



*Periodic Table Trend Activities:*

**Purpose:** The Periodic Table is a useful tool that helps us predict properties of various elements. In this activity, we will look at 4 properties:

1. **Atomic radius:** The distance from the atomic nucleus to the outmost orbital in a atom
2. **Electronegativity:** The ability of an atom to attract an electron from another atom
3. **Ionization Energy:** The energy needed to remove an electron from an atom
4. **Ionic radius:** The distance from the atomic nucleus to the outermost orbital in an ION
  - a. **Anions** – negative ions – gain electrons – tend to be larger than the neutral atom
  - b. **Cations** – positive ions – lose electrons – tend to be smaller than the neutral atom

**Procedure:** Click on the [Cool Periodic Table link http://www.chemicool.com/](http://www.chemicool.com/) (click on the element symbol). Record the atomic radius, electronegativity, and first ionization energy for each element in the table below:

**Data:**

Element	Atomic Radius	Electronegativity	1 <sup>st</sup> Ionization Energy	Ionic Radius
Li				
Be				
B				
Na				
Mg				
Al				
C				
Si				
N				
P				

**Discussion:**

1. What appears to be the trend in atomic radius as you move from left to right in a row?
2. What appears to be the trend in ionic radius as you move from left to right in a row?
3. What appears to be the trend in atomic radius as you move down a column?
4. What appears to be the trend in ionic radius as you move down a column?

5. Predict the change in a) atomic radius and b) ionic radius of the next elements in a row (C, Si), then check those properties. Do they match your predictions?
6. Check the a) atomic radius and b) ionic radius of the next elements in the series (N, P). How do they fit the predicted pattern?
7. Is the pattern of atomic radius absolute or general (always true or generally true)? What about the pattern of the ionic radius?
8. Consider all three of the properties that you have examined.
  - a. State the general trend for each property if you move from left to right on the Periodic Table. Now, state the general trend from top to bottom.
  - b. How do these properties show periodicity (periodic trends)?
9. Use the links given below to examine the same three properties graphically. View the line graph of atomic radius. [http://www.webelements.com/periodicity/atomic\\_radius/graph.html](http://www.webelements.com/periodicity/atomic_radius/graph.html)
  - a. What do the different colors show?
  - b. Describe the pattern in the second period that is repeated in the third period.
  - c. How does this graph agree with your observations of atomic radius made earlier?
  - d. Why do the fourth and fifth periods have more dots and different patterns?
10. Find the same type of graph for 1st ionization energy and electronegativity. Answer the same questions for these graphs as you did for the atomic radii graph.
11. Use the color-coded tables, atomic radius, [http://www.webelements.com/periodicity/atomic\\_radius/graph.html](http://www.webelements.com/periodicity/atomic_radius/graph.html) ionization energy, [http://www.webelements.com/periodicity/ionisation\\_energy\\_1/](http://www.webelements.com/periodicity/ionisation_energy_1/) and electronegativity [http://www.webelements.com/periodicity/electronegativity\\_pauling/](http://www.webelements.com/periodicity/electronegativity_pauling/) to answer the questions below
  - a. How does this show periodic trends of the selected property?
  - b. Which method did you find most informative?
  - c. Which method was easiest to see the general pattern and not get confused by exceptions in that pattern?