Lab: Ice Cube Race

FOR THE TEACHER

Summary
In this lab, students will investigate what factors can influence the change in state of matter from a solid to a liquid. They will have the opportunity to make a hypothesis and participate in the design and completion of an experiment.

Grade Level
Elementary School

Objectives
By the end of this lab, students should be able to
- Describe factors that affect how fast solids will change to a liquid.
- Construct a hypothesis statement that relates to the experiment.
- Understand that heat can impact the state of matter of a substance.

Chemistry Topics
- States of Matter
- Phase Changes
- Physical Properties

Time
Teacher Preparation: 10 minutes
Lesson: 55 minutes

Materials
Per group/student
- 1 ice cube in a zipped baggie
- timer

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Students should wash their hands thoroughly before leaving the lab.
- When students complete the lab, instruct them how to clean up their materials and dispose of any chemicals.
- Make sure the student’s hands are not wet when handling the ice cubes. The ice can stick to their skin causing burns.

Teacher Notes
- You may have to remind the students that this process will take time.
- Remember they are seeing what factors influence the ice to melt the fastest and slowest.
- Emphasize that heat is always necessary to melt, but depending on the conditions there are different amounts of heat necessary.
- You could relate this experiment to weather as well, tying in the Arctic and icebergs.
Procedure:

- Start off the lesson by asking your students these discussion questions:
  - Has anyone ever eaten ice cream on a hot summer day? What happens to it if it is not eaten quickly?
  - Have you ever left a glass of ice water out on the table? What happened to the ice?
  - Have you ever noticed what happens to frozen objects as they heat up?
  - What happens to the amount of a substance if it is changed from a solid to a liquid?
  - Discuss what we can do to an ice cube to make it a liquid.
- Explain that we are going to conduct an experiment to melt ice cubes. As a class, brainstorm different ways that we can melt an ice cube and list them on the board. Remind your students that heat can change the state of matter and adding more heat might make the state of matter change faster.
- Ideas might include:
  - Placing it in a sunny spot/under a heat lamp
  - Warming it between your hands (winter/cotton gloves should be worn)
  - Breathing on it
  - Wrapping it in a towel
  - Placing it next to the window
  - Crushing it into more than one piece
- As a class, predict the answers to the following questions based on your suggestions:
  - Which method do you think will melt the ice cube the quickest?
  - How long do you think it will take?
- Introduce the scientific vocabulary word hypothesis to the students.
- Ask students to create a hypothesis statement including time predictions next to each of the methods that the class will test.
- Give students the data sheet. Students should fill in the description of each of the melting methods they will test as well as the hypothesis for each.
- Assign each group with one or two of the above methods (depending upon age level of students).
- When all groups are ready, draw their attention to the timer (project the timer on a screen in the classroom if possible). Explain to students that everyone must start at the exact same time. You can make this a competition among groups within the class if you like!
- When each group has completely melted their ice cube, they will note how long it took to melt on their activity sheet.

Conclusion:

- Discuss and share results.
- Compare the estimated times and if the predictions were close.
- Students should share times and methods with the class, discuss which experiments were most successful and what students might change/improve.
- Discuss what factors would turn the water back into an ice cube.

Extension:

- Review or introduce concepts of independent and dependent variables and identify them in the experiments.
- Experiment with another type of solid - try melting chocolate chips or butter. The kids love it.
- You can also have students use the National Center for Education Statistics website to graph the class results.
**FOR THE STUDENT**

**Lesson**

**Student Data Sheet: Ice Cube Race**

Complete the tables below, before and during your experiment(s):

<table>
<thead>
<tr>
<th>Method #1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of Melting Method:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis and time prediction:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Observations/sketch after 5 minutes</strong></td>
<td><strong>Observations/sketch after 10 minutes</strong></td>
<td><strong>Observations/sketch At the end</strong></td>
</tr>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Method #2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of Melting Method:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis and time prediction:</strong></td>
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</tbody>
</table>

**Analysis**

1. What method(s) did you use to add heat to your ice cube?

2. How could you get your water back to a solid state?

3. After our class discussion on how others melted their ice cube, what are some common factors that groups need to do to melt their ice cube?

4. How could you improve your experiment if you were to do it again in the future?