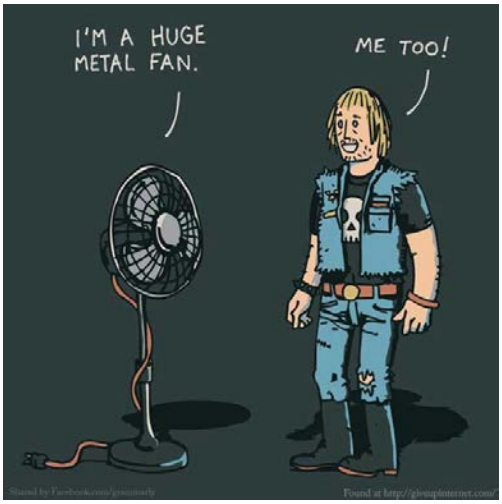
Reactivity Trends in the Periodic Table



Periodic trends include both physical and chemical properties of elements. In this investigation, find out if (and how) the reactivity of metals relates to their position on the periodic table.

Question

Is there a relationship between the reactivity of a metal and its position in the periodic table?

Materials

- Water
- 3 test tubes (small)
- Test tube rack
- Aluminum metal
- Pea sized piece of calcium
- Magnesium ribbon
- 1mol/L HCL
- Tweezers
- Wax crayon

Read the Procedure steps and design a table to record your observations. Draw Table Below. (Sample observations could include how fast, what it looks like, does the test tube feel warm?)

Procedure

1. Put 1 mL of water into each of the three test tubes (about an inch in a small test tube).
2. Label each test tube based on the metal that will be added
3. Add one metal to each test tube.
4. Record your observations in your data table.
5. When the reactions stop, dispose of the liquid as directed by your teacher.
    a. For each test tube you can dispose down the drain, ensure that the sink has a strainer to retrieve your metals
    b. The calcium must not be picked up by your hand, use the tweezers
    c. You are now finished with the calcium, please place it in the designated petri dish.
    d. Ensure you do not mix up the aluminum and magnesium as they will be used again.

6. You will use the magnesium and aluminum metals ONLY for the next step.
7. Add 1 mL of HCl to two test tubes labelled aluminum and magnesium
8. Add the magnesium and the aluminum to the appropriate test tube
9. Record your observations and indicate the relative reactivity of each metal. CAUTION: Be very careful when working with the hydrochloric acid. Acid can burn skin. If you spill any of the acid solution on your hands, rinse it off immediately with cold water and inform your teacher.
10. Clean up your work area (wash test tubes) and dispose of materials as directed by your teacher.
    a. Pour contents into the waste container. Retrieve the aluminum and magnesium metal using tweezers and place them in the designated petri dish.

Analyze and Interpret

1. Compare the reactivities of magnesium and calcium. Use evidence to support your comparison.

2. Compare the reactivities of magnesium and aluminum. Use evidence to support your comparison.

3. Which of the three metals was the most reactive? Which metal was the least reactive?

Conclude and Communicate

Draw Bohr diagrams for magnesium, calcium, and aluminum. Does your understanding of atomic structure support your observations from this investigation? Justify your response.