

Electrons in Atoms

Practice Worksheet IV

Learning Target

Explain how sublevels of principal energy levels differ.

List the three rules for writing the electron configurations of elements

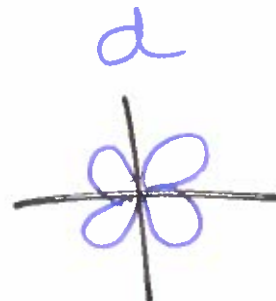
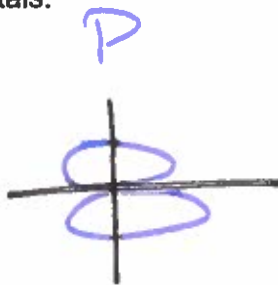
Describe what Bohr proposed in his model of the atom.

Describe what the quantum mechanical model determines about the electrons in an atom.

Explain how sublevels of principal energy levels differ.

Use your notes or textbook to help you answer the following questions.

1. [True or False] The electrons in an atom can exist between energy levels? False
2. What are the fixed energies of electrons called? energy levels
3. A quantum of energy is the amount of energy required to move an electron from its present energy level to a higher one.
4. In general, the higher the electron is on the energy ladder, the farther it is from the nucleus.
5. [True or False] The quantum mechanical model of the atom estimates the probability of finding an electron in a certain position. true
6. A(n) atomic orbital is often thought of as a region of space in which there is a high probability of finding an electron.
7. What term is used to label the energy levels of electrons? principal energy level
8. What letter is used to denote a spherical orbital? S
9. Draw the shapes of the s, p, and d orbitals.



10. What is the maximum number of electrons that can be held in each orbital?

2e⁻ in an orbital

11. What does the principal energy level describe?

the energy as PEL ↑, energy ↑

12. What is the maximum number of electrons that can be found in the s,p,d, and f sublevels?

$$S = 2e^{-}$$

$$P = 6e^{-}$$

$$d = 10e^{-}$$

$$f = 14e^{-}$$

13. The ways in which electrons are arranged into orbitals around the nuclei of atoms are called

electron configurations

14. List and describe the rules used to find the electron configurations of atoms.

1) Aufbau Principle — electrons enter the lowest energy level first.

2) Pauli Exclusion principle — the $2e^{-}$ have opposite spins

3) Hund's Rule — orbitals take $1e^{-}$ each, with parallel spins, before doubling up.

15. In an electron configuration, what does a superscript stand for?

number of electrons

16. In an electron configuration, what does the sum of the superscripts equal?

Atomic # / total # of e^{-} .

17. Filled energy sublevels are more stable than partially filled sublevels.

18. Half-filled levels are not as stable as filled levels, but are more stable than other configurations.

19. Passing the light emitted by an element through a prism gives the atomic

emission spectrum of the element.

20. [True or False] The emission spectrum of an element can be the same as the emission spectrum of another element. False

21. Only electrons moving from higher to lower energy levels lose energy and emit light.

22. What is the lowest possible energy of an electron called?

Ground State

23. [True or False] Quantum mechanics describes the motion of subatomic particles and atoms as waves. true

24. Bohr proposed that an electron is found only in specific circular paths, or orbitals, around the nucleus.

25. Orbitals, which are found in sublevels, have different shapes, depending on the energy of the electrons they contain.

26. Electron configurations can be written by using which three rules?

- 1) Aufbau's Principle
- 2) Pauli Exclusion principle
- 3) Hund's Rule

* see #
14

27. When atoms absorb energy, their electrons move to higher energy levels.