

Hot Stuff

Question

Can heat change matter from one form to another?

Setting the Stage

- Have a student team come up and huddle like the molecules in a solid. Tell them to pretend that they are on the beach and it is very, very hot and they are all hot and sticky. As they move apart, ask the class what they are doing (expanding). When they have expanded to a liquid form yell “Freeze!” Ask the class what form of matter they have become now (a liquid). Point out that they have loosened their bonds.
- Ask the molecule team to pretend that they are on fire, getting hotter and hotter. Allow them to run away, breaking their bonds. Then yell “Freeze!” Point out that they have expanded so much that they really stretched their bonds and are now a gas.
- Hold up three ice cubes, ask students what kind of matter this is. Place the ice cubes into a pan and heat them. When the ice has melted, hold up the pan and ask them what kind of matter they see now. Keep heating the pan until all of the water has evaporated. Turn the pan upside down and ask the students where the water went (the water turned into a gas and escaped into the air in the room). Discuss what happened (the heat made the solid molecules keep expanding until they had become a gas).

Materials Needed for Each Group

- newspapers
- three bowls
- three heat sources (e.g., lamp, flashlight, hair dryer, etc.)
- three ice cubes
- data-capture sheet (page 61)

***Note:** The teacher will need a pan, three ice cubes, and a hot plate for this demonstration.

Procedure

1. Record the time (to the minute) on your data-capture sheet.
2. Apply all of the heat sources to the ice cubes (e.g., turn on the lamp, flashlight, hair dryer). Be certain to hold all of them the same distance from the ice cube, in order to make a fair comparison about which heat source will change the matter fastest.
3. When all of your ice cubes have changed into a liquid, say “Time!” and the timer will tell you what time it is now. The data-capture sheet person must record the time and compute how many minutes have passed.
4. Complete the graph.

Extensions

- Have students look for examples of heat changing matter at home.
- Sit cups of water by the heater or in the sun. Have students mark the water line each day. Have them draw on the observation chart and draw conclusions about what happened to the water.

Hot Stuff *(cont.)*

Extensions *(cont.)*

- Have students write a story about the molecules in a snowman and what happens to them as the snowman sits all day in the sun.

Closure

- Discuss what happened to the solid molecules, emphasizing that in every case, it was heat which changed the matter. Have teams act out what happened.
- Make a science journal entry under “Principles of Matter”—“Heat can change matter from one form to another.”

The Big Why

After acting out what happens to molecules when they get hot, students conduct an investigation in which they change the form of matter by applying various forms of heat.



Hot Stuff (cont.)

Team Name _____ Date _____

Heat Source	Time Heat Was Applied	Time Ice Melted	Time It Took Ice to Melt
Flashlight	_____	_____	_____ minutes
Lamp	_____	_____	_____ minutes
Hair Dryer	_____	_____	_____ minutes

1. Which heat source melted the ice first? _____
2. What observations have you made that explain why that heat source may have made the ice melt first? _____
3. Which heat source melted the ice last? _____
4. What observations have you made that explain why that heat source did not work as fast as the other two? _____