



# Standard #: SC.912.P.8.5

This document was generated on CPALMS - [www.cpalms.org](http://www.cpalms.org)

Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.

## General Information

**Subject Area:** Science

**Grade:** 912

**Body of Knowledge:** Physical Science

**Idea:** Level 2: Basic Application of Skills & Concepts

**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 2: Basic Application of Skills & Concepts](#) - [More Information](#)

**Date of Last Rating:** 05/08

**Status:** State Board Approved

## Related Courses

| Course Number            | Course Title   |
|--------------------------|--|
| <a href="#">2002110:</a> | M/J Comprehensive Science 3, Advanced (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)                |
| <a href="#">2003340:</a> | Chemistry 1 (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)  |
| <a href="#">2003350:</a> | Chemistry 1 Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)                                   |
| <a href="#">2002400:</a> | Integrated Science 1 (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)                                 |
| <a href="#">2002410:</a> | Integrated Science 1 Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)                          |
| <a href="#">2003400:</a> | Nuclear Radiation (Specifically in versions: 2014 - 2015, 2015 - 2018 (course terminated))   |
| <a href="#">2020710:</a> | Nuclear Radiation Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)                             |
| <a href="#">2003310:</a> | Physical Science (Specifically in versions: 2015 - 2022 (current), 2022 and beyond)  |
| <a href="#">2003320:</a> | Physical Science Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)                              |
| <a href="#">2003020:</a> | M/J Physical Science, Advanced (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)                       |
| <a href="#">2003800:</a> | Florida's Preinternational Baccalaureate Chemistry 1 (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond) |
| <a href="#">7920011:</a> | Access Chemistry 1 (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 and beyond (current))                                   |
| <a href="#">7920025:</a> | Access Integrated Science 1 (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 and beyond (current))                          |
| <a href="#">2002085:</a> | M/J Comprehensive Science 2 Accelerated Honors (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)       |
| <a href="#">2002405:</a> | Integrated Science 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2020 (course terminated))                    |
| <a href="#">2003345:</a> | Chemistry 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2022 (current), 2022 and beyond)                      |
| <a href="#">7920022:</a> | Access Physical Science (Specifically in versions: 2016 - 2018, 2018 and beyond (current))   |

## Related Access Points

| Access Points Number             | Access Points Title  |
|----------------------------------|--|
| <a href="#">SC.912.P.8.In.4:</a> | Recognize that the periodic table includes all known elements.             |
| <a href="#">SC.912.P.8.Su.4:</a> | Recognize examples of common elements, such as oxygen and hydrogen.        |
| <a href="#">SC.912.P.8.Pa.3:</a> | Recognize that the parts of an object can be put together to make a whole. |

## Related Resources

### Lesson Plans

| Name  | Description  |
|---|--|
| <a href="#">Periodic Organization:</a>                          | This lesson explores how Mendeleev organized the periodic table by explaining the different trends and properties of elements. Students can determine the different relative properties of an element based on its location on the periodic table.   |
| <a href="#">Rodent Infestation:</a>                             | The lesson integrates language arts and science through the use of a Model Eliciting Activity. The lesson requires student collaboration to develop a solution to a problem. Chemistry is integrated because they must utilize their knowledge of the periodic table.  |
| <a href="#">BIOSCOPE Summer Institute 2013 - Atomic Models:</a> | 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.   |
| <a href="#">Last...but certainly not the least:</a>             | Through this activity, students will create a periodic table with Electron Dot Diagrams. This investigation allows students to explore and recognize patterns of the periodic table. This lesson allows students to draw conclusions and clearly demonstrates that atoms of elements in the same group have the same number of valence electrons while sharing similar properties and characteristics.   |
| <a href="#">To Friend or Not Friend:</a>                        | 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.  |
| <a href="#">All in the Family:</a>                              | 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. |

### Teaching Idea

| Name                                 | Description   |
|--------------------------------------|---|
| <a href="#">Island of Stability:</a> | 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  |
|--|--|
| <a href="#">Periodic Table of the Elements:</a>                        | This informational text resource is intended to support reading in the content area. This simple text explains the basics of how the periodic table is organized and summarizes the information that the table includes about each element.  |
| <a href="#">Chemistry Unearths the Secrets of the Terracotta Army:</a> | This informational text resource is intended to support reading in the content area. In 1974 a group of Chinese farmers digging a well came across a great discovery: the Terracotta Army from the tomb of the first emperor of China. Since the discovery, archaeologists have been researching many aspects of the artifacts. Recently, with the use of chemistry, they have been able to determine many details of the weapons of the Terracotta Army, including their chemical composition and production techniques.  |
| <a href="#">American Elements:</a>                                     | This web site features an interactive periodic chart that provides information on the elements, including a description, physical and thermal properties, abundance, isotopes, ionization energy, the element's discoverer, translations of element names into several languages, and bibliographic information on research-and-development publications involving the element. Additional information includes technical information and information on manufactured products for elemental metals, metallic compounds, and ceramic and crystalline products. The American Elements company manufactures engineered and advanced material products. |

