ACADEMY FOR URBAN LEADERSHIP | CHARTER SCHOOL
A Public School

General Chemistry

Length of Course: Full Year

Elective/Required: Required

Credit Value: 5 Credits

Date Approved:

Written: Hala Morcos

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Title of Unit	Introduction to chemistry	Grade Level	10th -12th grade
Curriculum Area	unit I	Time Frame	10 days
Developed By	Ms. Hala Morcos		

Identify Desired Results (Stage 1)

Content Standards

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

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.

HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*

Understandings	Essential Questions	
Overarching Understanding	Overarching	Topical

Students will be able to: • Understand the scientific process and the need for practicing safe procedures while conducting science investigations • Compare and contrast pure and applied chemistry • Identify reasons to study chemistry • Explain the different branches of chemistry • Identify the steps and problem-solving in scientific method • Identify properties of matter • Differentiate between the states of matter • Compare and contrast physical and chemical changes • Distinguish between homogeneous and heterogeneous mixtures • Describe how mixtures can be separated • Compare and contrast elements and compounds • Apply the law of the conservation of mass • Identify SI units of measurements • Perform unit conversion • Perform mathematical operations involving scientific figures • Summarize the five essential points of Dalton's atomic theory • Analyze the discovery of the subatomic particles	• How can atomic models be used to describe and explain the structure of atoms? • How do the properties of matter change as phases change? • How are solutions formed? • How can the structure of matter be used to explain the different types of reactions? • How can the law of conservation of mass be demonstrated in chemistry?	• How do structures and properties of materials determine their use? • How have different contributions made by scientists from diverse culture enhanced our knowledge in chemistry? • How can the structure of matter be used to explain the different types of reactions? • What is the role of mathematics in chemistry?
Related Misconceptions		

Homogeneous solutions and heterogeneous solutions are similar mixtures and compounds are the same elements and compounds are different the distinctions between mixtures and compounds physical changes and physical properties are the same chemical changes and chemical properties are the same		
Knowledge Students will know…	**Skills** Students will be able to…	

• How to determine what chemistry is and its scope, and its effect on everyday life and society. • How to apply the scientific process. • Synthesize and apply basic safety procedures and identify basic equipment. • Analyze and use appropriate units of measurement and the sources and implications of uncertainty in measurements. • How to use the SI units and how to convert among units	• Analyze How is the scientific method used to solve problems in chemistry?, as they work on class work , lab report of solve any word problems • Determine how chemists apply as to create and collect data analysis; as well as using other resources to come up with conclusion relating to the concept. Create the various components of matter using technology in chemistry. • Classify matter according to its composition, structure and behavior • Distinguish between homogeneous mixtures and heterogeneous mixtures • Develop and use models to relate properties of matter to its structure • Distinguish between chemical and physical properties of matter • Contrast physical and chemical changes • Apply the law of conservation of matter to chemical changes

Assessment Evidence (Stage 2)

Performance Task Description

• **Goal** • **Role** • **Audience** • **Situation** • **Product/ Performance** • **Standards**	• Chapter Assessment Unit 1 • Journal rubric using it as an exit ticket • Formal Laboratory Report rubric • Word Problem Rubric • Graphing Rubric, Portfolio Rubric, Prompt Rubric, Open-ended Questions Rubrics, Computer Simulation Conclusion Rubric, Laboratory accuracy rubric (advanced), • Research Project Rubric, Construction Project Rubric on the atom structure, uses in today's technology and medical uses, time line of element discoveries, • Projects – Know Your Element Atomic Model Time Line ,Poster Rubric, Oral Presentation Rubric, and power point ,Class Participation Rubric • Class work and Mini-lab Rubric • Quizzes and exams • Do now's or starting topic (as a problem, open question or an activity using activity worksheet) with groups elaborations (with each student has a part of this activity to work on it), than discuss it with in the class

Other Evidence

- Oral and/or written response to several of the essential questions (e.g., "compare between mixture and compound use examples?)
- Write responses to various open ended questions as part of the class participation and open discussions
- Create the graphic organizer for matter and its components using examples.
- Quizzes on terms/concepts concerning the trend of the periodic table, and elements locations and its properties

Conduct a unit test covers various aspects of the unit 1 (e.g. vocabulary, open response, fill in, and multiple choice)

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Title of Unit	Measurements and Calculations	Grade Level	10th -12th grade
Curriculum Area	Unit 2	Time Frame	10 days
Developed By	Ms. Hala Morcos		
Identify Desired Results (Stage 1)			
Content Standards			

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

HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

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.

