Lab: It’s Time to React
FOR THE TEACHER

Summary
In this lab, students will conduct four chemical reactions and analyze each for indicators of a chemical reaction. Based on their observations students will write a balanced chemical equation for each reaction as well as identify the reaction type for each reaction.

Grade Level
High School

AP Chemistry Curriculum Framework
This lab supports the following unit, topics and learning objectives:

- **Unit 4: Chemical Reactions**
  - **Topic 4.1: Introduction for Reactions**
    - TRA-1.A: Identify evidence of chemical and physical changes in matter.
  - **Topic 4.2: Net Ionic Equations**
    - TRA-1.B: Represent changes in matter with a balanced chemical or net ionic equation: a. For physical changes. b. For given information about the identity of the reactants and/or product. c. For ions in a given chemical reaction.
  - **Topic 4.7: Types of Chemical Reactions**
    - TRA-2.A: Identify a reaction as acid-base, oxidation-reduction, or precipitation.

Objectives
By the end of this lab, students should be able to

- Carry out basic chemical reactions.
- Identify indicators of a chemical reaction.
- Write a balanced chemical equation based on their observations and the materials used.

Chemistry Topics
This lab supports students’ understanding of

- Chemical Reactions
- Chemical Change
- Balancing Chemical Equations
- Classifying Chemical Reactions

Time
Teacher Preparation: 20 minutes
Lesson: 50 minutes

Materials
(Per Group)

- Butane Lighter
- Candle
- Watch glass
- Plastic spoon or scoopula
- Baking soda
- 0.10M Hydrochloric acid in dropper bottle
Vinegar in dropper bottle  
Small test tube  
Ruler  
Test Tube Rack or small beaker  
Zinc (one small piece)  
Water

Safety
- Always wear safety goggles when handling chemicals in the lab.  
- Wash your hands thoroughly before leaving the lab.  
- When students complete the lab, instruct them how to clean up their materials and dispose of any chemicals.  
- Always use caution around open flames. Keep flames away from flammable substances.  
- Always be aware of an open flame. Do not reach over it, tie back hair, and secure loose clothing.  
- Open flames can cause burns. Liquid wax is hot and can burn the skin.  
- When working with acids if any solution gets on your skin immediately rinse the area with water.

Teacher Notes
- I prepare the materials on trays for each group of students, this helps to keep the lab organized and timely.  
- Students may need to be told that acetic acid should be used when writing the chemical equations involving vinegar in reaction #3.

FOR THE STUDENT

Lesson

It’s Time to React

Objective
In this lab you will conduct four chemical reactions and analyze each for indicators of chemical change. Based on your observations you will write a balanced chemical equation for each reaction as well as identify the reaction type for each reaction.

Materials
- Butane Lighter  
- Candle  
- Watch glass  
- Plastic spoon or scoopula  
- Baking soda  
- 0.10M Hydrochloric acid  
- Vinegar  
- Small test tube  
- Ruler  
- Test Tube Rack or small beaker  
- Zinc  
- Water
Safety
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow the teacher’s instructions for cleanup of materials and disposal of chemicals.
- Always use caution around open flames. Keep flames away from flammable substances.
- Always be aware of an open flame. Do not reach over it, tie back hair, and secure loose clothing.
- Open flames can cause burns. Liquid wax is hot and can burn the skin.
- When working with acids if any solution gets on your skin immediately rinse the area with water.

Procedure
1. Collect a tray of lab materials.

Reaction #1:
2. You will first use the butane lighter. Pressing down on the lever at the top will light it. The formula for butane is C₄H₁₀.
3. Find the candle on the tray and use the butane lighter to light the candle. The candle wax follows the formula C₂₄H₅₀.
4. Record your observations in the table below.
5. Blow out the candle and return the materials to the tray.

Reaction #2:
6. Next, take the watch glass from the tray and use the plastic spoon or scoopula to place a small amount of baking soda onto the watch glass.
7. Find the bottle of HCl and using the eye dropper to put a few drops of HCl onto the baking soda.
8. Record your observations in the table below. Note: For this reaction there will be 3 products formed.
9. Wash the watch glass with water and dry it.

Reaction #3:
10. Use the plastic spoon to put another small amount of baking soda onto the watch glass.
11. Using the bottle of vinegar and the eye dropper attached to it to place a few drops of vinegar onto the baking soda.
12. Record your observations in the table below. Note: This reaction will also have 3 products.

Reaction #4:
13. Add approximately 3 cm of HCl to the test tube.
14. Stand the test tube up in the test tube rack.
15. Take the small piece of zinc from the zip lock bag and drop it into the HCl.
16. After the reaction has progressed a few minutes, light the candle and bring the candle flame to the top of the test tube.
17. Record all of your observations in the table below.
18. Carefully pour the liquid from the test tube into the large waste beaker, not down the sink!
19. Clean the test tube and watch glass and put everything back into your tray and put the tray on the front lab table.
## Observations

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Chemical Formula for Reactants</th>
<th>Indicators of a Chemical Reaction observed</th>
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## Analysis

Write a balanced equation for each of the reactions and identify what type of reaction occurred (synthesis, decomposition, single replacement, double replacement, combustion).

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Balanced Chemical Equation</th>
<th>Type of Reaction</th>
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