

Name: Solutions

Date: _____

AP Chemistry 30 – Lab Activity 2: Periodic Trends

Learning Objective

- Analyze atomic properties to determine periodic trends based on periods and families of elements

Lab Information

- Go to <http://haydukap.weebly.com/unit-1-atomic-structure-and-periodicity.html>. Download the file called PT_interactive.xls.
- To begin, click on the bottom tab that says “atom properties”.

Discussion

- Along the side of the graph area are a series of trends that you can select to display on the graph with respect to atomic number. Click on “atomic radius” if it is not already selected.

Atomic radius is the distance from the center of the nucleus to the outermost occupied energy level.

- What units are used to measure atomic radius?

pm

- In general, what happens to atomic radius as the atomic number increases?

increases decreases

- Below the graph, click the down arrow to choose a group to plot. Select Group 1. What happens to the atomic radius down a group?

increases decreases

- Select All Groups again in the drop-down menu for groups. Then, click on the down arrow to choose a period to plot. Select Period 3. What happens to the atomic radius across the period?

increases decreases

- Click on “first ionization energy” from the trends on the side. Ensure your graph is showing all of the elements.

Ionization energy is the amount of energy required to remove one valence electron from the atom.

- In general, what happens to the first ionization energy as the atomic number increases?

increases decreases

- How does this trend compare to atomic radius? Does this make sense? Why or why not?

opposite → yes → electrons are further away, easier to remove

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- c. Below the graph, click the down arrow to choose a group to plot. Select Group 1. What happens to the ionization energy down a group?

increases decreases

- d. Select All Groups again in the drop-down menu for groups. Then, click on the down arrow to choose a period to plot. Select Period 3. What happens to the ionization energy across the period?

increases decreases

3. Select All Periods again in the drop-down menu for periods. On the right, select "both first and second ionization energy".

First ionization energy is the amount of energy required to remove the first available valence electron. Second ionization energy is the amount of energy needed to remove the second valence electron.

- a. How do the first and second ionization energy compare to each other? Does this make sense? Why or why not?

second is higher → yes → less e^- repulsion,
more attraction to nucleus; harder to remove

- b. What would you expect to see on a graph for third ionization energy?

even higher E

4. Click on electronegativity.

Electronegativity is a measure of the tendency of an atom to attract a bonding pair of electrons.

- a. In general, what happens to the electronegativity as atomic number increases?

increases decreases

- b. How does this trend compare to that of atomic radius? Does this make sense? Why or why not?

opposite → yes → harder to attract
 e^- when they are further away

- c. How does this trend compare to that of first ionization energy? Does this make sense? Why or why not?

same → yes → easier to remove e^-
when they are not strongly attracted.