HSN-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. (HS-PS1-2),*(HS-PS1-4), (HS-PS1-5)*,(HS-PS1-7)

Understandings		
Overarching Understanding	**Essential Questions**	
	Overarching	**Topical**
Students will be able to: • How can atomic and molecular models be used to predict the behavior of atoms in reactions? • How can the periodic chart be used as an essential and informational tool? • How can quantum mechanics be used to explain atomic behavior? • Determine the number of each kind of atom in a compound, given the chemical formula.	• How do structures and properties of materials determine their use? • How have different contributions made by scientists from diverse culture enhance our knowledge in Chemistry? • How do the components	• Explain how science is a developing field where theories are constantly challenged • Analyze by Interpret the element information on the periodic table to the molecular model of an atom • What is the
Related Misconceptions		

The difference between the SI units to the English system (kg and Lbs.) The difference between the Protons, and neutrons and its relationship to the periodic table and its locations The difference between atomic mass vs. number and its relationship to the subatomic particles. Physical and chemical changes and properties difference Manipulating Density formula to solve for the unknown variables The difference between independent and dependent variables The difference between the qualitative and quantitative observations	of matter correlate with the core concepts of Chemistry?	role of mathematics in chemistry?
Knowledge Students will know…	**Skills** Students will be able to…	
• Distinguish between physical and chemical properties. • Contrast physical and chemical changes. • Calculate the density of a substance from experimental data. • Differentiate between physically blended and chemically bonded. • Distinguish between accuracy and precision, and directly and inversely proportional relationships • Using mini lab –virtue lab to enforce the physical and chemical Properties and changes.	• The student will demonstrate the ability to explain how matter may be identified, classified, and changed • The student will demonstrate the ability to summarize and apply the Law of Conservation of Matter and Energy. . • Distinguish between qualitative and quantitative observations • Compare and apply strategies for solving Density problems in Chemistry	

Assessment Evidence (Stage 2)	
Performance Task Description	
• **Goal** • **Role** • **Audience** • **Situation** • **Product/ Performance** • **Standards**	• Chapter Assessment Unit 2 • Journal rubric using it as an exit ticket • Formal Laboratory Report rubric • Word Problem Rubric • Graphing Rubric, Portfolio Rubric, Prompt Rubric, Open-ended Questions Rubrics, Computer Simulation Conclusion Rubric, Laboratory accuracy rubric (advanced), • Research Project Rubric, Construction Project Rubric on the atom structure, uses in today's technology and medical uses, time line of element discoveries, • Projects –Atomic model using assigned element, the Time Line of developments of the atomic theory, comparison between the various scientists and the developments of the atomic theory and modern model of the element. ,Poster Rubric, Oral Presentation Rubric, and power point ,Class Participation Rubric • Class work and Mini-lab Rubric • Quizzes and exams • Do now's or starting topic (as a problem, open question or an activity using activity worksheet) with groups elaborations (with each student has a part of this activity to work on it), than discuss it with in the class
Other Evidence	

- Using word problems to solve various Density problem , using both open response and algebraic equation to solve for volume, mass, and density written response to several of the essential questions
- Write responses to various open ended questions (e.g. how to calculate the density of irregular shape object) write the procedure for water displacement.
- Write a series of journal entries (e.g. Exit ticket write the steps of calculating density of regular shape, vs. density of irregular shape objects)
- Write conclusion as students compare their hypothesis to the analytical data and observations.
- Quizzes on terms/concepts concerning the trend of the periodic table, and elements locations and its properties

Conduct a unit test covers various aspects of the periodic table developments (e.g. vocabulary, open response, fill in, and multiple choice)

Using internet resources to promote learning such as http://www.chemistry.org/. http://www.nsc.org/library/chemical/index.htm

- **Conservation of Matter using water and seltzer tablets, calculating isotopes using m & m, Line Emission Spectra**

Learning Plan (Stage 3)

• **Where are your students headed? Where have they been? How will you make sure the students know where they are going?** • **How will you hook students at the beginning of the unit?** • **What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?** • **How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?** • **How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?** • **How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?** • **How will you organize and sequence the learning activities to optimize the**	1. students will analyze the concept of physical property using an example as an open ended question; which lead to class discussion. 2. Students will classify the different states of matter and compare and contrast them. 3. Students, in groups, will observe, analyze, and classify different sates of matter. 4. Teacher and students will go over students' work. 5. Students will complete a worksheet about physical properties and states of matter 6. Students will answer review questions about Physical Properties and States of Matter 7. Teacher and students will go over students' answers. 8. Lab: "candle" to calculate, measure, list the physical and chemical properties of a candle 9. The analysis section, and of their lab report , test a hypothesis using open questions 10. Teacher and students will scrutinize chemical properties of matter, and compare and contrast them with the physical properties of matter. 11. Students, in groups, will complete a worksheet about chemical properties and physical properties comparing and contrasting them .Teacher and students will analyze chemical changes, and their relationship with atoms and energy. 12. Students, in groups, will classify several changes as either physical or chemical explaining why. 13. To clarify all misconceptions students will work on lab activity , either video, virtue 14. Teacher will implement a graphic organizer using the vocabulary key terms and components that concept mapping of matter and its components, to stimulate and promote research and to clarify all misconceptions.

