Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hr \_\_\_\_\_\_\_\_\_\_

What’s Trending?

1. Research the following: Why is the table of elements called a Periodic Table?
2. Use the following link to visit “Graphing the Periodic Table Website”:

<http://dptv.pbslearningmedia.org/asset/lsps07_int_graphperiodic/>

1. Click on the tab titled “Plot Data”
2. Examine the graph of Molar Mass versus Z. **Z = Proton Count or Atomic Number**
   1. A student makes a claim that Molar Mass and Atomic Number have a direct relationship.
      1. How does the graph provide evidence for this claim? Give 2 examples that would support the claim.
      2. Use your background knowledge of the atom to provide the reasoning needed for this claim.
3. Use the x and y axes below and sketch the graph of Molar Mass versus Atomic Number. Label the axes and mark the graph with an **X** where the element 118 (Oganesson, Og) would likely appear on the graph.



1. **TREND ONE: ATOMIC RADIUS**: Notice that Molar Mass versus Atomic Number shows a **trend**. A **trend** is defined as a general direction in which something is happening. Trends on the Periodic table make it very easy for us to predict the outcomes of reactions or even the behaviors of elements that are not yet fully researched. This website highlights several trends. Look up the definition of each trend and then answer the questions that follow.
   1. Define Atomic Radius
   2. On the website, under the “Plot Data” tab, go to “Properties” and select “Atomic Radius”. Use the axes below to draw a rough sketch of this property. Label the axes.
   3. Go to “Groups” and select on the “Halogens”. Fill in the data table below by first identifying every member of the Halogen family off of the chart. THEN click on the red “Element Data” box and obtain the actual Atomic Radius for each member of the Halogen Family. You can do this by clicking on the dot on the graph OR by clicking on the element box in the Periodic Table below the graph.

|  |  |
| --- | --- |
| Halogen Name and Symbol | Atomic Radius (pm) |
|  |  |
|  |  |
|  |  |
|  |  |

* 1. The Halogens are members of Group 7A (17). MAKE A CLAIM! What is the trend for the atomic radius of the halogen family as you go from the top of the column to the bottom of that column? Does the radius increase, decrease or remain the same?
  2. State the evidence you used to make your claim regarding the trend in atomic radius going down the Halogen family.
  3. Use scientific reasoning to explain why you observed the trend in atomic radius for the halogens. You must use **Coulomb’s Law** in your reasoning statement.
  4. Explore at least TWO other groups of your choice from the “Groups” tab. Examine the graph for these groups and answer the questions below.
     1. What two groups did you select?
     2. Is the observed Atomic Radius trend for these families (groups) you selected the same as the trend you observed in the Halogens?
  5. Stay on the group tab and select the “Alkali Metals”. Click on Lithium’s dot on the graph. At the bottom of the page use the “Next” tab and follow the data on the graph as you move from Atomic Number 3 to Atomic Number 9. Atomic Numbers 3-9 represent members of the same (family / period).
  6. Fill in the data below by clicking on the red “Element Data” box for all elements 3-9. Obtain the actual Atomic Radius for each element 3-9. You can do this by clicking on the dot on the graph OR by clicking on the element box in the Periodic Table below the graph.

|  |  |  |
| --- | --- | --- |
| Atomic Number | Element | Atomic Radius (pm) |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |

* 1. Elements 3-9 are members of period 2 on the periodic table. MAKE A CLAIM! What is the trend for the atomic radius as you go from left to right with element 3 to element 9? (Does the radius increase, decrease or remain the same?)
  2. State the evidence you used to make your claim regarding the trend in atomic radius left to right across the second period.
  3. Use scientific reasoning to explain why you observed the trend in atomic radius for the second period elements. You must use **Coulomb’s Law** in your reasoning statement.

1. **TREND TWO: Electronegativity**:
   1. Define Electronegativity:
   2. On the website, under the “Plot Data” tab, go to “Properties” and select “Electronegativity”. Use the axes below to draw a rough sketch of this property. Label the axes.
   3. Go to “Groups” and select on the “Halogens”. Fill in the data table below by first identifying every member of the Halogen family off of the chart. THEN click on the red “Element Data” box and obtain the actual Electronegativity for each member of the Halogen Family. You can do this by clicking on the dot on the graph OR by clicking on the element box in the Periodic Table below the graph.

|  |  |
| --- | --- |
| Halogen Name and Symbol | Electronegativity |
|  |  |
|  |  |
|  |  |
|  |  |

