

SUMMER SCHOOL TEACHER GUIDE



Chemistry

Summer School
Table of Contents

| Day | Grade Results Title | Lesson # | Standard # | Page # |
|-------------------|---|----------|----------------------------|--------|
| 1 | Mathematical Principles in Chemistry | 1 | CHEM1.PS1.3 | 4 |
| 2 | Atomic Theories | 2 | CHEM1.PS1.11 | 6 |
| 3 | Atomic Structure | 3 | CHEM1.PS1.11 | 8 |
| 4 | Electron Configuration | 4 | CHEM1.PS1.12 | 10 |
| 5 | The Periodic Table of the Elements | 5 | CHEM1.PS1.12a | 13 |
| 6 | Metals, Nonmetals, Metalloids and Periodicity | 6 | CHEM1.PS1.12b | 14 |
| 7 | Chemical Bonding and Lewis Structure | 7 | CHEM1.PS1.12c | 15 |
| 8 | Electron in Chemical Reactions and Symbols in Equations | 8 | CHEM1.PS1.13a | 21 |
| 9 | Oxidation Numbers | 9 | CHEM1.PS1.13 | 24 |
| 10 | Post-Test Review & Post-Test | | | 26 |
| SEMESTER 2 | | | | |
| 11 | Structure and Bonding | 1 | CHEM1.PS2.1 | 28 |
| 12 | Chemical Reactions and Balancing Equations | 2 | CHEM1.PS1.4 | 30 |
| 13 | The Mole | 3 | CHEM1.PS1.3a | 33 |
| 14 | Calculations with Chemical Formulas | 4 | CHEM1.PS1.3b | 35 |
| 15 | The Gas Laws | 5 | CHEM1.PS1.5, CHEM1.PS1.6 | 37 |
| 16 | Gas Stoichiometry | 6 | CHEM1.PS1.5a, CHEM1.PS1.6a | 39 |
| 17 | Energy in Chemical Processes | 7 | CHEM1.PS3.1 | 41 |
| 18 | Acids and Bases | 8 | CHEM1.PS1.8 | 43 |
| 19 | Nuclear Chemistry and Isotopes | 9 | CHEM1.PS1.9, CHEM1.PS1.10 | 46 |
| 20 | Post-Test Review & Post-Test | | | 50 |

Summer School Teacher Guide

The Summer High School Program will be **20 days** for full credit and **10 days** for semester / half ($\frac{1}{2}$) credit). First Semester will be **days 1-10** and Second Semester will be **days 11-20**. Breakdown of days will have the following per semester / half ($\frac{1}{2}$) credit:

- Nine (9) days of daily lessons
- One (1) day post-test review and post-test

All Students and staff will use Grade Results for their summer curriculum. Each lesson will open daily, and students will not be able to work ahead; however, students can work on previously opened lessons per semester. Students can retake a daily post-test 3 times before it locks. If a student needs to retake a daily lesson post-test for a 4th time, then the teacher will have to open the lesson post-test again. Teachers should not delete any prior lesson post-test. Grade Results will post the highest grade from each students' lesson post-test.

Classroom Schedule – Time below is an approximate breakdown of time.

- **Attendance in PowerSchool** – 5 minutes
- **Lesson Introduction (I Do)** - 5 minutes.
- **Lesson Activities/Supplemental (We Do)** – 60 minutes.
- **Break – 10 Minutes** (*Site Administrator will work with teachers on breaks*)
- **Teacher Lesson Review** – 5 minutes
- **Independent Work** – Student Lesson Review*/Post-test (They Do) – 40 minutes.
- **Closing/Wrap Up**– 5 minutes.
- **Total Time: 2 hours 10 minutes**

***Lesson Review** – Students will review lessons for essential knowledge/information prior to the daily test.

The following will be used within **Grade Results**:

- Lessons with Content Area, Videos, and Activities
- Supplemental Teacher Resources App– Some lessons will have a Supplemental resource (Example – Flocabulary)
- Post-Test – Each lesson will have a daily post-test.
- Prerequisite - Some lessons may also include a Prerequisite.

