Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Graphing Periodic Trends**

The Periodic Table is arranged according to 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. These patterns can be discovered by examining the changes in properties of elements on the Periodic Table. The properties that will be examined in this lesson are: atomic size and ionization energy. And be able to explain the exceptions of the trend.

**Procedure**

* Graph 1
  + For elements 1-18 make a graph of ionization energy as a function of atomic number. Plot atomic number on the X-axis and the ionization energy on the ***LEFT*** Y-axis. **Use a colored pen or pencil to draw a vertical line that represents the beginning of each period**.
* Graph 2
  + For elements 1-18, make a graph of the atomic radius. Plot atomic number on the X-axis and atomic radius on the ***RIGHT*** Y-axis. **Use a different colored pen or pencil to draw a vertical line that represents the beginning of each period**.

**Questions**

1. Complete the graphic organizer based on your graph.

|  |  |
| --- | --- |
| **Ionization Energy** | **Atomic Radius** |
| Define: | Define: |
| Trend in period: | Trend in period: |
| Trend in group: | Trend in group: |
| Difference: | Difference: |
| **Relationship** | |

1. Using the shorthand orbital diagrams you drew earlier, explain the anomaly between the ionization energies of nitrogen and oxygen as well as sodium and magnesium.

**Data Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element Symbol** | **Atomic #** | **Atomic Radius (pm)** | **Ionization Energy (kJ/mol)** | **Shorthand Orbital Diagram** |
| H | 1 | 53 | 1311 |  |
| He | 2 | 31 | 2371 |  |
| Li | 3 | 167 | 520 |  |
| Be | 4 | 112 | 899 |  |
| B | 5 | 87 | 800 |  |
| C | 6 | 67 | 1086 |  |
| N | 7 | 56 | 1402 |  |
| O | 8 | 48 | 1313 |  |
| F | 9 | 42 | 1680 |  |
| Ne | 10 | 36 | 2080 |  |
| Na | 11 | 190 | 496 |  |
| Mg | 12 | 145 | 737 |  |
| Al | 13 | 118 | 577 |  |
| Si | 14 | 111 | 786 |  |
| P | 15 | 98 | 1011 |  |
| S | 16 | 88 | 999 |  |
| Cl | 17 | 79 | 1251 |  |
| Ar | 18 | 71 | 1520 |  |