

Atomic Orbitals and Periodic Trends

Definitions

You will not be asked to write a definition of any of these but I do expect you to recognize them when they are used in problems, etc..

Atomic Orbitals

Electron Shell

outer shell electrons

p orbitals

Principle Quantum Number

Quantum Mechanics

s orbitals

Shell Quantum Number

Subshells

Concepts

1. Be able to list the branch of physics that leads to the current understanding of atomic orbitals.
2. Recognize that what we know of electron positions are reflect the likelihood of finding an electron at a place, and be able to demonstrate that you know that we cannot truly know just where an electron is.
3. Be able to distinguish between p and s orbital electron distribution.
4. Be able to give the positions of orbitals with differing shell quantum numbers, relative to the nucleus of an atom.
5. Demonstrate that you understand and can follow the rules for filling atomic orbital's with electrons.
6. Recognize that the outer shell electrons, also called valence electrons, are the electrons that determine the chemistry of an element.
7. Be able to relate orbitals occupied by outer shell electrons to given regions on the periodic table.
8. Be able to relate orbital's occupied by outer shell electrons to given regions on the periodic table.
9. Be able to explain why atomic radii generally decrease across a period and increase when going down the column of a group of elements.
10. Be able to define ionization energy and electron affinity and recognize how these to aspects of elements can explain relative reactivity of elements.
11. Recognize that reactions are likely to take place between elements on either side of the noble gases (alkai metals and halogens) and be able to explain why this is.
12. Be able to explain what the very low reactivity of Noble Gases tell us about the stability of filled filled atomic orbital shells.
13. Be able to explain how what we know the stability of completely filled shells can explain the ratio of alkaline and alkali metals to halogens, and elements in the column with oxygen.

No Calculations