

TEACHER RESOURCE PAGE

Lesson Plan

Section: Electron Configuration

Pacing

Regular Schedule	with lab(s): 6 days	without lab(s): 2 days
Block Schedule	with lab(s): 3 days	without lab(s): 1 day

Objectives

1. Compare the Rutherford, Bohr, and quantum models of an atom.
2. Explain how the wavelengths of light emitted by an atom provide information about electron energy levels.
3. List the four quantum numbers, and describe their significance.
4. Write the electron configuration of an atom by using the Pauli exclusion principle and the aufbau principle.

National Science Education Standards Covered

UNIFYING CONCEPTS AND PROCESSES

UCP 1 Systems, order, and organization

UCP 2 Evidence, models, and explanation

UCP 5 Form and function

PHYSICAL SCIENCE—INTERACTIONS OF ENERGY AND MATTER

PS 6c Each kind of atom or molecule can gain or lose energy only in particular discrete amounts and thus can absorb and emit light only at wavelengths corresponding to these amounts. These wavelengths can be used to identify the substance.

TEACHER RESOURCE PAGE

Lesson Plan continued

KEY

SE = Student Edition

ATE = Annotated Teacher Edition

Block 4 45 minutes

FOCUS 5 minutes

- _ **Bellringer**, ATE (GENERAL). Students sketch their concepts of the atom.

MOTIVATE 10 minutes

- _ **Discussion**, ATE (GENERAL). Use students' models from the Bellringer above and their understanding of Rutherford's atomic model in Figure 15 to discuss the problems with Rutherford's model and set the stage for the concepts in this section.

TEACH 30 minutes

- _ **Teaching Tip**, ATE (GENERAL). Show students either a CRT with a paddlewheel or a photograph of one (for example, from the catalogue of a lab equipment company). Relate the piece of equipment to the experiment described in the textbook.
- _ **Transparency, Electromagnetic Spectrum (GENERAL)**. This transparency master illustrates the electromagnetic spectrum. (Figure 18)
- _ **Using the Figure**, ATE (GENERAL). Use Figure 18 to review the parts of the electromagnetic spectrum. Make sure that students understand that the visible spectrum is a small part of the electromagnetic spectrum.
- _ **Transparency, Wavelength and Frequency (GENERAL)**. This transparency master shows that frequency and wavelength are inversely related. (Figure 19)
- _ **Using the Figure**, ATE (GENERAL). Use Figure 19 and the questions in this feature to review the frequency and wavelength of red light and violet light.

HOMEWORK

- _ **Skill Builder**, ATE (BASIC). Have students look up the following terms in a dictionary: quantum, quantum leap, quantum jump. Then, have students relate the meanings of the terms to Bohr's atomic model.
- _ **Section Review**, SE (GENERAL). Assign items 1–3.

OTHER RESOURCES

- _ **Physics Connection**, ATE (ADVANCED). Ask students to research the work of Niels Bohr.
- _ **Teaching Tip**, ATE. Use a piece of rubber tubing or rope to demonstrate waves with differing wavelengths, frequencies, and amplitudes.
- _ **go.hrw.com**
- _ **www.scilinks.org**

TEACHER RESOURCE PAGE

Lesson Plan *continued*

KEY

SE = Student Edition

ATE = Annotated Teacher Edition

Block 5 45 minutes

TEACH 40 minutes

- **Inclusion Strategies**, ATE (GENERAL). This activity helps learning disabled and developmentally delayed students as well as English language learners grasp the electromagnetic spectrum by having them draw and color a rainbow and label it with frequencies.
- **Transparency, Hydrogen's Line Emission Spectrum (GENERAL)**. This transparency master shows hydrogen's emission spectrum. (Figure 20)
- **Using the Figure**, ATE (GENERAL). Compare the number of energy transitions shown in Figure 20 with the number of lines in the hydrogen spectrum, and discuss why these numbers are different.
- **Transparency, Shapes of s, p, and d Orbital (GENERAL)**. This transparency master shows the shapes of the s, p, and d orbitals. (Figure 21)
- **Sample Problem C: Writing Electron Configurations**, SE (GENERAL). This problem demonstrates how to write electron configurations.
- **Datasheets for In-text Lab: Flame Tests**, SE (GENERAL). Students identify a set of flame-test color standards for selected metal ions and relate the colors of a flame test to the behavior of excited electrons in a metal ion. Then, students identify an unknown metal ion by using a flame test.
- **Datasheets for In-text Lab: Spectroscopy and Flame Tests**, SE (GENERAL). Students identify an unknown metal ion based on its flame test.

CLOSE 5 minutes

- **Reteaching**, ATE (BASIC). Students write down one question relating to each heading and subheading in this section.

- _ **Quiz**, ATE (GENERAL). This assignment has students write the electron configurations of Sc, K, P, and B.
- _ **Assessment Worksheet: Section Quiz** (GENERAL)

HOMEWORK

- _ **Skill Builder**, ATE (ADVANCED). This activity has students calculate the wavelength in the first three transitions of the Lyman series.
- _ **Practice Sample Problems C: Writing Electron Configurations**, SE Assign items 1–2.
- _ **Homework**, ATE (BASIC). This assignment gives students additional practice writing electron configurations. (Sample Problem C).
- _ **Section Review**, SE (GENERAL). Assign items 3–11.
- _ **Skills Worksheet: Concept Review** (GENERAL)
- _ **Interactive Tutor for ChemFile**, Module 2: Models of the Atom; Topic: Electronic Structure

OTHER RESOURCES

- _ **Demonstration**, ATE (GENERAL). This demonstration shows students the emission spectra of different elements. It begins with the spectrum for hydrogen, which is also shown in Figure 20.
- _ **Skill Builder**, ATE (ADVANCED). Have students calculate the wavelength of the first three transitions in the Lyman series.
- _ **Focus on Graphing**, SE (GENERAL).
- _ **go.hrw.com**
- _ **www.scilinks.org**