Chapter 4- Electron Configurations

4.1 Radiant Energy

What is an electromagnetic wave?

Draw a wave and label its parts (e.g. amplitude, wavelength, frequency, etc.).

What are the units of measure used to express frequency?

Write the equation which describes the relationship between wavelength and frequency.

Arrange the various types of electromagnetic radiation within the electromagnetic spectrum in order of increasing wavelength.

4.2 Quantum Theory

What is Max Planck's theory of energy emitted (or absorbed) by objects?

Write Planck's equation and constant.

How did Albert Einstein use Planck's theory to describe the photoelectric effect?

What is meant when scientists say there is a dual nature of light?

4.3 Another Look at the Atom

How does a line spectrum (atomic emission spectrum) differ from a continuous spectrum?

What is unique of atomic emission spectra of elements?

Define the following:
Quantum number
Ground state
Excited state

Explain the significance of Niels Bohr's work with hydrogen.

What are photons?

Explain the significance of Louis de Broglie's work.

What is the Heisenberg uncertainty principle?

4.4 A New Approach to the Atom

What is the quantum-mechanical model of an atom?

What is an atomic orbital?

What determines the shape of electron clouds?

What does the principal quantum number (*n*) represent?

How is the number of sublevels within each principal energy level determined?

Fill in the following table:

Orbital Type	Shape	Number of Orbitals	Maximum Number of Electrons
s			
p			
d			
f			

What is the Pauli exclusion principle?

4.5 Electron Configuration

What does electron configuration refer to?

Arrange orbitals 3d, 4s, 4p, and 5s in order of increasing energy.

Explain the Aufbau principle.

Explain Hund's rule.

What is the purpose of drawing orbital diagrams?

Describe how orbitals and spinning electrons are represented in orbital diagrams.

Describe the shorthand method (a.k.a. sublevel notation) of writing orbital diagrams.

**Sample problem and practice problems on p. 151*

How does the quantum-mechanical model of an atom help explain how substances (e.g. ingredients in fireworks) produce visible light?

Explain how copper and chromium are exceptions to the Aufbau principle.