Standard #: SC.912.P.8.3

This document was generated on CPALMS - www.cpalms.org

Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.

General Information

Subject Area: Science

Grade: 912

Body of Knowledge: Physical Science

Idea: Level 3: Strategic Thinking & Complex Reasoning

Standard: Matter -
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.

Date Adopted or Revised: 02/08

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
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)
2003320:	Physical Science Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)
2003380:	Physics 1 (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)
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))
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)
2003385:	Physics 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2020 (course terminated))
2003836:	Florida's Preinternational Baccalaureate Physics 1 (Specifically in versions: 2015 - 2022 (current), 2022 and beyond)

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
The History of the Atomic Model:	The lesson is about the five scientists and their contributions to the theory of the atomic model. The scientists that we will study are John Dalton, J. J. Thompson, Ernest Rutherford and Niels Bohr. The students will also investigate what the present atomic model looks like and why the scientists have concluded that this is now the electron cloud model.
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.

Perspectives Video: Expert

Name	Description
The Discovery and Behavior of Antimatter:	Learn more about the atomic model and antimatter! Download the CPALMS Perspectives video student note taking guide.

Teaching Idea

Name	Description
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.

Text Resources

Name	Description
Avogadro: Voice in the Wilderness:	This informational text resource is intended to support reading in the content area. The article explains how Avogadro's hypothesis, proposed prior to the publishing of Dalton's atomic theory, was initially rejected. But his hypothesis turned out to be the key to solving many problems facing chemistry in the 1800s. The article describes how the later acceptance of his original idea changed the subject forever and even allowed for the creation of the periodic table.
History Of Chemistry/Famous Chemists:	This informational text resource is intended to support reading in the content area. This article describes the history of chemistry through the scientific findings and major contributions of several important chemists. These chemists, including Joseph Priestly, Dmitri Mendeleev, and Niels Bohr, discovered properties of gases and other materials, developed the Law of Conservation of Mass and the periodic table, and contributed to the development of atomic theory.

Virtual Manipulatives

Name	Description
Models of the Hydrogen Atom Simulation:	How did scientists figure out the structure of atoms without looking at them? Try out different models by shooting light at the atom. Check how the prediction of the model matches the experimental results.
Rutherford Scattering:	This virtual manipulative will help you investigate how Rutherford figured out the structure of the atom without being able to see it. This simulation will allow the you to explore the famous experiment in which Rutherford disproved the Plum Pudding model of the atom by observing alpha particles bouncing off atoms and determining that they must have a small core. Further explorations of the tutorial could include: • Describe the qualitative difference between scattering off positively charged nuclei and electrically neutral plum pudding atoms. • For a charged nucleus, describe qualitatively how angle of deflection depends on: energy of incoming particle, impact parameters, and charge of target.

Student Resources

Perspectives Video: Expert

Name	Description
The Discovery and Behavior of Antimatter:	Learn more about the atomic model and antimatter! Download the CPALMS Perspectives video student note taking guide.

Virtual Manipulatives

Name	Description
Models of the Hydrogen Atom Simulation:	How did scientists figure out the structure of atoms without looking at them? Try out different models by shooting light at the atom. Check how the prediction of the model matches the experimental results.
	This virtual manipulative will help you investigate how Rutherford figured out the structure of the atom without being able to see it.

Rutherford Scattering:	This simulation will allow the you to explore the famous experiment in which Rutherford disproved the Plum Pudding model of the atom by observing alpha particles bouncing off atoms and determining that they must have a small core. Further explorations of the tutorial could include: • Describe the qualitative difference between scattering off positively charged nuclei and electrically neutral plum pudding atoms. • For a charged nucleus, describe qualitatively how angle of deflection depends on: energy of incoming particle, impact parameters, and charge of target.

Parent Resources

Perspectives Video: Expert

Name	Description
The Discovery and Behavior of Antimatter:	Learn more about the atomic model and antimatter! Download the CPALMS Perspectives video student note taking guide.

Virtual Manipulative

Name	Description
Rutherford Scattering:	This virtual manipulative will help you investigate how Rutherford figured out the structure of the atom without being able to see it. This simulation will allow the you to explore the famous experiment in which Rutherford disproved the Plum Pudding model of the atom by observing alpha particles bouncing off atoms and determining that they must have a small core. Further explorations of the tutorial could include: • Describe the qualitative difference between scattering off positively charged nuclei and electrically neutral plum pudding atoms. • For a charged nucleus, describe qualitatively how angle of deflection depends on: energy of incoming particle, impact parameters, and charge of target.