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Understanding By Design Unit Template

Title of Unit	Development of the periodic Table	Grade Level	10th -12th grade
Curriculum Area	UNIT 3	Time Frame	20 days
Developed By	Ms. Hala Morcos		
Identify Desired Results (Stage 1)			
Content Standards			

Associated Disciplinary Core Ideas (DCIs) from NGSS include:

PS1: Matter and Its Interactions

PS1.A—Structure and Properties of Matter

Connections to other DCIs in this grade-band:

HS.PS3.A (HS-PS1-8); **HS.PS3.B** (HS-PS1-8); **HS.PS3.C** (HS-PS1-8); **HS.PS3.D** (HS-PS1-8); **HS.LS1.C** (HS-PS1-1); **HS.ESS1.A** (HS-PS1-8); **HS.ESS1.C** (HS-PS1-8);**HS.ESS2.C**(HS-PS1-3)

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.

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. [

Understandings	Essential Questions	
Overarching Understanding	Overarching	Topical

• Outline the historical development of the periodic tables • Describe the make-up of the periodic table • Compare and contrast between the properties of each groups/ periods on the periodic table • Use the periodic table to classify the characteristics of the elements • The student will demonstrate the ability to trace the history of the development of the modern atomic theory and model. • The student will demonstrate the ability to determine the composition of any atom, ion, or isotope. • Calculate average atomic mass from isotopic data • Explain the uniqueness of atomic spectra. • Describe the relative energies of ultraviolet, visible, infrared, Microwave, X-ray, radio, and TV waves.	• How some isotopes are made of unstable nuclei, which decay over time emitting particles and energy? • Where to analyze the atomic spectra using atomic structure?	How to compare between Dalton, Thomson, Rutherford, Bohr, and Schrodinger in the development of the modern understanding of atomic structure? • How these comparisons between the locations of the various subatomic particles? • What is the difference between the atomic number and mass to the subatomic particle?
Related Misconceptions The difference between the Dalton's theories to the Rutherford model related. The comparison between Rutherford experiments to the Bohr model compared. How the modern model to the Bohr model related to the various subatomic particles.		
Knowledge Students will know…	**Skills** Students will be able to…	

• Explain how science is a developing field where theories are constantly challenged. • Contrast the modern understanding of atomic structure with historic understandings • Distinguish between absorption (excitation) and emission of energy. • Identify the steps and problem-solving in scientific method • Describe the energies and positions of electrons according to the quantum mechanical model • Compare and contrast orbitals in different sub-levels • Explain how elements are organized and classified into three broad classes of elements in the periodic table	• Recognize the existence of smaller particles composing matter • Explain the quantum model and photoelectric effect • Calculate and manipulate the wavelength formula using the frequency and speed of light • Compare early and modern periodic tables • Explain the importance of the octet rule in chemical bonding • Describe the properties of light. (i.e. wavelength, frequency and energy) • Calculate the wavelength, frequency and energy for a given electron transition

Assessment Evidence (Stage 2)	
Performance Task Description	
• **Goal** • **Role** • **Audience** • **Situation** • **Product/ Performance** • **Standards**	Unit Tests unit 3 Mini - quizzes, isotopes, model of atoms, Dalton theory, atomic structure and calculating isotopes. Formal Lab reports Timeline of the developments of the modern model of the atom projects, Projects will include in the oral Presentations, power point and poster boards Activity worksheet with class participation both individual and groups discussions Do now's Exit tickets Journals and portfolios.

Other Evidence
• Oral and/or written response to several of the essential questions (e.g., "how the historical development of the periodic tables?) Using various evidence and theories. • Write responses to various open ended questions as part of the class participation and open discussions • Write a series of journal entries (e.g., compare the hypothèses to conclusion the trend of the elements in the periodic table.) • Present visual presentation showing the timeline of the atomic developments with various theories justice process • Quizzes on terms/concepts concerning the trend of the periodic table, and elements locations and its properties • Conduct a unit test covers various aspects of the periodic table developments (e.g. vocabulary, open response, fill in, and multiple choice)
Learning Plan (Stage 3)

• **Where are your students headed? Where have they been? How will you make sure the students know where they are going?** • **How will you hook students at the beginning of the unit?** • **What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?** • **How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?** • **How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?** • **How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?** • **How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?**	• Teacher and students will scrutinize Dalton's atomic theory. • Teacher and students will scrutinize the discovery of the different subatomic particles, as being assigned part of DO Now's. • Students, in groups, will complete a worksheet about subatomic particles. (FA- Teacher circulates to check all students' answers). • Students will go over students' work class participations. • Teacher and students will scrutinize Rutherford's Nuclear Model of the atom. Project on group and individual of the timeline between • Students, in groups, will complete a worksheet about nuclear model of the atom • The lab activities will be distributed throughout the learning process • To clarify all misconceptions students will work on lab activity, either video, virtue giving an element and create individual distance from the nucleus to the first of orbit. • Students using "both Measurements and periodic table to design an element." The ATOMIC STRUCTURE LAB. • Students Project "compare Rutherford model of the atom vs. Bohr and modern model of the element." • Students will complete the exit ticket through open response as they compare and contrast between various subatomic particles and its locations. How do the different subatomic particles compare from the point of