Graded Work – The Posttest will be the daily graded work. Graded work is automatically calculated by the Grade Results Software.

Anchor Charts – Some HS teachers will have Anchor Charts available with their lesson.

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 1

Topic/Lesson Title & Grade Results #: Part 1 Mathematical Principles in Chemistry - Lesson 1

Objective(s): Students will

1. Convert between any two units using dimensional analysis.
2. List different types of symbols used in chemistry.
3. Identify SI units and prefixes.
4. Solve a problem using the correct order of operations and equations.
5. Perform calculations in scientific notation.
6. Explain the use of operators, notations, exponentials, and logarithm in chemical calculations.

Guiding Question(s): What mathematical skills and understandings are needed to investigate chemistry?

TN Curriculum Standard(s): CHEM1.PS1.3 Perform stoichiometric calculations involving the following relationships: mole-mole; mass-mass; mole-mass; mole-particle; and mass-particle. Show a qualitative understanding of the phenomenon of percent yield, limiting, and excess reagents in a chemical reaction through pictorial and conceptual examples. (States of matter liquid and solid; excluding volume of gasses)

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Logarithmic Function: A function of the form $x = \log_b y$ is called logarithmic function.

Precision: Close agreement within repeated individual measurements.

Prefix: A group of letters that is added at the beginning of a word to change the meaning of the word.

Scientific notation: A shorthand way of writing numbers as the product of a non-exponential term and an exponential term.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will explain the significance math plays in chemistry and how important it is to have the proper math skills to be successful in Chemistry. Teacher will define chemistry and discuss how it touches our everyday lives.

Lesson Activities (We Do): 50 minutes As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slides 2 – 3 Teacher will discuss what a conversion factor is, watch video and do activity

Slide 4 Teacher will discuss Proportionality and how it is symbolized, Discuss Inequalities and Equivalence and its symbolization then let the students check for understanding in the activity.

Slide 5 Teacher will discuss, SI Units, Base units, SI prefixes, and how you can use Dimensional analysis solving mathematical conversion problems. Let the kids do the activity and check for understanding

Slide 6 Teacher will discuss Mathematical Foundations more specifically following are the rules that govern the order of operations performed in an expression.

Slide 7 The teacher will discuss Scientific notation, adding and subtracting in scientific notation. Watch the video and let the students do activity checking for understanding.

Slide 8 Teacher will discuss Logarithms and Exponential Functions and let the students do activity checking for understanding.

Slides 9 - 11 Teacher will discuss rearranging equations and how to find anyone of the quantities within the equation. Teacher here has an opportunity to include a few problems of their own as examples. Watch video together then let students do the 5 practice problems and check for understanding.

Lesson Review: - 5 minutes Slide 12 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 2

Topic/Lesson Title & Grade Results #: Part 1 Atomic Theories - Lesson 2

Objective(s): Students will

1. Describe the models and experimental evidence for the five atomic theories.
2. Characterize the 3 subatomic particles of the atom

Guiding Question(s): How do science concepts, engineering skills, and applications of technology improve the quality of life?

TN Curriculum Standard(s): CHEM1.PS1.11 Develop and compare historical models of the atom (from Democritus to quantum model) and construct arguments to show how scientific knowledge evolves over time, based on experimental evidence, critique, and alternative interpretations.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Anode - the positively charged electrode by which the electrons leave a device.

Cathode - the negatively charged electrode by which electrons enter an electrical device.

Alpha Particle - a helium nucleus emitted by some radioactive substances, originally regarded as a ray.

Subatomic particle - a particle smaller than an atom

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will share a brief history of how our understanding of the atomic model has changed and a few scientists that have played key roles in our understanding of the atom.

