

Name _____ Date _____ Period _____

Graphing Periodic Trends

Purpose

After reading the lab, create your own purpose below:

Pre-Lab Discussion (Do not copy in your lab book)

The Periodic Table is arranged according to the Periodic Law. The Periodic Law states that when elements are arranged in order of increasing atomic number, their physical and chemical properties show a periodic pattern. The properties that will be examined in this lesson are: atomic radius, ionization energy, and electronegativity. The atomic radius is the measure of the size of the whole atom, ionization energy is the measure of the energy necessary to remove an electron from an atom, and electronegativity is the measure of how much attraction the element has to electron pairs in a bond. Graphing the values of these measurements will show some of the periodic trends on the table.

Procedure

1. Using the data in **Table 1** below, plot a graph of atomic radius (y-axis) vs. atomic number (x-axis). The graph should take up approximately $\frac{1}{2}$ of a page in your lab notebook and include a title and all necessary axis labels.
2. Connect the dots point-to-point to make a line graph. Write the element symbol above each point you plotted.
3. Repeat steps 1-2, making two more graphs, the first for ionization energy (IE vs. atomic number) and the second for electronegativity (EN vs. atomic number). (Note: leave a gap in the electronegativity graph for the noble gases.)

Data

Table 1 – Element Properties

Element	Atomic Number	Atomic Radius (Å)	Ionization Energy (J)	Electronegativity
H	1	0.37	1312	2.2
He	2	0.5	2372	
Li	3	1.52	520	0.98
Be	4	1.11	899	1.57
B	5	0.88	801	2.04
C	6	0.77	1086	2.55
N	7	0.7	1402	3.04
O	8	0.66	1314	3.44
F	9	0.64	1681	3.98
Ne	10	0.7	2080	
Na	11	1.86	496	0.93
Mg	12	1.6	738	1.31
Al	13	1.43	578	1.61
Si	14	1.17	786	1.9
P	15	1.1	1012	2.19
S	16	1.04	999	2.58
Cl	17	0.99	1256	3.16
Ar	18	0.94	1520	

Questions

1. What is the periodic trend for atomic radius both across a period and down a group?
2. What is the periodic trend for ionization energy both across a period and down a group?
3. What is the periodic trend for electronegativity both across a period and down a group?
4. Based on your graphs, which element on the periodic table should have the highest:
 - a. Atomic radius?
 - b. Highest ionization energy?
 - c. Highest electronegativity?

Conclusion

Overall, do the trends change more going down a group or across a period? Use a specific example to support your answer.