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Understanding by Design Unit Template

Title of Unit	How elements react to form compounds	**Grade Level**	10th -12th grade
Curriculum Area	**UNIT 4**	**Time Frame**	20 days
Developed By	Ms. Hala Morcos		
Identify Desired Results (Stage 1)			
Content Standards			
Associated Disciplinary Core Ideas (DCIs) from NGSS include: **PS1: Matter and Its Interactions** **PS1.A—Structure and Properties of Matter** *Connections to other DCIs in this grade-band:* **HS.PS3.A** (HS-PS1-8); **HS.PS3.B** (HS-PS1-8); **HS.PS3.C** (HS-PS1-8); **HS.PS3.D** (HS-PS1-8); **HS.LS1.C** (HS-PS1-1); **HS.ESS1.A** (HS-PS1-8); **HS.ESS1.C** (HS-PS1-8);**HS.ESS2.C**(HS-PS1-3).			
Understandings		**Essential Questions**	

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Overarching Understanding	Overarching	Topical
a) Distinguish the properties of compounds and mixtures b) Analyze and differentiate the various types of compounds c) Differentiate between types of compounds: Ionic and Covalent d) Compare and contrast characteristics of ionic, covalent and polar covalent bonds e) The student will demonstrate the ability to distinguish among ionic, polar, and nonpolar covalent bonds. .	a) How to Explain the significance of a chemical formula b) How would you determine the formula of an ionic compound c) What are the rules that will implement the construction for naming compounds d) How to apply the rules of oxidation number to find the oxidation number of each element in a given formula	• Why the periodic law is an essential to the trends observed on the periodic table. • What the importance of the octet rule in chemical bonding? • How to differentiate between the two types covalent and ionic bonding? • How to determine Lewis dot diagrams for molecules continuing single or multiple bonds?
Related Misconceptions The difference the ionic and covalent bond How the dot diagram effect the bonding Relate the bond to the octet rule The effectiveness of the octet rule to sharing or transferring of bonds. How critical is the dot diagram to the bonding Why metallic is different than ionic than covalent bonding Why we need bonding		
Knowledge Students will know…	**Skills** Students will be able to…	

• Describe the energies and positions of electrons according to the quantum mechanical model • Describe how to write the electron configuration and orbital notation • Compare and contrast orbitals in different sub-levels • Explain the significance of a chemical formula • Determine the formula of an ionic compound • Apply the rules for naming compounds • Apply the rules of oxidation number to find the oxidation number of each element in a given formula	• Illustrate neutral atoms and ions using electron dot notation. • Illustrate ionic and covalent bonds utilizing electron dot notation. • Use appropriate materials to build adequate models of simple molecules and polyatomic ions representing the shapes of these species. • Analyze the difference between the properties of metallic, ionic, and covalent solids, based on its categories and data (solubility, melting point, boiling point, conductivity).

Assessment Evidence (Stage 2)

Performance Task Description

Units Tests chapter 4

Mini quizzes ionic bond, covalent bond

Lab reports chemical reactions , ionic formation compound

Projects on various compounds and identify the difference between ionic and covalent bond, using oral Presentations class participation activity worksheet, notes and virtue lab

Other Evidence

e) Oral and/or written response to several of the essential questions (e.g., How would you determine the formula of an ionic compound) Using various evidence and analysis

- Write responses to various open ended questions as part of the class participation and open discussions
- Write a series of journal entries (e.g., compare the hypothèses to conclusion to differentiates between Ionic, covalent and metallic bond.)
- Quizzes on terms/concepts of bonding and chemical formula as well as categorizations of the difference.

Conduct a unit test covers various aspects of the reactions of these element to stablish a bond (e.g. vocabulary, open response, fill in, and multiple choice)

Learning Plan (Stage 3)

• **Where are your students headed? Where have they been? How will you make sure the students know where they are going?** • **How will you hook students at the beginning of the unit?** • **What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?** • **How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?** • **How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?** • **How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?** • **How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?**	• How do the atomic number, mass number, and atomic mass compare? Why atoms of the same element can't have different atomic number? How do OPEN RESPONSE WHICH WILL LEAD TO CLASS DISCUSSION • We allocate electron in energy levels, and the electron distribution. • Teacher and students will go over the answers given by students. • Teacher and students will characterize valence electrons. • Students will investigate the Lewis dot diagrams. • Students, in groups, will create Lewis dot diagram, to the valence electrons • Teacher and students will go over the work done by students. • Students will answer the following questions, as an EXIT TICKET TO THE CLASS. What did you learn today? Students, individually, will complete and share with the class: I learned a lot about…I learned that…The most interesting I learned was…. • Students will share their findings. • Student will work on the lab activity Evidence of a Chemical Reaction: Iron Versus Rust, The Formation of Ionic Compounds • Student will be assigned to construct a model of ionic bonding vs. covalent bond project