Lesson Activities (We Do): 50 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

- Slide 3** Teacher will discuss Democritus' atomic philosophy and check for understanding after students do activity
- Slide 4** Teacher will discuss Dalton's atomic theory and his postulates. Students will do activity and teacher checks for understanding
- Slide 5** Student will watch video on Dalton and teacher will ask questions checking for understanding
- Slide 6** Teacher will discuss Thompson's discovery of the electron using the cathode ray tube. Students will do 2 activities and teacher will check for understanding
- Slide 7** Students will watch video and teacher will ask questions checking for understanding
- Slide 8** Teacher will discuss Robert Millikan's calculation of mass of electron using the Oil Drop Experiment.
- Slide 9** Students will watch video on Oil Drop experiment and teacher will ask questions checking for understanding
- Slide 10** Teacher will discuss Rutherford's Gold Foil Experiment and his discovery of the proton. Students will do activities while teacher checks for understanding
- Slide 11** Students will watch video on Rutherford and teacher will ask questions checking for understanding
- Slide 12** Teacher will discuss Niels Bohr and the Bohr model. Students will do activities and teacher will check for understanding
- Slide 13** Students will watch video on Bohr model and teacher will ask questions checking for understanding
- Slides 14 – 15** Teacher will discuss Chadwick's discovery of the neutron and student will watch video while teacher asks questions checking for understanding.
- Slides 16 - 17** Teacher will discuss the current model of the atom. Students will do the activities, watch video while teacher checks for understanding.
- Slide 18** Students will do activity on Atomic Models while teacher checks for understanding.

Supplemental: If time permits students will complete video in Safari **"Historical Developments of atomic Theory"** 5:40

Lesson Review: 5 minutes

- Slide 19.** Review summarizes the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, **(2)** Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 3

Topic/Lesson Title & Grade Results #: Part 1 Atomic Structure - Lesson 3

Objective(s): Students will

1. Describe the nucleus and subatomic particles.
2. Define mass and atomic numbers.
3. Describe ions and isotopes

Guiding Question(s): How do science concepts, engineering skills, and applications of technology improve the quality of life?

TN Curriculum Standard(s): **CHEM1.PS1.11** Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge, ionization energy, atomic radius, and electronegativity) based on location on the periodic table. Construct an argument to describe how the quantum mechanical model of the atom (e.g., patterns of valence and inner electrons) defines periodic properties. Use the periodic table to draw Lewis dot structures and show understanding of orbital notations through drawing and interpreting graphical representations (i.e., arrows representing electrons in an orbital).

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

amu: Acronym of Atomic Mass Unit, equal to one-twelfth of the mass of an unbound atom of carbon-12 at rest and in its ground state. It is the unit used to express the mass of atoms, molecules, and ions.

Atomic Number (Z): The number of protons contained in the nucleus of the atom of an element.

Ions: A net electric charge on an atom or a molecule due to the loss or gain of electrons.

Isotopes: Atoms of the element with same atomic number but different mass numbers.

Mass number (A): The total number of protons and neutrons, i.e., the number of nucleons present in the nucleus.

Molecule: A group of atoms bound together representing the fundamental unit of a compound.

Matter: Any substance which has mass and occupies space.

Negative ion: An ion with a negative charge formed by gaining one or more electrons.

Positive ion: An ion with a positive charge formed by the removal of one or more electrons.

Proton: A positively charged subatomic particle, located in an atom's nucleus.

Subatomic particles: The constituent particles of an atom.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will share an overview of the three subatomic particles protons neutrons and electrons. Teacher will review by whom and how these subatomic particles were discovered and touch on the topics to be presented in this lesson.

Lesson Activities (We Do): 50 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slides 2 – 4 Teacher will review the 3 subatomic particles. Students will watch video and do activity while teacher checks for understanding.

