Periodic Trends Worksheet Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_Period\_\_\_\_

Answer the following in the space provided.

1. Use your knowledge of the periodic table of the elements to explain the following trends. Be sure to state the trend **and** give reasons for the trend.
2. The trend in electronegativity from P to S to Cl
3. The trend in electronegativity from Cl to Br to I
4. The trend in atomic radius from Li to Na to K
5. The trend in atomic radius from Al to Mg to Na
6. Explain the reason(s) for each of the following:
7. The first ionization energy for magnesium is greater than the first ionization energy for calcium.
8. The first and second ionization energies for calcium are comparable, but the third ionization energy is much greater.
9. The second ionization energy for sodium is much greater than the first ionization energy, but the second ionization energy for magnesium is comparable to the first ionization energy.
10. The first ionization energy of aluminum is lower than the first ionization energy for magnesium.
11. As shown on the table below, the first ionization energies of Si, P, and Cl show a trend.

|  |  |
| --- | --- |
| Element |  Ionization Energy |
| Si | 786 |
| P | 1012 |
| Cl | 1251 |

Explain the reason for the trend.

1. The calcium atom is much larger than the calcium ion, while the fluorine atom is much smaller than the fluorine ion. Explain this natural occurrence.
2. The first three ionization energies (I1, I2, I3) for beryllium and neon are given in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| kJ/mole | I1 | I2 | I3 |
| Be | 900 | 1757 | 14840 |
| Ne | 2080 | 3963 | 6276 |

1. Write the complete electron configuration for Ne.
2. Explain any trends or significant discrepancies found in the ionization energies for Be and Ne.
3. If chlorine gas is passed into separate containers of heated Be and heated Ne, explain what compounds, if any, might be formed, and explain your answer in terms of the electron configurations of these two elements.
4. An unknown element, X, has the following three ionization energies:

|  |  |  |  |
| --- | --- | --- | --- |
| kJ/mole | I1 | I2 | I3 |
| X | 419 | 3069 | 4600 |

On the basis of the ionization energies given, what is most likely to be the compound produced when chlorine reacts with element X?

1. 3Br2(aq) + 2Al(s) 🡪 2Al+3(aq) + 6Br-(aq)

The reaction between aluminum metal and bromine in aqueous solution occurs according to the reaction above.

1. Give the ground state electron configurations of Al and Al+3.
2. Give the ground state electron configurations of Br and Br-.
3. Are Al3+ and Br- isoelectronic? Explain.