Lab: Periodic Table Trends

FOR THE TEACHER

Summary
In this lesson, students will investigate trends of the periodic table.

Grade Level
High or middle school

Objectives
By the end of this lesson, students will
- Better understand trends of the periodic table.
- See the difference between metals, nonmetals, and metalloids firsthand.

Chemistry Topics
This lesson supports students’ understanding of
- Trends of the periodic table

Time
Teacher Preparation: 30 minutes
Lesson: 60 minutes

Materials
Part I & II
- Element samples (silicon, magnesium, aluminum, sulfur, calcium, carbon)
- Well plate
- Water
Teacher demo
- Small samples of lithium, sodium, and potassium (these metals shouldn’t be mixed, and when adding them to water, add them to separate beakers)
- Large beakers (3)
- Watch glass (3)
- Cutting device (3)
- Water

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Students should wash their hands thoroughly before leaving the lab.
- When students complete the lab, instruct them how to clean up their materials and dispose of any chemicals.

Teacher Notes
- You could have students use the same six elements for both parts.
- Do not add the metals to the same beakers of water. It’s recommended to cut a small piece of metal off a larger sample on the watch glass. It gives students an opportunity to see the unoxidized metal before adding it to water.
The demonstration of group I elements in water can be substituted by this video by Braniac on YouTube.

FOR THE STUDENT

Student Activity Sheet: Periodic Table Trends

Lesson

Background
In your own words, describe how you understand the periodic table to be organized. Include any trends that you have noticed/learned about so far, and include any trends you may have learned about in previous science classes.

Problem
Are the properties of the periodic table observable on a macroscopic level?

Procedure

PART I
1. Obtain unknown substances 1–6. Make observations of each unknown substance. From your observations, classify each as a metal or nonmetal.
2. Use the conductivity apparatus to test unknowns 1–6. Make observations. From your observations, classify each as a metal or nonmetal.
3. Test malleability. Make observations. From your observations, classify each as a metal or nonmetal.
4. From your three tests, make an overall decision weather each unknown is a metal, nonmetal, or a metalloid.

PART II
1. Obtain a well plate. Fill six wells with water.
2. In one well, add calcium. Record your observations.
3. In one well, add magnesium. Record your observations.
4. In one well, add aluminum. Record your observations.
5. In one well, add sulfur. Record your observations.
6. In one well, add carbon. Record your observations.
7. In one well, add silicon. Record your observations.
8. In your data table, add a spot for lithium, sodium, and potassium. Record your observations from the demonstration your teacher shows you.

Results & Observations
Make two data tables: one for part I and one for part II. Remember, sometimes you need to make observations in addition to writing down a piece of data. Make sure your data table is large enough to record observations and data.

Analysis
In a paragraph, discuss how you categorized each unknown in part I as a metal, nonmetal, or metalloid.
In a paragraph, discuss what you understand from part II. Comment on both the group and period each element is part of.
Conclusion
In two to three sentences, answer the problem.