

Group Members:

Date:

Periodic Trends Lab Exercise Chapter 7



Objectives:

Students will...

[CHEM.A.2.3.1](#) Explain how the periodicity of chemical properties led to the arrangement of elements on the periodic table.

[CHEM.A.2.3.2](#) Compare and/or predict the properties (e.g., electron affinity, ionization energy, chemical reactivity, electronegativity, atomic radius) of selected elements by using their locations on the periodic table and known trends.

Background:

Over the past 2 weeks we have been investigating trends in the periodic table. It should come as no surprise that there are patterns, considering that is the entire basis of the [periodic] table. These values, for the most part, are not theoretical. They are based on experimentation using advancement measurement techniques. The purpose of this lab is to further investigate one of the trends we have discussed by using a web resource to create a scatter plot of the data.

This will require you take a deeper look into the content not only for the trend, but how the data was collected. You may have questions along the way, so take your time. Options are atomic size, ionic size (be aware of ligands and coordination complexes), ionization energy, electron affinity, or metallic character properties. Wikipedia actually has some good data sets just make sure it's referenced. You can use any resource you like *as long as it is referenced*. Good luck and have fun working on a team to complete this exercise.

Procedure:

1. Find a web resource that you find easy to navigate that has a complete set of data for one of the trends (atomic #1-36, *1 point bonus for every 10 elements plotted in addition to the 36*)
2. Using the attached plot, or your technology, create a scatter plot of the values of each element from your data set.
3. The x-axis should be the elements in increasing atomic number (labeled)
4. The y-axis should be the quantitative data based on the trend you have chosen (also labeled with units)
6. Plot the data neatly for the first 36 elements.
7. Add an appropriate title, and key if necessary.
7. Answer the follow up questions.

Follow up questions (5 points each):

1. Document the resource where you found your information. Is the data referenced?
2. Using your data, describe the trend in all both for this property of elements: across a period,
3. Which direction of the trend has the greater magnitude of increase, down a group or across a period (which has the greater effect on trend)?
4. Choose 4 elements that are fixated in a quadrant, sketch that quadrant below. Rank them in terms of your trend and explain why they are ordered in this way.
5. How is the data from the data table you are referencing gathered? Be specific as to the experimentation used to acquire the data set. Is any of it estimated? If so how is it estimated? *(2 point bonus for identifying the location and/or scientist who pioneered the collection of the original data)* **(15 points)**
6. During the construction of your graph there will most likely be aberrations to the trend. We call those exceptions, and they typically stem from unique properties in the electron configuration. Find one exception and determine why it does not agree with the consistency of the trend. If there are no exceptions identify that. **(10 points)**

Graph (25 points):

There is graph paper attached, or you can use excel. *Be sure to adhere to the directions up top in the procedure for the graph.*