

Unit 4 - Creating Relationships: Periodic Trends

Content Area: **Science**
Course(s): **Chemistry CP**
Time Period: **December**
Length: **6 weeks**
Status: **Published**

Transfer Skills

The Periodic Table is arranged in a specific way that shows periodicity. The arrangement of sub-atomic particles lead to patterns in properties and behavior of all substances.

Enduring Understandings

The Periodic Table is a patterned system of organized groups of related elements.

Manipulation and graphing data help to recognize and identify patterns.

Understanding of regularities and patterns in the periodic table allows for predictions of interactions among the elements.

Essential Questions

How and why was the periodic table developed and what is the basis of the arrangement of the elements?

How can properties of elements be predicted using the periodic table?

Which properties influence the arrangements of atoms of the periodic table?

Content

periodic law, ionization energy, atomic radii, ion, cation, anion, octet rule

Skills

Explain how atomic radii, ionization energy, and electron affinities vary within a group and within a period on the PT.

Predict the charge of an ion given its position on the periodic table and its electron configuration.

Draw electron dot structures of the representative elements.

Describe the history of the Periodic Table in determining the proper arrangement of elements.

Plot and identify groups of elements by family names.

Resources

Standards

SCI.9-12.5.1.12.A.1	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
SCI.9-12.5.1.12.B	Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.
SCI.9-12.5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
SCI.9-12.5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
SCI.9-12.5.1.12.B.3	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
SCI.9-12.5.1.12.B.4	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
SCI.9-12.5.1.12.B.a	Logically designed investigations are needed in order to generate the evidence required to build and refine models and explanations.
SCI.9-12.5.1.12.B.b	Mathematical tools and technology are used to gather, analyze, and communicate results.
SCI.9-12.5.2.12.A	All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.
SCI.9-12.5.2.12.A.1	Use atomic models to predict the behaviors of atoms in interactions.
SCI.9-12.5.2.12.A.2	Account for the differences in the physical properties of solids, liquids, and gases.
SCI.9-12.5.2.12.A.3	Predict the placement of unknown elements on the Periodic Table based on their physical and chemical properties.
SCI.9-12.5.2.12.A.4	Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes.
SCI.9-12.5.2.12.A.a	Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.
SCI.9-12.5.2.12.A.c	In the Periodic Table, elements are arranged according to the number of protons (the atomic number). This organization illustrates commonality and patterns of physical and chemical properties among the elements.

SCI.9-12.5.2.12.A.d	In a neutral atom, the positively charged nucleus is surrounded by the same number of negatively charged electrons. Atoms of an element whose nuclei have different numbers of neutrons are called isotopes.
SCI.9-12.5.2.12.B	Substances can undergo physical or chemical changes to form new substances. Each change involves energy.
SCI.9-12.5.2.12.B.1	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.
SCI.9-12.5.2.12.B.a	An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms. Chemical bonds are the interactions between atoms that hold them together in molecules or between oppositely charged ions.