

# Unit 04: The Periodic Table and Classifying Elements (Week 27-36)

Content Area: **Template**

Course(s):

Time Period: **Full Year**

Length: **6 weeks**

Status: **Published**

## Standards Alignment

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### PS1.A: Structure and Properties of Matter

- 6-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.
- 6-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

### PS1.A: Structure and Properties of Matter

- 7-PS1-1: Develop and use models to describe the atomic composition of substances.
- 7-PS1-2: Analyze and interpret data on the properties of substances before and after interactions to determine if a chemical reaction has occurred.

### PS1.A: Structure and Properties of Matter

- 8-PS1-1: Develop models to describe the atomic composition of molecules and explain how the Periodic Table organizes elements based on properties.
- 8-PS1-2: Construct an explanation based on evidence for how the properties of substances depend on the atomic-level structure.
- 8-PS1-3: Gather and evaluate information to describe how synthetic materials are derived from natural resources and how they impact society.

SCI.MS-PS1	Matter and its Interactions
SCI.MS-PS1-1	Develop models to describe the atomic composition of simple molecules and extended structures.
SCI.MS-PS1-2	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
SCI.MS-PS1-3	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
SCI.MS-PS1-4	Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
SCI.MS-PS1-5	Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
SCI.MS-PS1-6	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

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## **Integration of Career Readiness, Life Literacies and Key Skills**

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CAEP.9.2.8.B.2	Develop a Personalized Student Learning Plan with the assistance of an adult mentor that includes information about career areas of interest, goals and an educational plan.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
CAEP.9.2.8.B.4	Evaluate how traditional and nontraditional careers have evolved regionally, nationally, and globally.
CAEP.9.2.8.B.5	Analyze labor market trends using state and federal labor market information and other resources available online.
CAEP.9.2.8.B.6	Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce.
CAEP.9.2.8.B.7	Evaluate the impact of online activities and social media on employer decisions.

## **Technology / Integration of Computer Science and Design Thinking**

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CS.6-8.8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
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## **Interdisciplinary Connections: NJSLs for ELA, Social Studies, Science and/or Math Section**

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LA.RL.7.4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of rhymes and other repetitions of sounds (e.g., alliteration) on a specific verse or stanza of a poem or section of a story or drama.
LA.RI.7.1	Cite several pieces of textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.RI.7.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone.
LA.RI.7.9	Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and

background knowledge) how two or more authors writing about the same topic shape their presentations of key information by emphasizing different evidence or advancing different interpretations of facts.

## **Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy**

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see Crosswalks

## **21st Century Life and Careers**

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## **Stage I: Desired Results**

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## **Transfer/Overview/Rationale**

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### **Transfer / Overview / Rationale**

#### Unit Rationale

The purpose of this unit...

Chemistry deals with the composition, structures, and properties of matter; and the interactions between different types of matter, and the relationship between matter and energy. Through the learning of chemistry, it is possible to acquire relevant conceptual and procedural knowledge. The study of chemistry also helps to develop understanding and appreciation of developments in engineering, medicine and other related scientific and technological fields.

Furthermore, learning about the contributions, issues and problems related to innovations in chemistry will help students to develop a holistic view of the relationships between science, technology and society.

## Meaning

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### Essential Questions

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What evidence led scientists to conclude that matter is made of atoms?

Why do we organize the elements into a periodic table?

How can we use the properties of elements to categorize them?

Why is it important to understand the properties of different types of matter?

How can newly discovered elements be incorporated into the periodic table?

How do you explain the continuum between ionic and covalent bonding?

### Enduring Understanding/Indicators of Understanding

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Matter has properties related to its structure that can be measured and used to identify, classify and describe substances or objects.

The atomic structures of materials determine their properties

The make-up of the atom is essential in understanding the properties of materials and how they interact with other substances.

The periodic table provides a way of mapping the elements in such a way that much useful information can be incurred about individual elements.

Bonding occurs in patterns related to the periodic table.

## **Acquisition (Student Learning Objectives)**

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### **Knowledge**

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Knowledge

Students will know...

