

CHAPTER OVERVIEW

3: The Quantum-Mechanical Model of the Atom

In this chapter, we describe how electrons are arranged in atoms and how the spatial arrangements of electrons are related to their energies. We also explain how knowing the arrangement of electrons in an atom enables chemists to predict and explain the chemistry of an element. As you study the material presented in this chapter, you will discover how the shape of the periodic table reflects the electronic arrangements of elements. In this and subsequent chapters, we build on this information to explain why certain chemical changes occur and others do not. After reading this chapter, you will know enough about the theory of the electronic structure of atoms to explain what causes the characteristic colors of neon signs, how laser beams are created, and why gemstones and fireworks have such brilliant colors. In later chapters, we will develop the concepts introduced here to explain why the only compound formed by sodium and chlorine is NaCl, an ionic compound, whereas neon and argon do not form any stable compounds, and why carbon and hydrogen combine to form an almost endless array of covalent compounds, such as CH₄, C₂H₂, C₂H₄, and C₂H₆.

[3.1: Schrödinger's Cat](#)

[3.2: The Nature of Light](#)

[3.3: Atomic Spectroscopy and The Bohr Model](#)

[3.4: The Wavelength Nature of Matter](#)

[3.5: Quantum Mechanics and The Atom](#)

[3.6: The Shape of Atomic Orbitals](#)

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