

Title: Chemistry is Everywhere
Subject/Grade: Science, Grade 7
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Lesson Plan Summary: In this hands-on lesson plan, students will observe chemical and physical changes, compare and contrast chemical and physical changes, and observe the signs of a chemical reaction.

Objectives:

The student is expected to:

- Identify and demonstrate everyday examples of chemical phenomena such as rusting and tarnishing of metals and burning of wood. **§112.23. Science (7)(A).**
- Describe physical properties of elements and identify how they are used to position an element on the periodic table. **§112.23. Science (7)(B).**
- Recognize that compounds are composed of elements **§112.23. Science (7)(C).**

Materials: Worksheets (attached)

○ Hydrochloric acid 1 M	○ Distilled water
○ Zinc	○ Test tubes
○ Baking soda	○ Sodium hydroxide 1 M
○ Acetic acid (vinegar)	○ Ice
○ Magnesium ribbon	○ Lead
○ Salt	○ Hot plate
○ Copper	○ Bunsen burner
○ Potassium iodide 1 M	○ Blue Litmus paper
○ Lead (II) nitrate 1 M	○ Red Litmus paper

Introduction

Lecture:

1. Start the class by explaining the difference between a physical and chemical change (i.e., in a chemical change, new matter is produced).
2. Pass out LAB DATA SHEET: PHYSICAL AND CHEMICAL CHANGES.
3. Ask the students to give examples of physical changes, and write these examples on the board.
4. Review physical properties (mass, volume, malleability, heat and electric conductivity, color, density, state of matter).
5. Explain that physical properties describe physical changes.
6. Review chemical properties (flammability, reactivity, and oxidation).
7. Explain that chemical properties describe chemical changes.
8. Ask the students to give examples of chemical changes, and write these examples on the board.
9. Name different examples of change, and ask the students to classify them as chemical or physical changes.
10. Show the periodic table and explain why elements are in certain positions, briefly summarizing some physical and chemical properties of each group of periodic table.

11. Show different chemical reactions by example or by photos:
 - a. Alka-Seltzer in water
 - b. Burning gasoline
 - c. Leaves in autumn
 - d. Rusting of a metal
12. Ask the students what they observed in each chemical reaction.
13. Guide the students to identify the signs which give evidence for chemical reactions.
 - a. Gas formation (fizzing/bubbles)
 - b. Change in light or energy (hot, cold)
 - c. Change of color
 - d. Precipitate formation (solid)
14. Show some examples of chemical compounds and allow the students to identify the elements present in each example.
15. Explain that when writing elements, the first letter is always capitalized and, if the element's symbol has two letters, the second one should be in lowercase. This will help the students better identify each element.

Lab Demonstration: Chemical and Physical Changes

Procedure:

1. Label the test tubes with numbers 1-9.
2. Mix the following chemicals in separate test tubes
 - a. Baking soda and vinegar (gas formation)
 - b. Magnesium heated in a flame (light)
 - c. Iron sulphate and copper (change of color and precipitate)
 - d. Potassium iodide and lead (II) nitrate (precipitate)
 - e. Zinc with Hydrochloric acid (gas formation)
 - f. Sodium hydroxide and Hydrochloric acid (gas formation and exergonic)
 - g. Heat some ice
 - h. Heat a small piece of lead until melt it
 - i. Dissolve water and salt
3. Test with the red and blue litmus paper the baking soda
4. Test with the red and blue litmus paper the vinegar
5. Test with the red and blue litmus paper the products of the reaction on test tube 1
6. Test with the red and blue litmus paper the hydrochloric acid
7. Test with the red and blue litmus paper the sodium hydroxide
8. Test with the red & blue litmus paper the products of the reaction on test tube 6.
9. Write down all observations.

Assessment Activities

1. Laboratory Data Sheet: Physical and Chemical Changes
2. Extra Activity: Physical and Chemical Changes
3. Homework: Ask the student to write down a list of chemical reactions that they encounter in their everyday life during a week; ask them to describe observations and state the signs that support the evidence of chemical reaction.

Physical and Chemical Change

Classify the following examples as physical or chemical changes.

	Example	Type of change
1.	Food digestion	
2.	Dissolve salt and water	
3.	Boiling water	
4.	Bake a cake	
5.	Get a hair cut	
6.	Preparing a coffee	
7.	Rusting of your old bicycle	
8.	Burning charcoal	
9.	Cooking an egg	
10.	The gasoline combustion in the car	
11.	Cut a sheet of paper	
12.	Burning sugar (caramel)	
13.	Light a match	
14.	Melt a candle	
15.	Glass breaking	
16.	Hammering iron	
17.	Melting butter	
18.	Spoiling food	
19.	Fireworks exploding	
20.	An apple that turns brown	

Procedure

- Label the test tubes with numbers 1-9
- Mix the following chemicals in separate test tubes
 1. Baking soda and vinegar
 2. Magnesium heated in a flame
 3. Iron sulphate and copper
 4. Potassium iodide and lead (II) nitrate
 5. Zinc with Hydrochloric acid
 6. Sodium hydroxide and Hydrochloric acid
 7. Heat some ice
 8. Heat a small piece of lead until melt it
 9. Dissolve water and salt
- Test with the red and blue litmus paper the baking soda
- Test with the red and blue litmus paper the vinegar
- Test with the red and blue litmus paper the products of the reaction on test tube 1
- Test with the red and blue litmus paper the hydrochloric acid
- Test with the red and blue litmus paper the sodium hydroxide
- Test with the red and blue litmus paper the products of the reaction on test tube 6.
- Write down all observation

Data Table 1

Describe the appearance of the reactants

Compound	State of matter	Color
Hydrochloric acid		
Zinc		
Baking soda		
Acetic acid		
Magnesium		
Salt		
Copper		
Potassium iodide		
Lead (II) nitrate		
Distilled water		
Lead		
Sodium hydroxide		
Ice		

Data Table 2

Write the observations and classify them as chemical or physical change.

Test tube	Reactions	Observations (bubbles, change of temperature, change of color, solid formation)	Type of change
1.	Baking soda and vinegar		
2.	Magnesium heated in a flame		
3.	Iron sulphate and copper		
4.	Potassium iodide and lead (II) nitrate		
5.	Zinc with Hydrochloric acid		
6.	Sodium hydroxide and Hydrochloric acid		
7.	Heat some ice		
8.	Heat a small piece of lead until melt it		
9.	Dissolve water and salt		

Data Table 3

Register any color change in the litmus paper

Test	Compound	Red litmus paper	Blue litmus paper
1	Baking soda		
2	Vinegar		
3	Test tube 1		
4	Hydrochloric acid		
5	Sodium hydroxide		
6	Test tube 2		

Data Analysis and conclusions

1. Did you find any difference in the properties of reactants and products? If yes in which cases?
2. With the information from Data Table 3, What can you conclude?

3. Find out the formula of each compound and elements used during this lab practice.

Name	Formula
Hydrochloric acid	
Zinc	
Baking soda	
Acetic acid	
Magnesium	
Salt	
Cooper	
Potassium iodide	
Lead (II) nitrate	
Distillated water	
Lead	
Sodium hydroxide	
Ice	