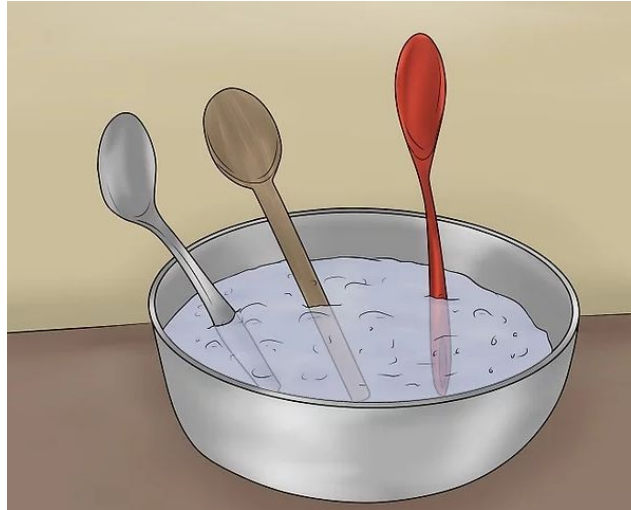


PROCEDURES

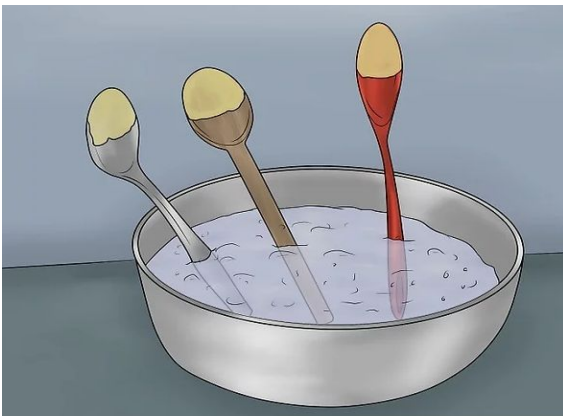
Step 1: Fill a cooking pot with water. Put pot of water on the hot stove/gas cooker.



Step 2: Place the 3 different spoons in the pot. Once the water is hot (boiling or near boiling).The bowl portion of the spoon should be comfortably out of the water and the bowl portion of the spoon should be at a diagonal. Try to make that diagonal as close to horizontal as possible by leaning the end of the handle that is in the water up against the side of the pot.



Step 3: Place butter on the spoons. Cut three slices of butter. You should cut them about a quarter inch each. Place one slice in each of the spoons. Make sure the butter don't slide into the water. Be careful not to touch the metal spoon as you place the butter on it.



Step 4: Wait a few minutes and check the butter. After about two minutes, come back and check the butter. Observe what happens to the butter in each spoon.

OBSERVATION/DISCUSSION

The butter on the metal spoon almost immediately melted away; the butter on the wooden spoon melted some; meanwhile, the butter on the plastic spoon stayed firm much longer. That's heat conduction at work. The heat was transferred by moving molecules within the spoons. The spoons themselves didn't move, but their molecules did.

This experiment also gives us some insight into what kinds of materials conduct heat well.

- Metal conducts heat better than wood, which conducts heat better than plastic.
- If you are using thermometers, check your thermometer readings after a few minutes. The same results will appear with specific numbers.

Now that you know metal is a better conductor of heat than plastic or wood. Now design an experiment to test other materials like glass and ceramics or fabrics against metal, wood and plastic. But this time don't use a pot of boiling water. Write up your hypothesis, materials, method, and results

REFERENCES

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