Activity: Sweet Stoichiometry Reactions

FOR THE TEACHER

Summary
In this activity, students will use candy to investigate stoichiometry and mole-gram relationships in chemical equations. It could also be used to introduce the concept of limiting reactants.

Resource Type: Activity
Grade Level: High school

Objectives
By the end of this lesson, students
• Will have a better understanding of stoichiometry.
• Could have an understanding of limiting reactants.

Chemistry Topics
This lesson supports students’ understanding of
• Stoichiometry
• Limiting reactants

Time
Teacher Preparation: 30–45 minutes
Lesson: 50 minutes

Materials
For each group:
• Balance
• Bag with the following food items (at least):
  o Butterscotch pieces (2)
  o Peppermints (1)
  o Animal crackers (6)
  o Smarties (4)
  o Skittles (30)
  o Starbursts (2)
  o M&Ms (10)

Safety
• Food should never be consumed in a chemistry lab. Be sure to conduct this activity away from a lab setting.
• Do not allow food to be consumed after the investigation, especially if the food items come into contact with the balance.

Teacher Notes
• A plastic bag of food items can be prepared by the teacher ahead of time. Suggested quantities are listed in the materials section. The quantities in the materials section are
enough food for no excess chemical in each reaction and match the exact ratios of the coefficients of each balanced equation.

- Each piece of food represents one mole of the symbol.
- Molar masses are determined by finding the mass of one chemical formula of food (ex: Bs = 1 butterscotch piece; S\textsubscript{4} = 4 smarties).

**FOR THE STUDENT**

**Student Activity Sheet: Sweet Stoichiometry Reactions**

**Lesson**

Complete the following table using the candy provided. Do not unwrap or eat any candy. Complete the missing information in the table.

<table>
<thead>
<tr>
<th>Element/Compound</th>
<th>Symbol</th>
<th>Molar Mass (g/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butterscotch</td>
<td>Bs</td>
<td></td>
</tr>
<tr>
<td>Peppermint</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Pepperscotch</td>
<td>Bs\textsubscript{2}P</td>
<td></td>
</tr>
<tr>
<td>Animal Cracker</td>
<td>Ac</td>
<td></td>
</tr>
<tr>
<td>Smarties</td>
<td>S\textsubscript{4}</td>
<td></td>
</tr>
<tr>
<td>Animartie</td>
<td>Ac\textsubscript{3}S\textsubscript{2}</td>
<td></td>
</tr>
<tr>
<td>Skittle</td>
<td>Sk\textsubscript{2}</td>
<td></td>
</tr>
<tr>
<td>Starburst</td>
<td>Sb</td>
<td></td>
</tr>
<tr>
<td>Skittleburst</td>
<td>Sk\textsubscript{2}Sb\textsubscript{2}</td>
<td></td>
</tr>
<tr>
<td>M&amp;M’s</td>
<td>Mm\textsubscript{5}</td>
<td></td>
</tr>
<tr>
<td>Mmittle</td>
<td>MmSk\textsubscript{3}</td>
<td></td>
</tr>
</tbody>
</table>

Use the candy in the bag to illustrate each reaction and answer the questions.

1. Butterscotch reacts with peppermint to form pepperscotch.
   a. Write the balanced equation.
   b. How many moles of pepperscotch can be formed by the elements in the bag?
   c. How many moles of butterscotch were used?
   d. How many moles of peppermint were used?
   e. If 18 moles of pepperscotch were produced, how many moles of butterscotch and how many moles of peppermint were used in the reaction?
   f. How many grams of pepperscotch can be produced if you start with 50.0 g of butterscotch?
   g. How many moles of pepperscotch can be made with 48.0 g of peppermints?
2. Animal cracker reacts with smarties to form animartie.
   a. Write the balanced equation.
   b. How many moles of animarties can be formed by the elements in the bag?
   c. How many moles of animal cracker were used?
   d. How many moles of smarties were used?
   e. How many moles of animarties can be made from 12.75 mols of animal crackers?
   f. How many grams of animarties can be made from 31.90 mols of smarties?

3. Starbursts react with skittles to from a skittleburst.
   a. Write the balanced equation.
   b. How many moles of skittlebursts can be formed by the elements in the bag?
   c. How many moles of starburst were used?
   d. How many moles of skittles were used?
   e. How many grams of skittlebursts can be made from 42.65 g of starburst?
   f. How many moles of skittles are needed to make 23.3 mols of skittlebursts?

4. M&M’s reacts with skittles to form a mmittle.
   a. Write the balanced equation.
   b. How many moles of mmittles can be formed by the elements in the bag?
   c. How many moles of M&M’s were used?
   d. How many moles of skittles were used?
   e. How many moles of mmittle can be made with 60.0 g of skittles?
   f. How many moles of M&M’s are required to make 35 mols of mmittles?