Slide 5 Teacher will Discuss Mass Number and Atomic Number. Students will watch video and do activity while teacher checks for understanding

Slide 6 Teacher will discuss what an ion is and how atoms acquire negative and positive charges. Students will complete activity while teacher checks for understanding

Slides 7 – 8 Teacher will discuss what is an isotope. Students will watch video and complete activities while teacher checks for understanding

Slides 9 Teacher will define average mass and how to calculate average mass. Students will complete activity while teacher checks for understanding

Slide 10 Students will complete activity on atomic structure while teacher checks for understanding

Supplemental: If time permits students will complete video in Flocabulary “**Atoms and Elements**” 2:22 **Atomic Structure** video 5:08 and **Nuclear Chemistry** video 19:17

Lesson Review: 5 minutes

Slide 11 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - 1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 4

Topic/Lesson Title & Grade Results #: Part 1 Electron Configurations - Lesson 4

Objective(s): Students will

1. Describe and distinguish between shells, subshells, and orbitals.
2. Write electron configurations, abbreviated notations and orbital notations.
3. Determine the number of valence electrons

Guiding Question(s): How does the structure of matter determine its chemical and physical properties?

TN Curriculum Standard(s): **CHEM1.PS1.12** Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge, ionization energy, atomic radius, and electronegativity) based on location on the periodic table. Construct an argument to describe how the quantum mechanical model of the atom (e.g., patterns of valence and inner electrons) defines periodic properties. Use the periodic table to draw Lewis dot structures and show understanding of orbital notations through drawing and interpreting graphical representations (i.e., arrows representing electrons in an orbital).

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Anion: An atom or a group of atoms with a negative charge.

Atomic orbital: A three-dimensional region around the nucleus of an atom where there is a probability of finding an electron.

Cation: An atom or a group of atoms with a positive charge.

Core Electrons: Inner electrons of an atom.

Diamagnetic substances: Substances that are weakly repelled by a magnetic field.

Electron configuration: The arrangement of electrons in an atom.

Ionic bond: The bond formed by the transfer of outermost electron from one atom to another atom.

Isoelectronic species: Atoms, ions or molecules that have the same electronic configuration and same number of valence electrons.

Paramagnetic substances: Substances that are weakly attracted by

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes - Teacher will define and discuss the importance of electrons in chemistry and present an overview of what will be learned in this lesson

Lesson Activities (We Do): 50 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slide 2 Students will watch video and do activity, while teacher checks for understanding.

Slides 3 - 4 Teacher will discuss electronic structure of atom (Shells, subshells and orbitals), and electron spin. Students will watch video and do activity while teacher checks for understanding

Slide 5 Teacher will discuss rules governing electron configurations – Aufbau Principle, Hund’s Rule and Pauli exclusion Principle

Slide 6 Teacher will discuss s,p,d,f notation. Students will complete activity while teacher checks for understanding.

Slide 7 Teacher will discuss Noble Gas Abbreviated Notation. Students will complete activity while teacher checks for understanding

Slide 8 Teacher will discuss Orbital Box notation. Students will complete activity while teacher checks for understanding

Slide 9 Teacher will review and summarize steps for writing electron configurations. Students will watch video and complete activity while teacher checks for understanding.

Slide 10 Teacher will discuss the electron configurations of ions. Students will watch a video.

Slide 11 Teacher will discuss anions and isoelectronic species. Students will complete activity while teacher checks for understanding.

Slide 12 Teacher will discuss exceptions to electron configurations and magnetic properties. Students will complete activity while teacher checks for understanding

Slides 13 – 14 Teacher will discuss valence electrons. Students will watch video and complete activity while teacher checks for understanding

Slides 15 – 16 Teacher will discuss valence orbitals. Students will complete activities and teacher will check for understanding

Slide 15 Teacher will Review valence electrons

Slide 16 Students will complete activity while teacher checks for understanding.

