# Week Three Assignment

ITL528

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# Standards

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|---|---|
| Content Standard | **HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**<br><br>**HS-PS1-8: Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.** |
| Visual and Performing Arts Standard | **Acc.MA:Cr1. Strategically utilize generative methods to formulate multiple ideas, and refine artistic goals to increase originality in media arts creation processes.** |

# Learning Objective

- Explain the historical development of atomic theory and key contributors.
- Describe the structure of the atom, including protons, neutrons, and electrons.
- Differentiate between atomic number, atomic mass, and isotopes.
- Explain electron configurations and how they relate to chemical behavior.
- Interpret periodic trends (atomic radius, ionization energy, electronegativity etc.) in relation to atomic structure.

# Lesson Plan Rationale

**Prior Academic Knowledge:**

- Inquire about prior knowledge of matter and atoms as a review material from 8th grade standards
- Use analogy: cutting paper in half multiple times

**Student Assets and Learning Needs:**

- Utilize data from discussion and pre-assessment to inform both pace and content.
- Review 8th grade content as necessary.
- Discuss ancient Indian, Greek, or Chinese concepts of atoms.
- Students from agricultural backgrounds may understand concepts of chemical compounds.
- Introduce key terms (e.g., *proton, neutron, electron*) in both English and native languages

# Day One

**Daily Learning Objective or Outcome:**

- Understand the evolution of atomic theory.
- Identify key contributors to the atomic theory.

**Overview:**:

- Introduction to the concept of atoms and early ideas (Democritus).
- John Dalton’s Atomic Theory.
- J.J. Thomson's discovery of the electron (Cathode Ray Experiment).
- Ernest Rutherford's gold foil experiment and discovery of the nucleus.
- Niels Bohr's model and introduction to electron orbits.

# Overview: Day One

**Warm-up (10 min):**

- Ask students: “What do you already know about atoms?”
- Discuss student responses as a class.

**Guided Instruction (20 min):**

- Present the history of atomic theory development (Democritus → Dalton → Thomson → Rutherford → Bohr).
- Use diagrams or videos to illustrate each model's features.

**Group Work (15 min):**

Students complete a timeline activity in small groups, matching scientists with their discoveries and models.

**Exit Ticket (5 min):**

Name one experiment that contributed to atomic theory and what it discovered.

# Day Two

**Daily Learning Objective or Outcome:**

- Understand the structure of an atom: nucleus, protons, neutrons, electrons.
- Differentiate between atomic number and atomic mass.

**Daily Overview**:

- Subatomic particles: protons, neutrons, electrons (location, charge, and mass).
- Atomic number and atomic mass.
- Isotopes
- Ions.

# Overview: Day Two

**Warm-up (5 min):**

- Review key scientists from Day 1 with a quick class poll or Kahoot quiz.

**Direct Instruction (20 min):**

- Explain the structure of atoms, focusing on the nucleus (protons + neutrons) and electron clouds.
- Discuss the properties of protons (positive charge), neutrons (neutral), and electrons (negative).

**Guided Practice (15 min):**

- Students create an original art piece with there conception of proton, neutron, and electron structure in atoms.

**Exit Ticket (5 min):**

- Ask students to summarize today’s lesson in one sentence.

# Day Three

**Daily Learning Objective or Outcome:**

- Understand atomic electron configuration.
- Explain how electron configurations relate to the chemical properties of elements.

**Daily Overview**:

- Energy levels and electron orbitals.
- Aufbau principle, Pauli exclusion principle, and Hund's rule.
- Electron configuration notation.
- Introduction to the quantum mechanical model of the atom.

# Overview: Day Three

**Warm-up (5 min):**

- How are protons, neutrons, and electrons arranged in an atom?

**Direct Instruction (20 min):**

- Introduce isotopes (same element, different neutrons) and ions (charged atoms).
- Use examples like carbon isotopes and sodium ions to illustrate.
- Teach students how to calculate atomic mass from isotope abundance.