Understanding By Design Unit Template

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Title of Unit	Formulas and Names of Ionic and Molecular compounds	Grade Level	10TH-12th
Curriculum Area	UNIT 5	Time Frame	15 days
Developed By	Ms. Hala Morcos		

Identify Desired Results (Stage 1)

Content Standards

Associated Disciplinary Core Ideas (DCIs) from NGSS include:

PS1: Matter and Its Interactions

PS1.A—Structure and Properties of Matter,

Connections to other DCIs in this grade-band:

HS.PS3.A (HS-PS1-8); **HS.PS3.B** (HS-PS1-8); **HS.PS3.C** (HS-PS1-8); **HS.PS3.D** (HS-PS1-8); **HS.LS1.C** (HS-PS1-1); **HS.ESS1.A** (HS-PS1-8); **HS.ESS1.C** (HS-PS1-8);**HS.ESS2.C**(HS-PS1-3)

HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed material

Understandings	Essential Questions	
Overarching Understanding	Overarching	Topical

a) Demonstrate proficiency in writing Chemical formulas b) Define oxidation number and state oxidation numbers for Monatomic and polyatomic ions. c) Distinguish between molecular and empirical formulas d) Compare and contrast the properties of molecular and ionic substances e) Interpret the information in a chemical formula f) Differentiate between a binary and ternary compound. g) Name a binary ionic compound using roman numerals, if needed.	a. What is the relation between the number of valence electrons in atoms of an element and the element's placement in the periodic table b. How the properties of metallic, ionic, and covalent solid different, use examples. b. How to Classify a substance as metallic, ionic, or covalent based on data (solubility, melting point, boiling point, conductivity). c. Illustrate neutral atoms and ions using electron dot notation. d. Illustrate ionic and covalent bonds utilizing electron dot notation.	• How can the total valence electrons for an element be determined? • How to Compare and contrast covalent ionic bonding • Why are molecules more stable than separated atoms? • How to use appropriate materials to build adequate models of simple molecules and polyatomic ions representing the shapes of these species?
Related Misconceptions		
Polyatomic ions are part of bonds Difference between molecular bonding Why ending is not changes		

Knowledge Students will know…	Skills Students will be able to…
• The student will demonstrate the ability to compose a proper formula for a compound • The student will demonstrate the ability to describe and name ionic compounds (binary or ternary) and covalent compounds (binary). • The student will demonstrate the ability to distinguish among ionic, polar, and nonpolar covalent bonds. • Use subscripts and parentheses, if needed, and determine the number of atoms represented by the formula	a. How to name a ternary ionic compound using roman numerals, if needed. b. How to name binary covalent compounds. c. How to name a binary or ternary ionic compound using the Stock (-ous/-ic) system of nomenclature. d. Explain the importance of the octet rule in chemical bonding d. Determine the oxidation number of a metal, nonmetal, or polyatomic ion and relate it to the loss or gain of electrons. e. Combine a cation and an anion such that the sum of the oxidation numbers will equal zero.
Assessment Evidence (Stage 2)	
Performance Task Description	

• **Goal** • **Role** • **Audience** • **Situation** • **Product/ Performance** • **Standards**	1. Chapter Tests 2. Quizzes on the nomenclature, naming molecular compound 3. Lab reports using various aspects, such as video, every day materials. 4. Group/individual project by presenting a molecular compound using Presentations, class participation, journals and portfolios

Other Evidence

- Oral and/or written response to several of the essential questions (e.g., "write the molecular formula for the following sodium nitrate, nitrogen disulfide, and analyze if this formula an ionic or covalent bond by explaining your answer).
- Write responses to various open ended questions as part of the class participation and open discussions
- Write a conclusion on molecular compound lab
- Quizzes on terms/concepts concerning the molecular compound and nomenclature Conduct a unit test covers various aspects of the chapter (e.g. vocabulary, open response, fill in, and multiple choice)

Learning Plan (Stage 3)

• **Where are your students headed? Where have they been? How will you make sure the students know where they are going?**
• **How will you hook students at the beginning of the unit?**
• **What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?**
• **How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?**
• **How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?**
• **How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?**
• **How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?**
	• How is the modern periodic table organized? What information does the group provides about the element's atomic structure? What information does the period provide about the element's atomic structure? (FA- Teacher circulates to check all students' answers).
	• Teacher and students will go over students' work.
	• Teacher and students will investigate the relationship between groups, and valence electrons and Lewis dot diagram.
	• Students, in groups, will determine the number of valence electrons, and create the Lewis dot diagram of elements from their group position in the periodic table. (FA- Teacher circulates to check all students' work).
	• Teacher and students will go over students' answers.
	• Teacher and students will classify, and characterize elements as metals, non-metals, and metalloids.
	• Students, in a project, will scrutinize, compare, and contrast the physical and chemical properties of metals, non-metals, and metalloids.
	• Students will complete their exit ticket.
	• Students will work on the various lab based as needed, using virtue lab, video
	  ○ Ionic or Covalent using a formula lab
	  ○ A Chemical Weather Predictor using formula lab
	  ○ 3.Where's the Calcium using a formula lab