Supplemental: If time permits students will complete video in Safari **“Orbitals”** 13:37

Lesson Review: 5 minutes

Slide 17 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 5

Topic/Lesson Title & Grade Results #: Part 1 The Periodic Table of the Elements - Lesson 5

Objective(s): Students will

1. Describe Periodic Law
2. Explain groups and periods in the periodical table
3. Describe properties of metals, nonmetals, and metalloids

Guiding Question(s): How does the structure of matter determine its chemical and physical properties?

TN Curriculum Standard(s): **CHEM1.PS1.12a** Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge, ionization energy, atomic radius, and electronegativity) based on location on the periodic table. Construct an argument to describe how the quantum mechanical model of the atom (e.g., patterns of valence and inner electrons) defines periodic properties. Use the periodic table to draw Lewis dot structures and show understanding of orbital notations through drawing and interpreting graphical representations (i.e., arrows representing electrons in an orbital).

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Boiling point: The temperature at which the liquid form of a substance changes into vapor (gas), at standard atmospheric pressure.

Ductility: A property that describes the ability of a material to be drawn into thin wire without breaking.

Groups: Elements arranged in vertical columns of the periodic table.

Malleability: A property describing the ability of a material to be hammered or rolled into thin sheets.

Metalloids: Elements which have some properties of metals and non-metals.

Modern periodic law: The properties of the elements are periodic functions of their atomic numbers.

Periods: The horizontal rows of elements in the periodic table.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes - Teacher will define and discuss the significance of the periodic table and its manifestation of element's electron configurations.

Lesson Activities (We Do): 50 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slide 2 Teacher will compare calendar to periodic Table. Students will do activity while teacher checks for understanding.

Slide 3 – 4 Teacher will discuss Periodic Law and the discovery of elements. Students will watch. Students will watch 40-minute video and do activity while teacher checks for understanding.

Slide 5 Teacher will discuss classification of elements (metals nonmetals and metalloids)

Slides 6 – 7 Teacher will discuss groups and Periods. Students will watch 23 min. video, and complete activity while teacher checks for understanding.

Slides 8 – 9 Teacher will discuss metals. Students' complete activity while checking for understanding.

Slide 10 Teacher will discuss nonmetals. Student will do activity while checking for understanding

Slide 11 Teacher will discuss metalloids. Student will do activity while checking for understanding

Slides 12 – 13 Students will watch 30 min video and complete activity while teacher checks for understanding.

Lesson Review: 5 minutes

Slide 14 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 6

Topic/Lesson Title & Grade Results #: Part 1 Metals Nonmetals Metalloids and Periodicity - Lesson 6

Objective(s): Students will

Lesson A

1. Classify, locate, describe and compare properties of metals nonmetals and metalloids.

Lesson B

1. Describe the trends of Ionization Energy, Electronegativity, Electron Affinity and Atomic Radius on the periodic table

Guiding Question(s):

Lesson A

How does the structure of matter determine its chemical and physical properties?

Lesson B

How does the structure of matter determine its chemical and physical properties?

TN Curriculum Standard(s):

- A. **CHEM1.PS1.12b** Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge, ionization energy, atomic radius, and electronegativity) based on location on the periodic table. Construct an argument to describe how the quantum mechanical model of the atom (e.g., patterns of valence and inner electrons) defines periodic properties. Use the periodic table to draw Lewis dot structures and show understanding of orbital notations through drawing and interpreting graphical representations (i.e., arrows representing electrons in an orbital).
- B. **CHEM1.PS1.12b** Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge, ionization energy, atomic radius, and electronegativity) based on location on the periodic table. Construct an argument to describe how the quantum mechanical model of the atom (e.g., patterns of valence and inner electrons) defines periodic properties. Use the periodic table to draw Lewis dot structures and show understanding of orbital notations through drawing and interpreting graphical representations (i.e., arrows representing electrons in an orbital).

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMs meeting (if applicable)

Lesson A Key Vocabulary/Terms: Teacher/Students will review, define and/or discuss vocabulary words for lesson

Boiling point: The temperature at which a substance changes from a liquid to a gas.

Density: Ratio of mass to volume.

