

Week 2 Assignment

Short Answer

1. What are the horizontal rows of the periodic table called?
2. What are the vertical columns of the periodic table called?
3. What is the name of the lowest possible energy state for an electron?
4. How many electrons can be accommodated in the fourth shell of an atom?
5. How many orbitals are there in the 4p subshell?
6. How many orbitals are there in the 3d subshell?

Multiple Choice

7. Which of the following sets of numbers could be used to designate the principal energy levels (shells) in an atom?
 - a. -1, 0, 1, 2, 3
 - b. 0, 1, 2, 3, 4
 - c. 1, 2, 3, 4, 5
 - d. all of these
8. How many electrons can be accommodated in the 2d subshell?
 - a. 2
 - b. 5
 - c. 10
 - d. None, there is no 2d subshell
9. Which of the following is true of the number of subshells associated with a particular shell?
 - a. It depends on which atom is being considered.
 - b. It depends on the particular shell being considered.
 - c. It depends on both a and b.
 - d. It depends on neither a nor b.
10. Which of the following types of orbitals can hold a maximum of 10 electrons when filled?
 - a. s
 - b. p
 - c. d
 - d. f
11. Which of the following statements describe properties of orbitals?
 - a. Orbitals fill in the order of increasing energy from lowest to highest.
 - b. Each orbital can hold up to two electrons with opposite spins.
 - c. When there is a set of orbitals of equal energy each orbital becomes half filled before any of them becomes completely filled.
 - d. all of the above

12. When filling a set of orbitals of equal energy which of the following is true?
- There are no sets of orbitals of equal energy.
 - Two electrons will occupy the same orbital rather than separate orbitals.
 - Two electrons will occupy different orbitals and have opposing spins.
 - Two electrons will occupy different orbitals and have like spins.
13. Which of the following is true when comparing two electrons which are in different shells of an atom?
- The electron in the higher numbered shell is closer to the nucleus and is easier to remove.
 - The electron in the higher numbered shell is closer to the nucleus and is harder to remove.
 - The electron in the higher numbered shell is further from the nucleus and is easier to remove.
 - The electron in the higher numbered shell is further from the nucleus and is harder to remove.
14. Atoms of which of the following elements are largest?
- Al
 - Mg
 - Na
 - None, they are all the same size.
15. Atoms of which of the following elements are smallest?
- Al
 - Mg
 - Na
 - None, they are all the same size.
16. The ionization energy of an atom is which of the following?
- the energy released when an atom gains an electron
 - the energy released when an atom loses an electron
 - the energy required to add an electron to an atom
 - the energy required to remove an electron from an atom
17. Which of the following is true of the ionization energy of the elements?
- Ionization energy generally decreases as we move left to right and decreases as we move top to bottom in the periodic table.
 - Ionization energy generally decreases as we move left to right and increases as we move top to bottom in the periodic table.
 - Ionization energy generally increases as we move left to right and decreases as we move top to bottom in the periodic table.
 - Ionization energy generally increases as we move left to right and increases as we move top to bottom in the periodic table.
18. Which of the following give(s) the correct order of ionization energies?
- $\text{Li} > \text{Na} > \text{K} > \text{Rb}$
 - $\text{Na} > \text{Mg} > \text{P} > \text{Cl}$
 - both a and b
 - neither a nor b

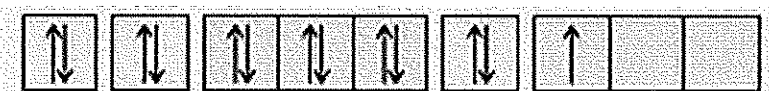
19. Which of the following is the correct order of filling orbitals?

- a. 1s, 2s, 2p, 3s, 3p, 3d, 4s
- b. 1s, 2s, 2p, 3s, 3p, 4s, 3d
- c. 1s, 2s, 3s, 4s, 2p, 3p, 3d
- d. none of these

20. Which of the following correctly represents the electronic configuration of sulfur?

- a. $1s^2 2s^2 2p^6 3s^2 3p^4$
- b. $1s^2 2s^2 2p^6 3s^2 3p_x^2 3p_y^1 3p_z^1$
- c. $[\text{Ne}] 3s^2 3p^4$
- d. all of them

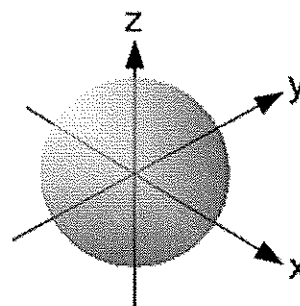
21. Which element has the following ground state electron configuration?



- a. Al
- b. Na
- c. B
- d. Ga
- e. none of these

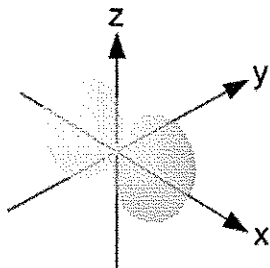
Shorter Answer

22. Which type of orbital is shown in the image (right) (e.g., s, p, d, f...) and how many electrons can this orbital hold?

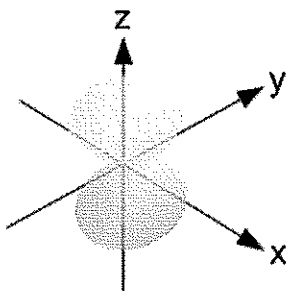


23. What is the identity of each of the three orbitals below? Be sure to use the appropriate letter for the orbital (e.g., s, p, d, f, ...) along with the correct orientation indicator (x, y, z,...)

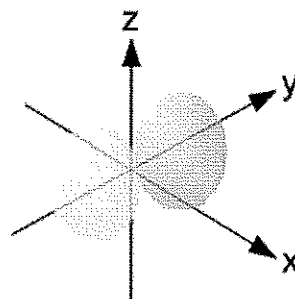
A)



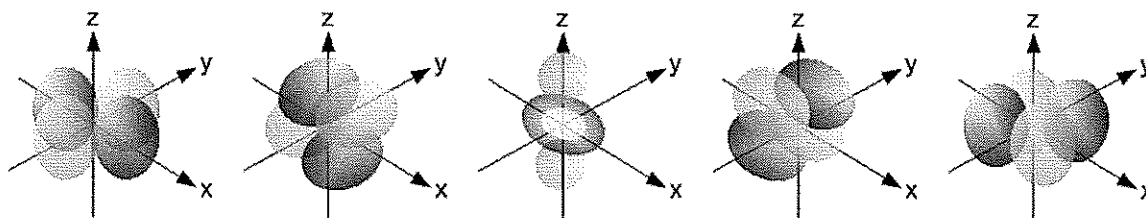
B)



C)



24. What set of orbitals are represented below? Provide only the letter indicator (e.g., s, p, d, f, ...)



25. Write out the orbital box diagram and the condensed electron configuration for Silicon:

26. Which quantum number represents the energy level of a particular electron?

27. What is the name of the rule that says no two electrons in an atom can be represented with the same set of quantum numbers?

28. What is the name of the rule that says every orbital in a sublevel (for example, within the p orbitals) is singly occupied before any orbital is doubly occupied, and moreover that all of the electrons in singly occupied orbitals have the same spin?