Understanding by Design Unit Template

Title of Unit	**Chemical reactions and equations**	**Grade Level**	10th -12th grade
Curriculum Area	Unit 6	**Time Frame**	25 days
Developed By	Ms. Hala Morcos		
Identify Desired Results (Stage 1)			

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Content Standards

Associated Disciplinary Core Ideas (DCIs) from NGSS include:

PS1: Matter and Its Interactions

PS1.B—Chemical Reactions

Connections to other DCIs in this grade-band:

HS.PS3.A (HS-PS1-8); **HS.PS3.B** (HS-PS1-8); **HS.PS3.C** (HS-PS1-8); **HS.PS3.D** (HS-PS1-8); **HS.LS1.C** (HS-PS1-1); **HS.ESS1.A** (HS-PS1-8); **HS.ESS1.C** (HS-PS1-8);**HS.ESS2.C**(HS-PS1-3)

HSN-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. (HS-PS1-2),*(HS-PS1-4),(HS-PS1-5)*,(HS-PS1-7)

Understandings	Essential Questions	
Overarching Understanding	**Overarching**	**Topical**
• How can one explain the structure, properties, and interactions of matter? • The student will demonstrate the ability to write and balance simple equations. • The student will demonstrate the ability to classify chemical reactions and predict the products.	a. how to distinguish between reactants and products in a chemical reaction. b. Illustrate by analyzing Write a word or symbolic equation to represent a chemical reaction. c. what is a Balance a simple equation	a. how would you Categorize the types of chemical reactions based on the nature of observed b. How many bonds may be formed by atoms of representative elements? Explain, including all groups of representative
Related Misconceptions		

The difference between the 5 types of the reactions Using the mathematical concept to balance the chemical equations How to rewrite the formula and place it in the proper category of the chemical equations Categorize the various parts of the chemical equations Where the products and reactants which direction is the equations	a simple equation. d. how a balanced chemical equation supports the Law of Conservation of Mass. e. Differentiate and analyze the amount and kinds of atoms of reactants and products in a chemical reaction.	elements b. Differentiate by Identify the type of chemical reactions based on the reactants given. c. How would you Write net ionic reactions for precipitation reactions?
Knowledge Students will know…	**Skills** Students will be able to…	
a. Illustrate how to balance chemical reactions by changing coefficients b. Demonstrate how chemical equations describe chemical reactions c. Demonstrate and determine the factors that influence the specific heat rate of reaction d. Differentiate among five general types of chemical reactions (Synthesis, decomposition, combustions, single and double displacement)	a. Write a word or symbolic equation to represent a chemical reaction. b. Balance a simple equation. c. Explain how a balanced chemical equation supports the Law of Conservation of Mass. d. Compare the amount and kinds of atoms of reactants and products in a chemical reaction.	
Assessment Evidence (Stage 2)		
Performance Task Description		

• **Goal** • **Role** • **Audience** • **Situation** • **Product/ Performance** • **Standards**	Tests chapter 6 Lab reports Exploring Chemical Changes, Class work activity, group work , group activity ,Using computer game to determine student understanding.

Other Evidence

- Written open responses using Do now, review homework, open discussions of the topic of chemical reactions
- Write responses to various open ended questions as part of the class participation and open discussions
- Write a series of journal entries (e.g., compare the hypothèses to conclusion chemical reactions, predicting the Product, catogrorizing the reactions.)
- Present visual presentation using both research on various virtue labs , predicting their chemical reactions and the categorizing it with written report, power point and posters.
- Quizzes on terms/concepts concerning writing and balancing chemical equations

Learning Plan (Stage 3)

• **Where are your students headed? Where have they been? How will you make sure the students know where they are going?** • **How will you hook students at the beginning of the unit?** • **What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?** • **How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?** • **How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?** • **How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?** • **How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?**	1. Students will review for Naming Ionic Binary Compounds Quiz. 2. Students will take the Naming Ionic Binary Compounds Quiz. 3. Teacher and students will scrutinize how to formulate an ionic binary compound type I, and type II. 4. Teacher and students will practice formulating ionic binary compounds type I, and type II. 5. Students, in groups will test their knowledge and skills about formulating Ionic Binary Compounds type I and type II by successfully complete a worksheet about Formulating I.B.C. types I, and II. 6. Students will come to the front and explain their work to the class. 7. What did you learn today? Students, individually, will complete and share with the class: I learned a lot about…I learned that…The most interesting I learned was…. 8. Students will share their findings with the class. 9. Read the class objective and answer using your own words: 1. What are going to learn today? Why is it important to learn it? How will you show you have learned it? 10. Teacher and students will comment on students' answers. 11. Students will answer review questions about formulating ionic binary compounds types I, and II.