### Unit/Lesson Sequence

| Name   | Description  |
|--|--|
| <a href="#">Middle School Chemistry Unit   Chapter 4   The Periodic Table &amp; Bonding:</a> | Students look more deeply into the structure of the atom and play a game to better understand the relationship between protons, neutrons, electrons, and energy levels in atoms and their location in the periodic table. Students will also explore covalent and ionic bonding. |

### Video/Audio/Animations

| Name                                       | Description   |
|--|---|
| <a href="#">Alkali Metals in Water:</a>    | This short YouTube video offers an amusing means for students to learn about the way alkali metals react in water. When teaching trends of the Periodic Table this video works well emphasizing similar properties of groups. |
| <a href="#">Science Crossword Puzzles:</a> | 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   |
|---------------------------------|---|
| <a href="#">Periodic Table:</a> | This unique periodic table presents the elements in an interesting visual display. Select an element to find an image of the element, a description, history, and even an animation. Other chemical data is linked as a PDF file (requires Acrobat Reader). |

|   |   |
|---|---|
| <a href="#">Electron Configurations:</a>                    | The electron configuration of an atom is the representation of the arrangement of electrons that are distributed among the orbital shells and subshells. The simulated activity will help the learners practice the arrangement of the electrons. The learners will be required to follow rules in order to correctly divide the electrons in the orbitals based on the valency of the atom.  |
| <a href="#">Introduction to Compounds - How Atoms Bond:</a> | 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 <sub>3</sub> COOH, both oxygens are bonded to the carbon atom, for example)  |
| <a href="#">Understanding Polarity:</a>                     | Understanding molecular polarity by changing the electron-negativity of atoms in a molecule to see how it affects polarity. See how the molecule behaves in an electric field. Change the bond angle to see how shape affects polarity. See how it works for real molecules in 3D.<br><br>Some learning goals: <ul style="list-style-type: none"> <li>•predict bond polarity using electron-negativity values</li> <li>•indicate polarity with a polar arrow or partial charges</li> <li>•rank bonds in order of polarity</li> <li>•predict molecular polarity using bond polarity and molecular shape</li> </ul> |

## Student Resources

### Text Resource

| Name                               | Description  |
|------------------------------------|--|
| <a href="#">American Elements:</a> | This web site features an interactive periodic chart that provides information on the elements, including a description, physical and thermal properties, abundance, isotopes, ionization energy, the element's discoverer, translations of element names into several languages, and bibliographic information on research-and-development publications involving the element. Additional information includes technical information and information on manufactured products for elemental metals, metallic compounds, and ceramic and crystalline products. The American Elements company manufactures engineered and advanced material products. |

### Video/Audio/Animation

| Name                                       | Description   |
|--|---|
| <a href="#">Science Crossword Puzzles:</a> | 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   |
|--|---|
| <a href="#">Periodic Table:</a>          | This unique periodic table presents the elements in an interesting visual display. Select an element to find an image of the element, a description, history, and even an animation. Other chemical data is linked as a PDF file (requires Acrobat Reader).   |
| <a href="#">Electron Configurations:</a> | The electron configuration of an atom is the representation of the arrangement of electrons that are distributed among the orbital shells and subshells. The simulated activity will help the learners practice the arrangement of the electrons. The learners will be required to follow rules in order to correctly divide the electrons in the orbitals based on the valency of the atom.  |
| <a href="#">Understanding Polarity:</a>  | Understanding molecular polarity by changing the electron-negativity of atoms in a molecule to see how it affects polarity. See how the molecule behaves in an electric field. Change the bond angle to see how shape affects polarity. See how it works for real molecules in 3D.<br><br>Some learning goals: <ul style="list-style-type: none"> <li>•predict bond polarity using electron-negativity values</li> <li>•indicate polarity with a polar arrow or partial charges</li> <li>•rank bonds in order of polarity</li> <li>•predict molecular polarity using bond polarity and molecular shape</li> </ul> |

## Parent Resources

### Virtual Manipulatives

| Name                                     | Description   |
|--|---|
| <a href="#">Electron Configurations:</a> | The electron configuration of an atom is the representation of the arrangement of electrons that are distributed among the orbital shells and subshells. The simulated activity will help the learners practice the arrangement of the electrons. The learners will be required to follow rules in order to correctly divide the electrons in the orbitals based on the valency of the atom.  |
| <a href="#">Understanding Polarity:</a>  | Understanding molecular polarity by changing the electron-negativity of atoms in a molecule to see how it affects polarity. See how the molecule behaves in an electric field. Change the bond angle to see how shape affects polarity. See how it works for real molecules in 3D.<br><br>Some learning goals: <ul style="list-style-type: none"> <li>•predict bond polarity using electron-negativity values</li> <li>•indicate polarity with a polar arrow or partial charges</li> <li>•rank bonds in order of polarity</li> <li>•predict molecular polarity using bond polarity and molecular shape</li> </ul> |

