2020 Unit 01: Atoms and the Periodic Table

Content Area: **Science**
Course(s): **Advanced Placement Chemistry**
Time Period: **September**
Length: **1 Month**
Status: **Published**

Unit Overview:

The beginning of this unit deals with the basic skills such as measuring, graphing, math, and the metric system that the students will need to be successful in this course. The rest of the unit focuses on the introductory chemical concepts focusing on atoms and the periodic table.

Enduring Understandings:

- All matter is made of atoms. There are a limited number of types of atoms; these are atoms.
- Atoms are so small they are difficult to study directly, and there fore we learn through macroscopic data collected during experimentation.
- Elements display trends with their properties when arranged by atomic number.
- The atoms of each element have unique structures arising from interactions between electrons and nuclei.

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
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.

Essential Questions:

- How do we know so much about something (the atom) that we can't see? (history & interactions of matter)
- How does the arrangement of subatomic particles dictate an element's chemical properties?
- How is the position of an element on the Periodic Table related to that element's chemical and physical properties?
- What does light and the electromagnetic spectrum have to do with electrons and energy?
- What information can be gleaned about an atom/element from its "box" on the Periodic Table?

- Why is the location of the electrons so important?

Standards/Indicators/Student Learning Objectives (SLOs):

SCI.HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
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.
SCI.HS-PS1-8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
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-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.

Lesson Titles:

- Atoms, Ions, and Isotopes
- Electron Configuration
- Frequency, Wavelength, and Energy
- Mass Spectroscopy
- Periodic Trends
- Photoelectron Spectroscopy
- Significant Figures

Equity Considerations

Asian American and Pacific Islander Mandate

Topic (Person and Contribution Addresses): Students will engage in discussion centered around notable Asian Americans in the STEM field.

Materials Used: https://ideas.ted.com/8-asian-americans-and-pacific-islanders-whose-innovations-have-changed-your-life-really/

Addresses the Following Component of the Mandate:

- Social

LGBTQ and Disabilities Mandate

Lessons will include multiple perspectives from the LGBTQ and Disabilities population, including John F. Nash (chemist that suffered from Schizophrenia).

https://www.nobelprize.org/prizes/economic-sciences/1994/nash/biographical/

STEM

LGBTQ:

Sir Francis Bacon (1561–1626)

Florence NightingaleFrancis Bacon | Philosophy, Scientific Method, & Facts | Britannica(1820-1910)

George Washington Carver (1861-1943)

Sara Josephine Baker (1873-1945)

Alan Turing (1912-1954)

Allan Cox (1926-1987)

Sally Ride (1951-2012)

Ben Barres (1954-2017)

Ruth Gates (1962-2018)

Tim Cook (1960)

Disabilities:

Leonardo da Vinci (1452-1519)- Dyslexia

Isaac Newton (1664-1727)- Epilepsy

Thomas Edison (1847-1931)- Hearing

Charles Darwin (1809-1882)- Stutter, Dyslexia

Alexander Graham Bell (1847-1922)- Deaf

Albert Einstein (1879-1955)- Aspergers

Florence B. Seibert (1897-1991)- Mobility

Stephen Hawking (1942-2019)- ALS

John Forbes Nash (1928-2015)-
Schizophrenia

Temple Grandin (1947)- Autism

- Social

Climate Change

Topic (Person and Contribution Addresses): Understanding the links between Chemistry and climate change. Students will engage in discussion centered around how chemistry plays a part in climate change.

Materials Used: https://www.openaccessgovernment.org/chemistry-climate-change/23849/

Addresses the Following Component of the Mandate:

- Social

SCI.HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

Inter-Disciplinary Connections:

LA.RH.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, qualitatively, as well as in words) in order to address a question or solve a problem.
LA.RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LA.RST.11-12.10	By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.
LA.WHST.11-12.1.A	Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
LA.WHST.11-12.1.B	Develop claim(s) and counterclaims using sound reasoning and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations

	of both claim(s) and counterclaims in a discipline appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.
LA.WHST.11-12.1.C	Use transitions (e.g., words, phrases, clauses) to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
LA.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.11-12.2.E	Provide a concluding paragraph or section that supports the argument presented.
LA.WHST.11-12.10	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Chromebook Activity
- Computer Simulations
- Delsea One Tutoring
- Independent Studies
- Lectures
- Problem Solving
- Science Labs

Modifications

ELL Modifications:

- Digital translators
- Focus on domain specific vocabulary and keywords
- Offer resources for specific topics in primary language (Youtube web resources)
- Repeat, reword, clarify
- Use real objects when possible

IEP & 504 Modifications:

- have formula's available on the test and/or sample problems
- modeling and showing lots of examples
- scaffolded notes
- students could use calculator and/or other math tools

G&T Modifications:

- Extra Labs to Do Outside the Classroom
- Give students Challenge Problems
- Send Links to Videos of Interest

At Risk Modifications

- Have Students See Me During Delsea One
- Reach out to Parents

Formative Assessment:

- Anticipatory Set
- Closure
- Density Lab
- Discovering Periodic Trends Lab
- Quizzes on topics throughout the Unit
- Warm-Up

Summative Assessment:

- Alternate Assessment
- Benchmark assessment on topics covered
- Marking Period Assessment

Benchmark Assessments

Skills-based assessment
Reading response
Writing prompt
Lab practical

Alternative Assessments

Performance tasks
Project-based assignments
Problem-based assignments
Presentations

Reflective pieces
Concept maps
Case-based scenarios
Portfolios

Resources & Materials:

- AP Chemistry Website designed for the class - https://sites.google.com/site/delseaapchemistry/
- Lab Equipment
- PhET Lab Simulations - https://phet.colorado.edu/en/simulations/category/chemistry
- Vernier Chemistry Probes

Technology:

- Chromebooks
- Desmos
- Graphing Calculators
- Interactive Boards
- Pocket Lab
- Smart Phones
- Venier Probes

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.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.12.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.12.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.12.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.12.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a

	variety of sources and media.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
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.8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
TECH.8.2.12.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
TECH.8.2.12.C.CS3	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
TECH.8.2.12.E	Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.