

Standard #: SC.912.P.8.4

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Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.

General Information

Subject Area: Science

Grade: 912

Body of Knowledge: Physical Science

Idea: Level 3: Strategic Thinking & Complex Reasoning

Standard: Matter -

Date Adopted or Revised: 02/08

A. A working definition of matter is that it takes up space, has mass, and has measurable properties. Matter is comprised of atomic, subatomic, and elementary particles.

B. Electrons are key to defining chemical and some physical properties, reactivity, and molecular structures. Repeating (periodic) patterns of physical and chemical properties occur among elements that define groups of elements with similar properties. The periodic table displays the repeating patterns, which are related to the atom's outermost electrons. Atoms bond with each other to form compounds.

C. In a chemical reaction, one or more reactants are transformed into one or more new products. Many factors shape the nature of products and the rates of reaction.

D. Carbon-based compounds are building-blocks of known life forms on earth and numerous useful natural and synthetic products.

Content Complexity Rating: [Level 3: Strategic Thinking & Complex Reasoning](#) - [More Information](#)

Date of Last Rating: 05/08

Status: State Board Approved

Related Courses

Course Number	Course Title
2002110:	M/J Comprehensive Science 3, Advanced (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2001350:	Astronomy Solar/Galactic (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2020910:	Astronomy Solar/Galactic Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003340:	Chemistry 1 (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003350:	Chemistry 1 Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2002400:	Integrated Science 1 (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2002410:	Integrated Science 1 Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003400:	Nuclear Radiation (Specifically in versions: 2014 - 2015, 2015 - 2018 (course terminated))
2020710:	Nuclear Radiation Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003310:	Physical Science (Specifically in versions: 2015 - 2022 (current), 2022 and beyond)
2003320:	Physical Science Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003390:	Physics 1 Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003600:	Principles of Technology 1 (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003610:	Principles of Technology 2 (Specifically in versions: 2014 - 2015, 2015 - 2018 (course terminated))
2003020:	M/J Physical Science, Advanced (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003800:	Florida's Preinternational Baccalaureate Chemistry 1 (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
7920011:	Access Chemistry 1 (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 and beyond (current))
7920025:	Access Integrated Science 1 (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 and beyond (current))
2002085:	M/J Comprehensive Science 2 Accelerated Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2002405:	Integrated Science 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2020 (course terminated))
2003345:	Chemistry 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003836:	Florida's Preinternational Baccalaureate Physics 1 (Specifically in versions: 2015 - 2022 (current), 2022 and beyond)
7920022:	Access Physical Science (Specifically in versions: 2016 - 2018, 2018 and beyond (current))

Related Access Points

Access Points Number	Access Points Title
SC.912.P.8.In.3:	Identify the nucleus as the center of an atom.
SC.912.P.8.Su.3:	Recognize that atoms are tiny particles in materials, too small to see.
SC.912.P.8.Pa.3:	Recognize that the parts of an object can be put together to make a whole.

Related Resources

Lesson Plans

Name	Description
Atomic Theory Stations - Eckert:	This is a set of 8 stations (each station lasts 15-20 minutes) that students may complete individually or in small groups. The stations focus on the development of the atomic theory and introduce students to the concept of the subatomic particles, how they were discovered, and where they are located within the atom. The stations can be grouped together and used as one lesson for 2-3 consecutive days, or they can be split into smaller increments and used over the course of several lessons.
The Structure of an Atom and its Particles:	In this lesson, the 5E model is used to teach students about the structure of an atom. Students will study the atom's subatomic particles, including their masses, electrical charges, and locations.
BIOSCOPE Summer Institute 2013 - Atomic Models:	This lesson is designed to be part of a sequence of lessons. It follows CPALMS Resource #52952 "BIOSCOPE Summer Institute 2013 - Solutions." The lesson employs a predict, observe, explain approach along with inquiry-based activities to enhance student understanding of atomic structure.
Mystery Isotopes:	Through this engaging activity students work as a group to create models of isotopes with stickers and construction paper. Students also use models created by their peers to analyze the number of subatomic particles and determine isotopes' names. All worksheets and data collection sheets are included.
To Friend or Not Friend:	The in this activity on chemical bonding, students will mimic Facebook, choosing "friends" based on their oxidation number. When the oxidation numbers of two or more elements equal zero, a stable bond has been formed. The purpose of this activity is for students to understand the rules for which elements bond to make compounds.
All in the Family:	This lesson allows the students to become familiar with the elements on the periodic table. The students play a game of go fish using cards they've made from index cards. The students match the cards according to their oxidation number in a similar pattern to how the game go fish is played. The students also use the index cards to make flash cards of their elements and use the cards as a study tool. The students will learn how subatomic particles and chemical characteristics determine the placement of elements on the periodic table.

Perspectives Video: Expert

Name	Description
Properties and Structures of Subatomic Particles:	Do you know everything about protons? Are you positive? Download the CPALMS Perspectives video student note taking guide .

Teaching Ideas

Name	Description
CERN:	This PBS/NOVA presentation tells the story of the CERN and the Large Hadron Collider project - an amazing ongoing investigation in search of an answer to the mysteries that still exist in particle physics. Recommended discussions and activities before and after the video are provided.
Island of Stability:	A video and supporting activities about the Periodic Table. The context is man's quest to create elements. The focus is atomic structure and atomic theory.

Video/Audio/Animations

Name	Description
Element Math Game:	Students determine the number of protons, electrons, neutrons, and nucleons for different atoms
Science Crossword Puzzles:	A collection of crossword puzzles that test the knowledge of students about some of the terms, processes, and classifications covered in science topics

Virtual Manipulatives

Name	Description
Build an Atom:	Build an atom out of protons, neutrons, and electrons, and see how the element, charge, and mass change. Then play a game to test your ideas!
Introduction to Compounds - How Atoms Bond:	I use this simulation as an introduction to molecules and compounds to help students understand that atoms are not randomly joined to form a compound/molecule, but join in very specific patterns. In order to successfully complete the simulation activity, students must re-arrange molecules various ways. (In CH ₃ COOH, both oxygens are bonded to the carbon atom, for example)

Student Resources

Perspectives Video: Expert

Name	Description
	Do you know everything about protons? Are you positive?

Video/Audio/Animations

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Parent Resources

Perspectives Video: Expert

Name	Description
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Properties and Structures of Subatomic Particles:	Download the CPALMS Perspectives video student note taking guide.