*Chemistry, defined as the study of matter and its interactions, is also known as the "Central Science." Chemistry is essential to understand the physical and biological world; observed patterns in nature guide organization and classification.*

**Chemistry Is Classified In Small Disciplines:** Chemical knowledge is understood best by observing and representing matter at multiple levels. It is important to recognize that the tiniest levels influence what occurs and is observed at higher levels.

**Matter is Predictable:** Matter, on all levels, has predictable properties that can be related to structures of the elements that make up that matter. These properties, resulting from the electronic and atomic structures, are responsible for behavior of elements, compounds, and mixtures on all levels. The periodic table is a useful tool for the organization of these properties on the elemental level.

**The Periodic Table Is A Standard Tool:** The arrangement of the periodic table is based on structures, patterns, and relationships. The periodic table is dynamic as a result of scientific discovery.

**Scientific Communication Is Systematic:** Communicating information about chemical concepts is highly dependent upon understanding the symbolism and conventions used to represent matter and information about matter.

## **Skills**

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### Skills

Student will be skilled at ...

Students will understand that all matter is composed of extremely small parts called atoms. Each atom has unique properties, depending upon the number and arrangement of the subatomic particles within it.

Students will apply knowledge of matter and its unique properties to address patterns found in the environment.

Students will recognize that the periodic table is a systematic way of arranging the chemical elements. The elements exhibit periodic properties that can be used to predict their characteristics, including the likelihood they will form compounds and participate in chemical reactions.

Students will discover that there is an orderly progression from the lightest to the heaviest atoms and that this pattern is organized on the Periodic Table of elements.

Students will discover that unknown elements were predicted based on empty spaces in the table.

Students will be introduced to the idea that chemical changes can be explained in terms of the arrangement and motion of atoms and molecules.

Students will accept that the Periodic Table continues to be useful as more is learned about the structural parts of atoms, their electrical charges, and their associated properties.

## **Stage 3: Learning Plan**

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## **Resource and Mentor Texts**

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Resources and Mentor Texts

Internet/Videos

Interactive Notebooks/Materials

Google Presentations

Interactive Websites

Document Camera

Lab Materials

Copies of Student Activity Materials

## **Formative Assessment Strategies**

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Formative Assessment Strategies

Observation/Discussion/Informal Questioning

Interactive Notebook Activities/Graphic Organizers

Quizzes/Checkpoints/Wrap-Ups

Peer/Self Assessments (Reflection)

Notebook Checks

Virtual labs

## **Learning Activities/Unit of Study**

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Learning Activities/Unit of Study

Atoms and the Atomic Theory: Introduction to Atoms Stations; Atomic Structure Virtual Lab; Atomic Theory Research Project

The Periodic Table: Interacting with the Periodic Table Game; Color Coding the Periodic Table

Properties and Interactions of Matter: Properties of Matter Activities; Chemistry Stations

Balancing Chemical Equations: Balancing Chemical Equations Hands-On Activity; Kesler Lab Stations

Covalent and Ionic Bonding: Plate Pairs Bonding Activity; Candy Compounds

[Introduction to Atoms Stations](#)

[Atomic Structure Virtual Lab](#)

[Interacting with the Periodic Table Game](#)

[Properties of Matter Activities](#)

[Balancing Chemical Equations Hands-On Activity](#)

[Balancing Chemical Equations: Kesler Lab Stations](#)

[Plate Pairs Bonding Activity](#)

[Candy Compounds.pdf](#)

## **Modifications and/or Accommodations**

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**Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)**

### **English Language Learners**

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This

could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

## Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

## Students with 504 Plans

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## Gifted & Talented Strategies

**Extensions/Enrichments:** Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

**Modify/Change Activities:** Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

## Students at Risk of School Failure

**Directions or Instructions:** Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

**Peer Support:** Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

**Alternate or Modified Assignments:** Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

**Increase One to One Time:** When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

**Contracts:** It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

**Hands On:** As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

**Tests/Assessments:** Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

**Seating:** Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.

