

Trends in Elemental Properties

In this activity you will be using Excel to create graphs that show trends in the properties of elements. You will be using the same elements that you used in the classification activity a few days ago. Use the atomic numbers and information about each element to make the graphs below.

Graph 1: Chemical Property Trend:

The chemical property that you will be graphing is how many oxygen atoms each element combines with.

1. Open Excel
2. Type your name and period in cell A1
3. Enter the atomic number of your elements into column A
4. Enter the Ionization Energy of each element in column B
5. Highlight the data you entered in columns A and B
6. Click on Insert and choose "Chart..."
7. Click on the first bar chart pictured and click Next
8. Click on "Series"
9. In the box labeled "Series" if there is a "Series2" listed, click on it and hit "Remove"
10. Now click "Next"
11. Title the chart "Chemical Property Trend"
12. Label the x-axis "Atomic Number"
13. Label the y-axis "Ionization Energy"
14. Click "Next"
15. Click "Finish" so that the chart shows up next to your data

Graph 2: Physical Property Trend:

1. Enter the atomic number of your elements into column A further down the page
2. Enter the boiling point of each element in column B alongside your column A data
3. Follow the same directions as above to create a bar graph
4. Title this chart "Physical Property Trend"
5. Label the x-axis "Atomic Number"
6. Label the y-axis "Boiling Point (K)"
7. Click "Next"
8. Click "Finish" so that the chart shows up next to your data

Printing:

- Both of these charts should fit on one page. To check this, click on "File" and select "Print Preview."
- If both data sets and graphs do not fit on one page, click "Close" and move or shrink your graphs. (Ask for help if you do not know how to do this).
- Go back to "Print Preview" if needed, and then print your graphs.

Answer these questions on the back of your printed graphs:

1. Do either of your graphs show a repeating, or cyclic, pattern? Describe.
2. Are these patterns consistent with the patterns found in our card organization activity? Explain.
3. Based on these two bar graphs, why is the chemist's organization of elements called a *periodic table*?
4. Where are elements with the highest ionization energy located on the periodic table? What does this tell us about how easy it is to remove an electron from this element?
5. Where are the elements with the highest boiling points located on the periodic table?
6. Explain the trends you noticed in Questions 4 and 5.
7. Predict which element should have the lowest boiling point: Selenium (Se), Bromine (Br) or Krypton (Kr).
8. Using your graphs, predict the pattern of boiling points and ionization energy for the following elements: Gallium (Ga), Germanium (Ge), Arsenic (As), Selenium (Se), Bromine (Br)

Element Data to Graph

Using the instructions on the other side of this paper, graph this data to uncover patterns of the Periodic Table. Please do not write on this sheet.

Element	Atomic Number	Ionization Energy (eV)	Boiling Point (K)
Hydrogen	1	13.6	21
Helium	2	24.6	4
Lithium	3	5.4	1600
Beryllium	4	9.3	2780
Boron	5	8.3	2800
Carbon	6	11.3	4620
Nitrogen	7	14.5	77
Oxygen	8	13.6	90
Fluorine	9	17.4	85
Neon	10	21.6	27
Sodium	11	5.1	1162
Magnesium	12	7.6	1390
Aluminum	13	6.0	2600
Silicon	14	8.2	2950
Phosphorus	15	10.5	553
Sulfur	16	10.4	718
Chlorine	17	13.0	239
Argon	18	15.8	87
Potassium	19	4.3	1030
Calcium	20	6.1	1760