Unit 3: Periodic Law

Content Area: **Science**
Course(s):
Time Period: **Marking Period 2**
Length: **20 days**
Status: **Published**

Summary

On television, the periodic table is often shown on the wall to indicate the audience is looking in on a science class. In reality, the periodic table is much more than simply a prop and nor is it a random arrangement of elements. There is a clear purpose to the organization and structure of the periodic table. What will be covered in this unit is the *history and reason* behind that structure from Mendeleev to modern atomic theory. Although it often hangs on a wall, the periodic table is one of chemistry's most useful predictive devices. Students will be able to read, interpret and utilize the periodic table , this will be a necessary skill for students throughout this course and future science courses.

Revised July 2021

SCI.HS-PS1-1	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
LA.RH.9-10.7	Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text, to analyze information presented via different mediums.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
SCI.HS-PS1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
LA.WHST.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LA.WHST.9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LA.WHST.9-10.9	Draw evidence from informational texts to support analysis, reflection, and research.
SCI.HS-PS2-6	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.
SCI.HS-PS3-5	Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.3	Consider the environmental, social and economic impacts of decisions.

WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.
TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.2.12	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.9.4.12.TL	Technology Literacy
TECH.9.4.12.GCA	Global and Cultural Awareness
TECH.9.4.12.IML	Information and Media Literacy

Essential Questions/Enduring Understandings

Essential Questions

How is the structure of the modern periodic table linked to the modern atomic model?

How can the periodic table be used to make predictions about the properties of the elements?

Enduring Understandings

The modern periodic table is an organization of the elements based off the atomic number and in such a way that properties of the elements repeat regularly.

The periodic table is a predictive device.

Objectives

Students will know how the periodic table's organization is linked to the modern theory of the atom.

Students will know the periodic table developed by Mendeleev was accepted by contemporaries in part because of its predictive ability.

Students will know the named sections of the periodic table and the properties of the elements within those sections.

Students will know periodic trends that will help them understand periodic law.

Students will be skilled at reading the periodic table to "see" trends in properties that are not listed on a standard periodic table.

Students will be skilled at making predictions about element properties using a periodic table.

Learning Plan

Preview essential questions and connect them to the concepts we will cover in the unit.

Compare and contrast early periodic tables and what Mendeleev did with his that set it apart from the rest.

Using a set of “elements”, students will organize them by properties in a similar manner to Mendeleev.

Color code the periodic table to identify element by type, block, and group name (if applicable).

Identify the properties of elements that are used to group them together (i.e. Alkali Metals).

Discover the periodic trends to develop an understanding of Periodic Law. Trends include valence electrons, atomic radius, and electronegativity.

Investigate the abundance of the elements and how this may be linked to their value to society (monetary and/or usefulness).

Assessment

Formative Assessment

Identify the link between modern atomic theory and the structure of the modern periodic table.

Describe the predictive nature of the periodic table in the manner Mendeleev initially used it.

Identify the named sections of the periodic table and the properties of the elements within those sections.

Benchmark Assessment

Mid-Term
Utilize the predictive power of the periodic table to organize a set of “elements” in the same manner.

Alternative Assessment

Analyze the abundance of the elements and how that may impact the monetary value and usefulness of the element.

Analyze and plot data of the elements in order to identify trends on the periodic table for specific properties (i.e. valence electrons, electronegativity, atomic radius).

Color code the periodic table according to properties (type of element), block (according to atomic theory), and group name.

Summative Assessment

Unit Quizzes

Unit Tests

Materials

Guided notes or teacher handouts

Lab Handouts (Mendeleev's Periodic Table, NOTE: Supplies for each lab included on handout.)

Color Coded Periodic Table Guidelines and Colored Pencils (the actual colors can vary but if possible all students should follow the guide)

Periodic Table Trends (data)

NOVA: Hunting the Elements (https://www.pbs.org/video/nova-hunting-the-elements/)

Safety Supplies (specifics to when they are required included in lab handouts)

Integrated Accommodations and Modifications Spec Ed., ELL, At-Risk, G&T, Career Education, 504s

https://docs.google.com/spreadsheets/d/1CvoX6NXdGUPtTPcEqPOsnWbqpDLS4Ego1W1eaIrGYTo/