Ductility: Property that describes the ability of a material to be drawn into thin wire without breaking.

Malleability: Property describing the ability of a material to be hammered or rolled into thin sheets.

Melting point: The temperature at which a substance changes from a solid to a liquid.

Attendance in PowerSchool – 5 minutes

Lesson A Introduction (I Do): 5 minutes - Teacher will define a trend and discuss an overview of the Periodic Table of elements and its organization along with the trends associated with the table.

Lesson A Activities (We Do): 25 minutes As a whole group, complete the Practice Activities. Discuss
(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slides 1 – 5 Teacher will review classification of elements. Students will watch video and complete activity while teacher checks for understanding

Slide 6 Teacher will review metals and their properties. Students will complete activity while teacher checks for understanding.

Slides 7 – 8 Students will watch video on Alkali Metals and complete activity, while teacher checks for understanding

Slide 9 Teacher will discuss chemical and electronic properties of metals including Electronegativity and reaction with oxygen, water and nonmetals. Students will complete activity

Slide 10 Students will watch videos on chemical properties of metals and reactions with acids, while teacher checks for understanding

Slides 11 – 12 Teacher will discuss properties associated with nonmetals including valence, electronegativity, reaction with oxygen, water, acids, and nonmetals. Students will watch video while teacher checks for understanding

Slides 13 – 16 Teacher will discuss metalloids. Students will watch video and complete activities, while teacher checks for understanding.

Slides 17 – 18 Students will watch video on Periodic Table and complete activity, while teacher checks for understanding

Lesson B Key Vocabulary/Terms Teacher / Students will review, define and / or discuss vocabulary words for lesson

Atomic radius: A measure of the size of its atoms, usually the distance from the nucleus to the boundary of the surrounding cloud of electrons.

Ionic radius: The measure of the size of an ion. The distance from its nucleus to the cloud of the electron of the ion.

Ionization energy: The energy required to remove an electron from a gaseous neutral atom to form a positive ion.

Electronegativity: The relative ability of atoms to attract electrons in chemical bond.

Lesson B Activities (We Do): 20 minutes - As a whole group, complete the Practice Activities. Discuss

Slide 1 Objectives

Slides 2 – 3 Teacher will discuss Atomic Radius and ionic radius

Slide 4 Teacher will discuss Ionization energy and its trend. Students will do activity, while teacher checks for understanding

Slide 5 Teacher will discuss electronegativity and its trend

Slide 6 Students will complete activity while teacher checks for understanding.

Lesson A Review: Slide 19 5 minutes Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Lesson B Review: Slide 7 5 minutes Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 7

Topic/Lesson Title & Grade Results #: Part 1 Chemical Bonding and Lewis Structure - Lesson 7

Objective(s): Students will

Lesson A

1. Describe the octet rule
2. List the types of bonds. Describe and contrast ionic and covalent bonds.

Lesson B

1. Describe the octet rule
2. Understand and learn how to draw Lewis Structures

Guiding Question(s):

Lesson A

What types of interactions between matter generate new substances?

Lesson B

What types of interactions between matter generate new substances?

TN Curriculum Standard(s):

- A. CHEM1.PS1.12c** Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge, ionization energy, atomic radius, and electronegativity) based on location on the periodic table. Construct an argument to describe how the quantum mechanical model of the atom (e.g., patterns of valence and inner electrons) defines periodic properties. Use the periodic table to draw Lewis dot structures and show understanding of orbital notations through drawing and interpreting graphical representations (i.e., arrows representing electrons in an orbital).
- B. CHEM1.PS1.12c** Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge, ionization energy, atomic radius, and electronegativity) based on location on the periodic table. Construct an argument to describe how the quantum mechanical model of the atom (e.g., patterns of valence and inner electrons) defines periodic properties. Use the periodic table to draw Lewis dot structures and show understanding of orbital notations through drawing and interpreting graphical representations (i.e., arrows representing electrons in an orbital).