* 1. MAKE A CLAIM! What is the trend for the electronegativity of the halogen family as you go from the top of the column to the bottom of that column? (Does the electronegativity increase, decrease or remain the same?)
  2. State the evidence you used to make your claim regarding the trend in electronegativity going down the Halogen family.
  3. Use scientific reasoning to explain why you observed the trend in electronegativity for the halogens. You must use **Coulomb’s Law** in your reasoning statement and correlate the response back to atomic radius.
  4. Explore the alkali metal group from the “Groups” tab. Examine the graph for this group and answer the questions below.
     1. Is the observed electronegativity trend for this family (group) the same as the trend you observed in the Halogens?
  5. Stay on the group tab and select the “Alkali Metals”. Click on Lithium’s dot on the graph. At the bottom of the page use the “Next” tab and follow the data on the graph as you move from Atomic Number 3 to Atomic Number 9.
  6. Fill in the data below by clicking on the red “Element Data” box for all elements 3-9. Obtain the actual Electronegativity for each element 3-9. You can do this by clicking on the dot on the graph OR by clicking on the element box in the Periodic Table below the graph.

|  |  |  |
| --- | --- | --- |
| Atomic Number | Element | Electronegativity |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |

* 1. MAKE A CLAIM! What is the trend for electronegativity as you go from left to right with elements 3-9? (Does the electronegativity increase, decrease or remain the same?)
  2. State the evidence you used to make your claim regarding the trend in electronegativity going from left to right across the second period.
  3. Use scientific reasoning to explain why you observed the trend in electronegativity for the second period elements. You must use atomic radius and **Coulomb’s Law** in your reasoning statement.
  4. Examine Electronegativity from the graph for the elements of period 3. How does the trend in this period correlate to the trend sited for period 2?

1. **TREND THREE: First Ionization Energy**:
   1. Define Ionization Energy:
   2. On the website, under the “Plot Data” tab, go to “Properties” and select “Ionization Energy”. Use the axes below to draw a rough sketch of this property. Label the axes.
   3. Go to “Groups” and select on the “Halogens”. Fill in the data table below by first identifying every member of the Halogen family off of the chart. THEN click on the red “Element Data” box and obtain the actual First Ionization energy for each member of the Halogen Family. You can do this by clicking on the dot on the graph OR by clicking on the element box in the Periodic Table below the graph.

|  |  |
| --- | --- |
| Halogen Name and Symbol | Ionization Energy |
|  |  |
|  |  |
|  |  |
|  |  |

* 1. MAKE A CLAIM! What is the trend for the ionization energy of the halogen family as you go from the top of the column to the bottom of that column? (Does the ionization energy increase, decrease or remain the same?)
  2. State the evidence you used to make your claim regarding the trend in ionization energy going down the Halogen family.
  3. Use scientific reasoning to explain why you observed the trend in ionization energy for the halogens. You must use **Coulomb’s Law** in your reasoning statement and correlate the response back to atomic radius.
  4. Explore the alkali metal group from the “Groups” tab. Examine the graph for this group and answer the questions below.
     1. Is the observed ionization energy trend for this family (group) the same as the trend you observed in the Halogens?
  5. Stay on the group tab and select the “Alkali Metals”. Click on Lithium’s dot on the graph. At the bottom of the page use the “Next” tab and follow the data on the graph as you move from Atomic Number 3 to Atomic Number 9.
  6. Fill in the data below by clicking on the red “Element Data” box for all elements 3-9. Obtain the actual First Ionization Energy for each element 3-9. You can do this by clicking on the dot on the graph OR by clicking on the element box in the Periodic Table below the graph.

|  |  |  |
| --- | --- | --- |
| Atomic Number | Element | Ionization Energy |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |

* 1. MAKE A CLAIM! What is the trend for ionization energy as you go from left to right with elements 3-9? (Does ionization energy increase, decrease or remain the same?)
  2. State the evidence you used to make your claim regarding the trend in ionization energy in going from left to right across the second period.
  3. Use scientific reasoning to explain why you observed the trend in ionization energy for the second period elements. You must use atomic radius and **Coulomb’s Law** in your reasoning statement.
  4. Examine Ionization energy from the graph for the elements of period 3. How does the trend in this period correlate to the trend sited for period 2?

1. PUTTING IT ALL TOGETHER! A SUMMARY OF THE THREE TRENDS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Property | Definition | Group Trend | Period Trend | Why? |
| Atomic Radius |  |  |  |  |
| Electronegativity |  |  |  |  |
| Ionization energy |  |  |  |  |

1. What do you notice about the trends for Electronegativity and Ionization Energy when they compare to the trends for Atomic Radius?