Lab: Limiting Reactant Candy Lab

FOR THE TEACHER

Summary
In this lab, students will understand what is meant by the term, "limiting reactant" and be able to identify the limiting reactant in a non-chemistry situation.

Grade Level
High School

Objectives
By the end of this lesson, students should be able to
- Understand the concept of limiting reactants on a conceptual level.

Chemistry Topics
This lesson supports students’ understanding of
- Limiting reactant

Time
Teacher Preparation: 10 minutes
Lesson: 45 minutes

Materials
For each group:
- 1 package of Reese’s peanut butter cups (2 cups/package)
- 4 pieces of fruit slices candy
- 1 sleeve of SweetTarts
- 1 mini package of Nerds
- 4 gummy worms
- 5 Dove chocolates
- 5 mini KitKats bars

Safety
- Food should never be consumed in a lab setting. If students are permitted to consume the reactants at the completion, the activity should be carried out in a nonlab setting.

Teacher Notes
- I use this activity as an introduction to the concept of limiting reactant. Then for homework, students identify the limiting reactant in chemical reactions shown on a molecular level and then progress to identifying the limiting reactant based on the moles of each reactant.

FOR THE STUDENT
Lesson

Obtain the following materials on a plate:

<table>
<thead>
<tr>
<th>Material</th>
<th>Symbol</th>
<th>Part of Candy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Reese’s peanut butter cups package</td>
<td>Pb</td>
<td>head</td>
</tr>
<tr>
<td>4 fruit slices</td>
<td>Fs</td>
<td>mouth</td>
</tr>
<tr>
<td>1 SweetTarts package</td>
<td>Sw</td>
<td>eyes</td>
</tr>
<tr>
<td>1 Nerds package</td>
<td>N</td>
<td>nose</td>
</tr>
<tr>
<td>4 gummy worms</td>
<td>Gw</td>
<td>hair</td>
</tr>
<tr>
<td>5 Dove chocolates</td>
<td>D</td>
<td>body</td>
</tr>
<tr>
<td>5 KitKat packages</td>
<td>Kk</td>
<td>arms and legs</td>
</tr>
</tbody>
</table>

Open the packages and remove the individual candies. Do not allow any group members to eat your reactants. In the empty column of the table, indicate how many of each “chemical” you have. For example, when you open the Nerds package, you have more than one nerd; you may have 20, so you would write 20 N in the empty column.

Work through the following questions to help you understand what is meant by the term **limiting reactant**.

1. Create candy people using the reactants collected above. The balanced equation for this process is:
   \[
   \text{Pb} + \text{Fs} + 2 \text{Sw} + \text{N} + \text{Gw} + \text{D} + 4 \text{Kk} \rightarrow \text{PbFsSw}_2\text{NgwD}Kk_4
   \]
   a. Create as many products (candy people) as possible using the reactants you collected. The specific purpose of each piece of candy is noted in the materials section. Draw your products in the box below along with any leftover reactants.

   ![Product Box](image)

   b. How many products (candy people) did you make using the reactants?
   c. What reactants do you have leftover?
   d. Which reactant limited the number of candy people you could form? In a chemical reaction this reactant is called the **limiting reactant**.

2. Now create your own candy reaction using the reactants collected.
   a. Write the balanced equation for the process. Use the symbols from the table
above, but you don’t have to create people.
b. Create as many products as possible using the reactants you collected.

   Draw your products in the box below along with the leftover reactants.

c. How many products can be formed using the reactants?
d. Which reactants do you have leftover?
e. Which reactant(s) limited the number of products you could form? (What "chemical" is the limiting reactant?)

**Conclusion**
In two sentences, summarize what you understand by the phrase limiting reactant in your own words.