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| CHEMISTRY | CODE: SCS21 |
| 2014-2015 SCHOOL YEAR | INSTRUCTOR: Ms. Bui |
| CLASSROOM: 510 | LAB ROOM: 506 |

**LAB 07**

**GRAPHING TRENDS IN THE PERIODIC TABLE**

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| Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | GRADE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/100 points |

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| **PRE-LAB: (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/10 points)**  ***Instructions: You have 2 minutes to complete this task. This is individual work. You are seated and silent.***  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 AND first ionization energy   1. Make a prediction as to what will happen to the sizes of atoms as one progresses from left to right across a period on the periodic table. (Example: the sizes of atoms will (increase, decrease, remain constant) as one goes left to right across a period.) 2. According to your prediction, make a sketch of how you would EXPECT a graph to appear if you plotted atomic number on the X-axis and atomic radius (size of the atom) on the Y-axis. |

**EXPLORATORY ACTIVITY: (\_\_\_\_\_\_\_\_\_\_\_\_\_\_/90 points)**

**Procedure:**

Using the attached graphs and TABLE S, graph the following information according to the steps described

1. Graph 1: Atomic Radius vs Atomic Number: Elements 3-20
   1. For elements 3-20 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.
   2. After creating the graph, use a colored pen or pencil to draw a vertical line that represents that beginning of each period (horizontal row on the periodic table).

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| 1. What happens to the sizes of atoms as one goes left to right across a period (*use the term “atomic radius” in your response*) |

1. Graph 2: Atomic Radius vs Atomic Number: Groups 1 and 2
   1. For elements in Group 1 (Alkali metals), make a graph of atomic radius as a function of atomic number.
      1. Use a periodic table to determine which elements are members of Group 1
   2. Make a second line on this same graph that will represent Group 2 (Alkaline Earth Metals).
      1. Use a periodic table to determine which elements are members of Group 2.

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| 1. What happens to the sizes of atoms as one goes down a group (*use the term “atomic radius” in your response*)? |

1. Graph 3: Ionization Energy vs Atomic Number: Elements 3-20
   1. For elements 3-20, 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.
   2. After creating the graph, use a colored pen or pencil to draw a vertical line that represents that beginning of each period (horizontal row on the periodic table).

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| 1. What happens to the ionization energy as one goes left to right across a period (*use the term “ionization energy” in the response*)? |

1. Graph 4: Ionization Energy vs Atomic Number: Groups 1 and 2
   1. 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. On the same graph make a second line to represent Group 2 (Alkaline Earth Metals). Use a periodic table to determine which elements are members of Group 1 and which elements are members of Group 2.

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| 1. What happens to the ionization energy as one goes down a group (*use the term “ionization energy” in the response*)? |

**GUIDED NOTES:**

* The Atomic Radius is an estimate of the \_\_\_\_\_\_\_\_\_\_\_\_ of an atom or the distance from the center of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_ of the atom. It is an \_\_\_\_\_\_\_\_\_\_\_\_ due to the fact the outer edge of an atom is not distinct. Atomic radii are measured in picometers.
* The First Ionization Energy is defined as the energy required to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the most loosely bound (outermost) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from an atom. This electron is one of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons. It is measured in kilojoules/moles (kj/mol) of atoms.

**ANALYSIS**

1. Record any similarities and differences between your predicted graph and the graph of actual data.
2. Looking at the Bohr models of atoms, offer an explanation as to WHY the atomic size changes as it does for both periods and groups (*use the term “atomic radius” in your response*).
   1. Periods:
   2. Groups:
3. Offer an explanation as to WHY the ionization energy changes as it does for both periods and groups (*use the term “ionization energy” in the response*).
   1. Period:
   2. Group:
4. What PROPERTIES of elements visibly show periodic trends when their values are graphed?