Chemical and Physical Changes in Your Kitchen

Annotation
This lab helps students to understand the difference between chemical and physical changes. Students perform common household tasks like melting chocolate. They then have to determine what kind of change occurred during the task. Answers are not always as straightforward as those given in textbooks. Lab is geared toward Physical Science Students.

Primary Learning Outcome:
Students will be able to identify the five indications that a chemical change has taken place.
Students will be able to determine the difference between a physical and a chemical change.

Additional Learning Outcomes:
Students will become familiar with using a hotplate
Students will create a data table

Assessed QCC:
Characteristics of Matter
Use of Scientific Tools
Habits of Mind

Total Duration:
45 minutes

Materials and Equipment:
1. Aluminum foil
2. 3 hotplates or Bunsen burners
3. Disposable wooden stirring sticks
4. Glass stirring rods
5. Chocolate bars or kisses (Students tend to eat more chocolate than anything else. So, buy extra.)
6. Marshmallows
7. Alka-Seltzer
8. Ice cubes
9. Salt
10. Erlenmeyer flasks
11. Plastic Cups
12. Salt
13. Water

Procedures:
Set up
Set up four stations around the room with the following supplies
Station 1
  Marshmallows
  Hotplate
  Aluminum Foil
  Disposable wooden stirring sticks

Station 2
  Ice
  Hotplate
  Erlenmeyer flask
  Glass stirring rod

Station 3
  Salt
  Water
  2 plastic cups or Erlenmeyer flask
  Glass stirring rod
  Alka-Seltzer

Station 4
  Chocolate
  Hotplate
  Aluminum Foil
  Disposable wooden stirring sticks

Lesson Materials Attached at the end:
  Directions for each station
  Student instruction sheet
  Data sheet
  Sample grading key

Assessment:
Data sheet and definitions will be graded
A sample grading key is attached

Extension:
An additional station can be added for advanced students. This station involves changes which occur when popping popcorn. A bag of microwave popcorn should be pre-popped. Students can investigate the differences between popped and unpopped kernels. When popcorn is popped, liquid inside the kernel is changed to steam. Pressure from the steam builds up inside the kernel. When the pressure reached a critical stage the kernel pops turning itself inside out. This is a physical change.

Remediation:
A teacher can demonstrate the lab instead of having the students being responsible for completing each task.

Accommodation:
A teacher can demonstrate the lab instead of having the students being responsible for completing each task.
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Rules of Engagement/Plan of Attack:

There are 5 stations. Each station may have more than one task. There are a total of 10 tasks. Visit each station during the lab period and complete all of the tasks. There are procedures for each station taped next to the object you will be looking at. Make sure you include description, observations, and type of change for each task.

Data Collection:

Visit each station and fill in the data table for each task.

Evidence of a Chemical Change

1. Unexpected color change
2. Change in odor
3. Unexpected temperature change
   a. Endothermic - heat is absorbed. (feels cooler)
   b. Exothermic - heat is released. (feels hotter)
4. Gas bubbles appear
5. Electricity is generated
6. Light is produced
7. Fire is produced
8. A solid forms when two liquids are mixed

Post-Lab:

On the back of your data table, write two sentences, one describing what a physical change is and one describing what a chemical change is.
• Station 1:
  o Eat a marshmallow. Place a few marshmallows in a cupcake foil. Heat and stir on hotplate until melting is complete. Write observations. When cooled, taste the marshmallow and note any other observations or comparisons.
  o Continue to heat the marshmallow over the hotplate until it gets good and crusty. Write observations. When cooled, taste and note any other observations and comparisons.
  o Rip a marshmallow in half. Put it back together. Write observations.

• Station 2:
  o Lick the ice cube and taste the water. Write observations.
  o Melt the ice cube until it begins to boil and evaporate. Write observations.
• Station 3:
  o Dissolve some salt into a cup of water. Taste the salt water. Make observations.
  o Place an Alka-Seltzer® tablet in a cup of water and observe the release of carbon dioxide gas. **Do not taste.** Write observations.

• Station 4:
  o Eat a rectangle of chocolate. What happens when you eat the chocolate? Make observations.
  o Place another piece of chocolate in a cupcake foil and melt the chocolate. Let the chocolate cool and taste. Write observations.
  o Proceed to heat the piece of chocolate until it is good and crusty. Let chocolate cool and taste. Write observations.
<table>
<thead>
<tr>
<th>Station</th>
<th>Describe what was done to change the food at each task</th>
<th>Observed Affect</th>
<th>Physical or Chemical Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex</td>
<td>Ex. Mash Cooked Potatoes</td>
<td>Ex. Smoother consistency, tastes the same</td>
<td>Ex. Physical</td>
</tr>
<tr>
<td>1</td>
<td>Melt marshmallow</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burn marshmallow</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rip marshmallow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Melt ice</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boil water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaporate water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dissolve salt in water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dissolve Alka-Seltzer in water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Melt chocolate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burn chocolate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Grading sample

<table>
<thead>
<tr>
<th>Station</th>
<th><strong>Describe what was done to change the food at each task</strong></th>
<th><strong>Observed Affect</strong></th>
<th><strong>Physical or Chemical Change</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex</td>
<td>Ex. Mash Cooked Potatoes</td>
<td>Ex. Smoother consistency, tastes the same</td>
<td>Ex. Physical</td>
</tr>
<tr>
<td>1</td>
<td>Melt marshmallow</td>
<td>Changed to a liquid, tastes the same</td>
<td>Physical</td>
</tr>
<tr>
<td></td>
<td>Burn marshmallow</td>
<td>Became crusty, tastes different/burnt</td>
<td>Chemical</td>
</tr>
<tr>
<td></td>
<td>Rip marshmallow</td>
<td>Change in size only</td>
<td>Physical</td>
</tr>
<tr>
<td>2</td>
<td>Melt ice</td>
<td>Changed from a liquid to a solid</td>
<td>Physical</td>
</tr>
<tr>
<td></td>
<td>Boil water</td>
<td>Bubbles formed</td>
<td>Physical</td>
</tr>
<tr>
<td></td>
<td>Evaporate water</td>
<td>Changed from a liquid to a gas</td>
<td>Physical</td>
</tr>
<tr>
<td>3</td>
<td>Dissolve salt in water</td>
<td>Salt disappeared, tasted salty</td>
<td>Physical</td>
</tr>
<tr>
<td></td>
<td>Dissolve Alka-Seltzer in water</td>
<td>Bubbles formed without the application of heat</td>
<td>Chemical</td>
</tr>
<tr>
<td>4</td>
<td>Melt chocolate</td>
<td>Changed to a liquid, tastes the same</td>
<td>Physical</td>
</tr>
<tr>
<td></td>
<td>Burn chocolate</td>
<td>Became hard and crusty, tastes different/burnt</td>
<td>Physical</td>
</tr>
</tbody>
</table>