Periodic Table Lab

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Student Guide

Objective:

In this laboratory, you will explore precipitation reactions of halide salts and test the reactivity of a set of metals.

TN State Standards: **7.PS1.5** Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter.

Safety First: Read the following passage on safety. Then, answer the questions below.

Students should not eat, drink, or chew gum in the lab. Avoid contact with any of the chemicals used in this lab. Be particularly careful with silver nitrate, which will stain skin and clothing.

Chemicals included in this kit may irritate eyes, skin, and mucous membranes and may be harmful if swallowed. Avoid ingestion of chemicals. Hydrochloric acid can burn skin and eyes, and must always be handled with caution. Always use proper safety equipment (e.g., goggles and any other equipment as instructed) to avoid contact with chemicals. Use forceps to transfer and handle calcium turnings and magnesium ribbon.

Calcium turnings, magnesium ribbon and sulfur powder are flammable solids and must be kept away from sparks, flame, and other ignition sources. Both the calcium turnings and magnesium ribbon are sensitive to moisture.

1. Why can't we eat or drink in the lab?

2. Why is it a bad idea to touch your eyes during a lab?

3. Why do we need to be careful with silver nitrate?

4. What can Hydrochloric acid do to harm us?

Note: Each student should be wearing goggles. All groups will be given a marker board periodic table and an expo marker with which they should keep track of which elements they are exploring.

Activity 1: The Halide Family

Materials: (per group)

- 2 medicine cups, each with 10 drops of 0.1 M AgN03
- 0.1 M KBr (bottle may be shared by two groups)
- 0.1 M KI (bottle may be shared by two groups)
- White paper

Procedures:

1. Label your paper with one space for KBr and one for KI. Once you have your cups, place the cups on the paper near their name.
2. Add 10 drops of 0.1 M KBr to the medicine cup labeled *KBr*.
3. Record your observations on your data sheet in Table 1.
4. Add 10 drops of 0.1 M KI to the medicine cup labeled *KI.* Record your observations on your data sheet in Table 1.
5. When all observations are complete and recorded in the table, dispose of the medicine cup contents as instructed by your teacher.

Results: **Table 1**

	KBr	**KI**
$AgN0_3$		

Discussion: Answer the questions below as soon as you are finished with the lab.

I. In which areas of the periodic table are potassium, iodine, and bromine located?

2. What was similar about the two reactions you performed in this activity? Why would these similarities exist?

3. What was different about the two reactions you performed in this activity?

4. Which of the following do you believe would form a precipitate with silver nitrate? Circle each one that you think will form a precipitate. Refer to your periodic table for help.

lithium bromide	lithium chloride
lithium iodide	lithium nitrate
potassium chloride	potassium nitrate
sodium bromide	sodium iodide
sodium nitrate	sodium chloride

Activity 2: Activity of Metals

Materials: (per group)

- 1 M HCl (bottle may be shared)
- 3 M HCl (bottle may be shared)
- Beaker of distilled or deionized water
- Pipet or dropper
- Forceps (may be shared)
- 24 well plate containing calcium turnings, copper shot, magnesium ribbon, and zinc shot

Procedures:

1. Orient the reaction tray so that it matches the diagram. Place it on top of your worksheet so that each well is labeled with what goes inside.
2. In your jelly tray are:
    a. Three small pieces of calcium turnings (should be handled with forceps)
    b. Three pieces of copper shot
    c. Three small pieces of magnesium ribbon (should be handled with forceps)
    d. Three pieces of zinc shot.
3. Use the pipette to add 20 drops of water into four wells in the second row. Be CAREFUL to not drip into the first row.
4. Carefully add 20 drops of 1 M HCl to four wells in the third row
5. Carefully add 20 drops of 3 M HCl to four wells in the fourth row
6. You will test each solid metal sample for reactivity with water. **Wait for your teacher to instruct you to do so.**
7. Use forceps to move one piece of calcium from the first row to the well with water below it. Observe. Repeat this step for two pieces of copper, one piece of magnesium ribbon, and one piece of zinc shot.
8. Observe the wells in row B for 2 minutes. Record your observations on the data sheet in Table 2. Note the rate of any reactions.

9. Repeat the two previous steps, testing for reactions with 1 M HCl in the third row.
10. Repeat again, testing for reactions with 3 M HCl in the fourth row.

Results: **Table 2**

	Calcium	**Copper**	**Magnesium**	**Zinc**
Reaction with water				
Reaction with 1 M HCI				
Reaction with 3 M HCI				

Discussion: Answer the following questions as soon as you are done with the lab.

1. In which areas of the periodic table are calcium, copper, magnesium, and zinc located?

2. List the metals calcium, copper, magnesium, and zinc in order of decreasing reactivity.

3. Why did you place the metals in the previous question in the order that you did?

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Results: **Table 1**

	KBr	**KI**
AgN03		

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2. What was similar about the two reactions you performed in this activity? Why would these similarities exist?

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Results: **Table 2**

	Calcium	**Copper**	**Magnesium**	**Zinc**
Reaction with water				
Reaction with 1 M HCl				
Reaction with 3 M HC1				

Discussion: Answer the following questions as soon as you are done with the lab.

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