**Guided Practice (15 min):**

- Students work in pairs on a worksheet to practice identifying isotopes and calculating atomic masses.

**Exit Ticket (5 min):**

- Define isotope and ion in your own words.

# Day Four

**Daily Learning Objective or Outcome:**

- Identify periodic trends in atomic structure.
- Explain how atomic structure affects properties such as atomic radius, ionization energy, and electronegativity.

**Overview of each day**:

- Periodic trends
    a. atomic radius,
    b. Nth ionization energy,
    c. electronegativity).
- How electron configurations influence these trends.

# Overview: Day Four

**Warm-up (5 min):**

- What are isotopes and ions?

**Direct Instruction (20 min):**

- Explain energy levels, electron shells, and how electrons are arranged (2-8-8 rule).
- Demonstrate how to write electron configurations (e.g., $1s^2\ 2s^2\ 2p^6$).

**Guided Practice (15 min):**

- Students practice writing electron configurations for elements up to Calcium (Z=20).

**Exit Ticket (5 min):**

- Explain why atomic size decreases across a period.

# Day Five

**Daily Learning Objective or Outcome:**

- Review key concepts from the week.
- Demonstrate understanding of atomic theory, structure, electron configurations, and periodic trends.

**Overview of each day**:

- - Review of
    a. atomic theory
    b. atomic structure
    c. electron configuration
    d. periodic trends

# Overview: Day Five

**Warm-up (5 min):**

- Quick review using a short game or flashcards.

**Quiz (25 min):**

- Administer a short quiz covering key concepts: atomic models, subatomic particles, isotopes, ions, and electron configurations.

**Application Activity (15 min):**

- Students read a short article or case study on the importance of atomic theory in fields like medicine or energy.
- Discuss as a class how understanding atoms influences technology and science.

**Reflection (5 min):**

- Students complete a reflection sheet: “What was the most interesting thing you learned this week?”

# Instructional Strategies

- Provide visual aids for students who need additional support.
- Group work for collaborative learners.
- Challenge advanced students with complex atoms for electron configuration tasks.
- For Struggling Students: Use visual aids, provide guided notes, and offer extra practice worksheets.
- For Advanced Students: Assign optional readings on quantum mechanics and allow them to explore more complex electron configurations.

# Academic Language Development

- Content specific terms:
  - atom
  - proton
  - neutron
  - electron
  - nucleus
  - atomic mass
  - atomic number
  - isotope
  - ion

- General Academic Terms:
  - Model
  - Theory
  - Structure
  - Experiment

- General Strategies:
  - Word wall
  - Vocabulary Cards
  - Native language glossary

# Assessments

- Informal and formative assessments throughout the week:
  - Warm-up and exit tickets
  - Kahoot/Online quizzes
  - Pair/small group problem solving
  - Cold calling
- Use of data to inform your next steps.
  - Target teaching
  - Flexible grouping
  - Reteaching
  - Scaffolding(i.e. Vocabulary support and sentence frames).

# Focus Students

- **Jun**
  - Scaffolding(i.e. Vocabulary support and sentence frames).
  - Provide graphic organizers such as concept maps
  - Native language glossary
- **Juan**
  - Provide specified accommodations detailed in IEP (the link to the IEP in provided resources does not work).
  - Access Juan's current knowledge about robotics to explain ions and electrons
- **Benji**
  - Preferential seating
  - Scaffolding and electronic resources

# Formative Assessment

- The formative assessment utilizing a digital tool is an atom game. This is a simulation game from PhET. On the webpage for the assignment, I instruct students to keep their window open until I can check their performance on the assessment.

# Summative Assessment

- choice board
- rubric

# Summative Assessment Rationale

The choice board allows students to work with different media, formats, and approaches while ensuring they engage with the core concepts of atomic theory. I have divided the assessments into three categories covering content knowledge, real-world application and creativity and synthesis.

The rubric is general and adaptable to different project formats and selection. The goal being to ensure students receive feedback pertaining to content knowledge and their ability to analyze and synthesize the subject matter pertaining to atomic theory.