

General Chemistry – Unit 3 (Electron Cloud Structure) Exam Review

Learning Target 1 Use **QUANTUM NUMBERS** to help describe the location of electrons.

1. Describe the difference between a Bohr orbit and a Heisenberg/Schrödinger orbital. Which theory states you cannot find the exact location of an electron?
2. Fill in the following table with the correct information about **QUANTUM NUMBERS**.

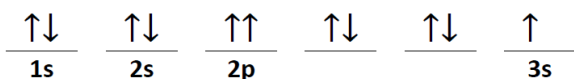
| | Abbreviation (n, l, m_l, m_s) | Description |
|------------------|--------------------------------------|-------------|
| Principle | | |
| Orbital | | |
| Magnetic | | |
| Spin | | |

3. Describe the difference between an energy SHELL and SUBSHELL.
4. For each of the following energy shells, list the specific subshells (s,p,d,f) found in that energy level
 - a. $n = 1$
 - b. $n = 2$
 - c. $n = 3$
 - d. $n = 4$
5. How many orientations (X – Y – Z axis) and electrons are possible for each subshell?
 - a. (s) subshell
 - b. (p) subshell
 - c. (d) subshell
 - d. (f) subshell
6. Which shell has more energy: $n = 3$ or $n = 6$? **Justify your answer.**

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Learning Target 2 Use **ELECTRON CONFIGURATION** to illustrate the electron cloud.

7. Define the following rules/principles for writing electron configurations.
- Aufbau Principle.
 - Hund's Rule.
 - Pauli Exclusion Principle.
8. Draw the **ORBITAL NOTATION** (arrows $\uparrow\downarrow$) for the following elements.
- Carbon (**C**)
 - Aluminum (**Al**)
 - Iron (**Fe**)
9. Write the **CONFIGURATION NOTATION** (superscripts, ns^2) for the following elements.
- Chlorine (**Cl**)
 - Zirconium (**Zr**)
 - Antimony (**Sb**)
10. Identify which rule/principle is violated in the following diagram. Justify your answer.



11. What is the highest occupied subshell for each of the following element?
- Rubidium (**Rb**)
 - Potassium (**K**)
 - Nickel (**Ni**)

Learning Target 3 Describe the relationship between **WAVELENGTH, FREQUENCY** and **ENERGY**.

12. How did Bohr describe the electron movement around the nucleus? **Draw a diagram.**

13. Assume the following movements of electrons in the atom

Electron **A** moves from $n = 1$ to $n = 3$

Electron **B** moves from $n = 3$ to $n = 5$

Electron **C** moves from $n = 6$ to $n = 2$

Electron **D** moves from $n = 4$ to $n = 1$

- Which electron(s) will have an emission spectrum?
- Which electron(s) have the greatest change in energy?

14. Describe **LIGHT DUALITY** in terms of how light behaves.

15. Describe the relationship between wavelength and frequency. Draw a diagram.

16. Explain how energy affects both wavelength and frequency.

17. If Radiation X has a longer wavelength than Radiation Z, which radiation has a higher frequency?

18. Explain the difference between a ground-state and excited-state electron.

19. How can an electron go from ground-state to excited-state?

20. Explain the difference between a **QUANTUM** and a **PHOTON**.