

Electron Configurations homework.

1. Write the full electron configuration for the elements C, Mo, and Sb.
2. Write the abbreviated electron configuration for C, Mo, and Sb.
3. How many valence electrons are there for C and Sb? (Omit transition metals for this type of question.)
4. What is the highest energy shell that electrons of antimony (Sb) occupy?
5. What are the lowest energy shell and subshell that electrons occupy?
6. Valence electrons are the outermost electrons, the electrons responsible for chemical reactivity. All of the other electrons are called core electrons. How many core electrons does an atom of carbon have?
7. What ion would the following atoms make if they became part of an ionic compound: Mg, K, P, S, I.
8. Write the electron configuration of the IONS in the question above.
9. How many orbitals are in the d subshell? How many electrons can the d subshell hold?
10. What does the "shell" number mean physically? What is the difference between orbitals in the second shell and orbitals in the third shell?
11. What does the subshell letter represent, physically?
12. How many valence electrons does an atom of argon have?

Answers:

1. C: $1s^2 2s^2 2p^2$; Mo: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^4$
Sb: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^3$
2. C: $[\text{He}] 2s^2 2p^2$; Mo: $[\text{Kr}] 5s^2 4d^4$; Sb: $[\text{Kr}] 5s^2 4d^{10} 5p^3$
3. The valence electrons C: 4, Sb: 5
4. The highest shell is 5.
5. The lowest energy shell and subshell are 1 and s.
6. Carbon has 2 core electrons.
7. Mg^{2+} K^+ (the "one" is understood), P^{3-} , S^{2-} I^- (the "one" is understood).
8. Mg^{2+} : $1s^2 2s^2 2p^6$; K^+ $1s^2 2s^2 2p^6 3s^2 3p^6$; P^{3-} $1s^2 2s^2 2p^6 3s^2 3p^6$;
 S^{2-} $1s^2 2s^2 2p^6 3s^2 3p^6$; I^- $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$
9. 5 orbitals in the d subshell; up to 10 electrons.
10. The shell represents energy. Orbitals in a shell have similar energies.
Orbitals in the second shell have lower energy than orbitals in the third shell.
11. The subshell is a set of orbitals grouped by similarities in the shapes of the orbitals.
12. Argon is a noble gas. It has 8 valence electrons.