Name(s): _____ **Period:**_____

GRAPHING PERIODIC TRENDS

PRE-LAB DISCUSSION:

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. Students can discover these patterns by examining the changes in properties of elements on the Periodic Table. The properties that will be examined in this lesson are: atomic radius AND first ionization energy

PURPOSE: To determine periodic trends going down a group and across a period of atomic radius, ionization energy, and electronegativity.

PROCEDURE:

1. Use the information in these tables to complete the graph as described below.
2. Make a correct scale on each of your graphs. (take your highest value for each graph and divide it by the total number of boxes on the graph to determine the scale, i.e. what each small line is increasing by)
3. Plot the points on the graph.
4. Draw a line of best fit, do not connect the dots.
5. Repeat for graphs 1a-3b

Group 1, Alkali Metals:

Symbol	Atomic Radius (Picometers)	First Ionization (kilojoules/mole)	Electronegativity (4-point scale)
H	31	1312	2.1
Li	128	520	1.0
Na	166	496	0.9
K	203	410	0.8
Rb	220	403	0.8
Cs	244	376	0.7

Period 3:

Symbol	Atomic Radius (Picometers)	First Ionization (kilojoules/mole)	Electronegativity (4-point scale)
Na	166	496	0.9
Mg	141	738	1.2
Al	121	578	1.5
Si	111	787	1.8
P	107	1012	2.1
S	105	1000	2.5
Cl	102	1251	3.0
Ar	106	1521	---

Graph 1a: Atomic Radius (period)

For period 3 make a graph of atomic radius as a function of atomic number. Plot atomic number on the X axis and atomic radius on the Y axis.

Graph 1b Atomic Radius (group)

For elements in Group 1 (Alkali metals), make a graph of atomic radius as a function of atomic number. Plot atomic number on the X axis and atomic radius on the Y axis.

Graph 2a Ionization Energy (period)
For period 3, make a graph of the energy required to remove the easiest electron (first ionization energy) as a function of atomic number. Plot atomic number on the X axis and energy required on the Y axis.

Graph 2b Ionization energy (group)
For elements of Group 1 (Alkali metals), make a graph of the energy required to remove the easiest electron (first ionization energy) as a function of atomic number.

Graph 3a Electronegativity
For period 3, make a graph of the electronegativity as a function of atomic number. Plot atomic number on the X axis and electronegativity on the Y axis.

Graph 3b Electronegativity (group)
For elements of Group 1 (Alkali metals), make a graph of the electronegativity as a function of atomic number. Plot atomic number on the X axis and electronegativity on the Y axis.

Discussion:

1. Define each of these terms: Atomic radius, First Ionization Energy, and Electronegativity

2. What happens to the atomic radius as the atomic number increases across a period? Down a group?

3. What happens to the energy needed to remove an electron as the atomic number increases across a period? Down a group?

4. Why does atomic radius change as it does?

5. Why does the energy required to remove an electron change as it does?