

* Notice - the group #1 example given for question #4 contains exceptions to the general trend. Know general trends, not exceptions.

Key P.T.

Periodic Trends

Can the properties of an element be predicted using a periodic table?

Why?

The periodic table is often considered to be the "best friend" of chemists and chemistry students alike. It includes information about atomic masses and element symbols, but it can also be used to make predictions about atomic size, electronegativity, ionization energies, bonding, solubility, and reactivity. In this activity you will look at a few periodic trends that can help you make those predictions. Like most trends, they are not perfect, but useful just the same.

1. Consider the data in Model 1 on the following page.

a. Each element has three numbers listed under it. Which value represents the atomic radius?

The first number under the Electron Shell Diagram

b. What are the units for the atomic radius?

pm - picometer

c. Write a complete sentence to convey your understanding of atomic radius. Note: You may not use the word "radius" in your definition.

The distance between the nucleus and the valence electrons of the atom.

2. In general, what is the trend in atomic radius as you go down a group in Model 1? Support your answer, using examples from three groups.

Atomic radius decreases as you go down a group (vertical column).
Grp #1 Li-152, Na-186, K-227 Grp #2 Ne-70, Ar-98, Kr-112
Grp #3 Be-112, Mg-160, Ca-197

3. Using your knowledge of Coulombic attraction and the structure of the atom, explain the trend in atomic radius that you identified in Question 2. *Hint:* You should discuss either a change in distance between the nucleus and outer shell of electrons or a change in the number of protons in the nucleus.

* *As you go down a group, the greater the distance between the nucleus and valence electrons, the smaller the attractive force.*

4. In general, what is the trend in atomic radius as you go across a period (left to right) in Model 1? Support your answer, using examples from two periods.

The general trend is atomic radius decreases in a period (horizontal row) moving left to right.

Grp #2 Ne-70, Mg-160, Al-143, Si-117, P-115, S-104, Cl-99, Ar-98

5. Using your knowledge of Coulombic attraction and the structure of the atom, explain the trend in atomic radius that you identified in Question 4.

As you move to the right across a period, protons are added to the nucleus. The greater number of protons increases the attractive force on the valence electrons. This decreases the atomic radius.

Periodic Trends Pogil Worksheet Extension Answers

WJ Hussar



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