

GRAPHING PERIODIC TRENDS

Standard: Students know how to use the periodic table to identify trends in ionization energy, electronegativity, and the relative sizes of ions and atoms.

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 understand periodic trends relating to atomic radius, ionization energy, and electronegativity.

PROCEDURE:

Use the information in these tables to complete the graph as described below.

RESULTS:

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

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	---



1. Define each of these terms: Atomic radius, First Ionization Energy, and Electronegativity
2. Create a table on graph paper that shows Group 1 (the Alkali metals) as well as Period 3 (the third row) of the table. You can see an example on the reverse side of this page. Leave lots of room for including necessary data (sodium is done on the reverse).
3. Label each box with the symbol for the element at the top of the box, following the example on the reverse side.
4. Using colored pencils or pens, list under the symbol (in this order!) the Atomic Radius, First Ionization Energy, and Electronegativity. Use a different color for each property. Example: Write all of the Atomic radius values in red, all of the First ionization energies in green, and all of the Electronegativities in blue. Of course, you can pick any colors that are available, as long as you are consistent.
5. Observe the trends in each property as you go down the Alkali metal group, and as you go across Period 3.
6. Write out each of the statements written on the opposite side, completing each statement with the observed trend (increase or decrease)

Definitions:

Atomic Radius –

First Ionization Energy –

Electronegativity -

H	<p>Across a period (→) atomic radius tends to _____.</p> <p>Across a period (→) first ionization energy tends to _____.</p> <p>Across a period (→) electronegativity tends to _____.</p> 						
Li							
Na 166 496 0.9	Mg	Al	Si	P	S	Cl	Ar
K	<p>Down a Group (↓) atomic radius tends to _____.</p> <p>Down a Group (↓) first ionization energy tends to _____.</p> <p>Down a Group (↓) electronegativity tends to _____.</p> 						
Rb							
Cs							