Understanding By Design Unit Template

Title of Unit	**Expanding the theory of the Atom**	**Grade Level**	10th -12th grades
Curriculum Area	UNIT 7	**Time Frame**	20 days
Developed By	Ms.Hala Morcos		
Identify Desired Results (Stage 1)			
Content Standards			

Associated Disciplinary Core Ideas (DCIs) from NGSS include:

PS1: Matter and Its Interactions

PS1.A—Structure and Properties of Matter

HSN-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. (HS-PS1-2),*(HS-PS1-4)*,*(HS-PS1-5)*,(HS-PS1-7)

Understandings	Essential Questions	
Overarching Understanding	**Overarching**	**Topical**
a. How can one explain the structure, properties, and interactions of matter? b. The student will demonstrate the ability to explain how electrons are organized around the nucleus. c. The student will demonstrate the ability to explain the source and common use of atomic spectra	a.How to distinguish among energy levels, sublevels, and orbitals. b. why can use the Aufbau principle to fill an energy level diagram. c. Compare using differentiations of how to determine	a. Where and how to determine the quantum numbers associated with an electron b. How would you Distinguish by Comparison and contrast the Bohr model and the quantum model of an atom.
Related Misconceptions		

Writing electron configurations and using the overlap of various orbits The shape of the orbits How these orbits has different shapes and why The amount and different electrons that relates to each orbits. Nobel Gas electron configurations vs. the long hand electron configurations.	both the full and shorthand electron configurations for an atom or ion. d. How to determine the orbital notation for the electron arrangement in an atom or ion using Hund's rule and Pauli's exclusion principle. e. Where the use of to the quantum numbers associated with	c. how to Characterize the four quantum numbers d. How to write the electron configurations of the elements e. When we can Use the Pauli exclusion principle and quantum numbers to describe an electron in an atom
Knowledge Students will know…	**Skills** Students will be able to…	

a. Distinguish between absorption (excitation) and emission of energy. b. Describe the properties of light. (i.e. wavelength, frequency and energy) c. Calculate the wavelength, frequency and energy for a given electron transition. d. Write the electron dot diagrams for the elements a) of an electron in an atom b) Describe the electron cloud e. Relate energy sublevels and orbital of an atom (s, p, d & f) f. Distinguish the s, p, d &f blocks on the periodic table and relate them to an elements' electron configuration	a. Describe the wave mechanical view of the hydrogen atom. b. Characterize the relationship between the wavelength and frequency to the position a. Describe the process that creates atomic spectra. C Explain the uniqueness of atomic spectra. d. Provide examples of the common applications of atomic spectra, i.e. analysis of a mixture using atomic spectra. e. Describe the relative energies of ultraviolet, visible, infrared, microwave, X-ray, radio, and TV waves

Assessment Evidence (Stage 2)

Performance Task Description

• **Goal** • **Role** • **Audience** • **Situation** • **Product/ Performance** • **Standards**	Chapter 7 unit test Quizzes on the electron configurations of the various elements Classwork using activity worksheet Homework using the study guide Lab activities, line emission Do now's

Other Evidence

- Oral and/or written response to several of the essential questions (e.g., write the electron configuration of sodium using both periodic table and arrow diagram
- Write responses to various open ended questions as part of the class participation and open discussions
- Write a series of journal entries (e.g., compare the hypothèses to conclusion the trend of the elements in the periodic table.)
- Quizzes on terms/concepts concerning chapter 7 and the quantum mechanics (e.g. vocabulary, open response, fill in, and multiple choice)

Learning Plan (Stage 3)

- **Where are your students headed? Where have they been? How will you make sure the students know where they are going?**
- **How will you hook students at the beginning of the unit?**
- **What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?**
- **How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?**
- **How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?**
- **How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?**
- **How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?**

a. Teacher and students will go over the concepts taught.
b. Students will answer review questions about the topics taught last class.
c. Teacher and students will compare, and contrast energy levels, sub-energy levels and orbitals.
d. Students, in groups, will complete a worksheet about energy levels, sub-energy levels and orbitals.
e. Students will come to the front and explain their work to the class.
f. Students will complete their exit ticket.
g. Individual review for atomic structure quiz.
h. Students will take a quiz about atomic structure.
i. Teacher and students will investigate how to create elements' electron configurations.
j. Teacher and students will practice how to create elements' electron configurations.
k. Students will write both the Nobel gas configurations and long hand configurations.

Students, in groups, will create elements electron configurations. (FA- Teacher circulates to check all students' answers). 1.The orbital lab , where students design the 3 D of the orbitals using their own balloons to determine the shape and the orientations of each sub particle with in the subatomic structure.

1. Colored flames- A window into the Atom
2. Electrons in Atoms

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Understanding By Design Unit Template

Title of Unit	**Periodic properties of the Elements.**	**Grade Level**	10th-12th
Curriculum Area	UNIT 8	**Time Frame**	25 days
Developed By	Ms. Hala Morcos		
Identify Desired Results (Stage 1)			
Content Standards			

Associated Disciplinary Core Ideas (DCIs) from NGSS include:

PS1: Matter and Its Interactions

PS1.A—Structure and Properties of Matter

HSN-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. (HS-PS1-2),*(HS-PS1-4)*,*(HS-PS1-5)*,(HS-PS1-7)

Understandings	Essential Questions	
Overarching Understanding	**Overarching**	**Topical**
• How can one explain the structure, properties, and interactions of matter? • The student will demonstrate the ability to describe the origin and organization of the modern Periodic Table. • The student will demonstrate the ability to explain periodicity	• Analyze by Contrasting Dimitri Mendeleev and Henry Mosely's contributions and method of organizing the Periodic Table • Creating by	• Create by identify regions of the periodic table including earth metals, alkali metals, alkaline transition metals, halogens, noble
Related Misconceptions		

The reverse between the electronegativity and the radius. Why we using the periodicity and its relation to the elements alignments in the periodic table	Creating by Collecting and use information on the Periodic Table, including atomic number, atomic • Create or design Mass, family designation, period number, classification of element (metal, nonmetal, semimetal, or metalloid), and the state of the element at room temperature.	halogens, noble gases, lanthanide, and actinide series. • How to relate the family or group of elements to their corresponding number of valence Electrons. • How the relationship between the period of elements to the energy level of valence electrons.
Knowledge Students will know…	**Skills** Students will be able to…	

a) Use examples to explain the periodic properties of elements b) State how atomic and ionic sizes change in groups and periods c) Predict oxidation numbers of elements d) Define ionization energy and electron affinity e) Describe the factors that affect these properties f) Compare ionization energy, electronegativity, and atomic radius; contrast the trends in these properties as one proceeds across a period and down a family of elements on the Periodic Table.	• Relate the position of any main group to its electron configuration • Relate the chemical and physical properties of the elements to their electron configuration • Predict chemical behavior of the elements based on their positions in the periodic table • Identify an element as belonging to the *s*-, *p*-, *d*-, or *f*-block in the Periodic Table. • Explain trends and patterns in the ionic radius, electron affinity, and reactivity within families and periods of representative elements.

Assessment Evidence (Stage 2)

Performance Task Description

• **Goal** • **Role** • **Audience** • **Situation** • **Product/ Performance** • **Standards**	1. Quizzes on the periodicity of the periodic table 2. Notes using video and worksheet 3. Virtue lab reports 4. Classwork activity sheet 5. Computer –mini active program with open ended questions

Other Evidence

- Oral and/or written response to several of the essential questions (e.g., compare and contrast the electronegativity of the elements from left to right and down in clolumn based on its increasing or decreasing and explain why ?) Using various evidence and theories.
- Write responses to various open ended questions as part of the class participation and open discussions
- Write a series of journal entries (e.g., compare the hypothèses to conclusion the trend of the elements in the periodic table.)
- Quizzes on terms/concepts concerning the chapter 8 and the periodicity of the periodic table. (e.g. vocabulary, open response, fill in, and multiple choice)

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Learning Plan (Stage 3)

- **Where are your students headed? Where have they been? How will you make sure the students know where they are going?**
- **How will you hook students at the beginning of the unit?**
- **What events will help students experience and explore the big idea and questions in the unit? How will you equip them with needed skills and knowledge?**
- **How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work?**
- **How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?**
- **How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?**
- **How will you organize and sequence the learning activities to optimize the engagement and achievement of ALL students?**

1. Read class objective and answer the following questions using your own words: 1. what are you going to learn today 2. Why is important to learn it? 3. How will you show you have learned it?
2. Teacher and students will discuss students' answers.

Lab: "The Periodic Table"

3. Teacher will explain to students the objective of this lab.
4. Students will write their hypothesis for this lab.
5. Teacher will explain the procedures for this lab.
6. Students in groups of three will do the lab and record their observations.
7. Teacher will supervise their work, answer questions and correct mistakes or inadequate procedures.
8. How is the modern periodic table organized? What information does the group provides about the element's atomic structure? What information does the period provide about the element's atomic structure? Teacher and students will go over students' work.
9. Teacher and students will investigate the relationship between groups, and valence electrons and Lewis dot diagram.
10. students will classify, and characterize elements as metals, non-metals, and metalloids.
11. Students, in a project, will scrutinize, compare, and contrast the physical and chemical properties of metals, non-metals, and metalloids.
12. Students will complete their exit ticket.