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Lesson A Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Chemical bond: The force of attraction between two atoms.

Conduction: The electromagnetic interaction between delocalized electrons.

Covalent bond: The sharing of a pair of valence electrons by two atoms.

Ductility: The ability of a substance to be stretched.

Electronegativity: Property of an atom to attract the electrons of a bond.

Ionic bond: The bond formed by the transfer of an outermost electron from one atom to another atom.

Molecule: Two or more atoms chemically combined to form a single species.

Attendance in PowerSchool – 5 minutes

Introduction (I Do): 5 minutes - Teacher will discuss and define Covalent and Ionic bonding and the significance they play in our everyday lives.

Lesson A Activities (We Do): 25 minutes As a whole group, complete the Practice Activities. Discuss
(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slides 2 – 4 Teacher will discuss how atoms are held together. Students will watch a video and complete activity while teacher checks for understanding.

Slides 5 – 7 Teacher will discuss ionic bonds and their properties. Students will watch a video and complete activity while teacher checks for understanding.

Slides 8 – 10 Teacher will discuss covalent bonds. Students will watch a video and complete activity while teacher checks for understanding.

Slides 11 – 13 Teacher will discuss metallic Bonds and their properties. Students will watch a video and complete activity while teacher checks for understanding.

Slides 14 – 16 Students will complete activities and watch a video on all three types of bonds while teacher checks for understanding.

Lesson B Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Octet rule: To attain stability, elements need to have eight electrons in their outermost orbital.

Polar covalent bond: Unequal sharing of the electron pairs, with the electrons spending more time around the more nonmetallic atom.

Lewis Structure: Representation of the electron arrangement in atoms, ions, or molecules, by showing the valence electrons as dots placed around the symbols for the elements.

Lesson B **Activities (We Do): 20 minutes** - As a whole group, complete the Practice Activities. Discuss
(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slides 3 – 4 Teacher will discuss what Lewis structures are and represent. Students will watch video and complete activity while checking for understanding.

Slides 5 – 9 Teacher will discuss rules for and how to draw Lewis Structures

Slide 10 Teacher will discuss the structure of Lewis ions and exceptions. Students will watch video while teacher checks for understanding.

Slides 11 – 12 Teacher will discuss Lewis structures in equations. Students will do activities while teacher checks for understanding

Lesson A **Review: Slide 17 - 5 minutes** - Review summarizes the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question.

Have students review the slides and their notes to prepare for the Posttest.

Lesson B **Review: Slide 13 - 5 minutes** - Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 8

Topic/Lesson Title & Grade Results #: Part 1 Role of Electrons in Chemical Reactions / Symbols & Equations Lesson 8

Objective(s): Students will

Lesson A

Write the electronic configuration of elements, using the periodic table. Identify oxidizing/reducing agents in the redox reactions. Explain the role of valence electrons in chemical reactivity

Lesson B

Write and name ionic and covalent compounds.

Guiding Question(s):

Lesson A

What types of interactions between matter generate new substances?

Lesson B

What types of interactions between matter generate new substances?

TN Curriculum Standard(s):

- A. **CHEM1.PS1.13a** Use the periodic table and electronegativity differences of elements to predict the types of bonds that are formed between atoms during chemical reactions and write the names of chemical compounds, including polyatomic ions using the IUPAC criteria.
- B. **CHEM1.PS1.13a** Use the periodic table and electronegativity differences of elements to predict the types of bonds that are formed between atoms during chemical reactions and write the names of chemical compounds, including polyatomic ions using the IUPAC criteria.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Lesson A Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Core Electrons: Inner electrons of an atom.

Covalent bond: The sharing of a pair of valence electrons by two atoms.

Ionic bond: The bond formed by the transfer of outermost electron from one atom to another atom.

Oxidation number: Oxidation number is defined as the charge that an atom appears to have when all other atoms are removed from it as ions.

Oxidation: Removal of one or more electrons from an element.

Attendance in PowerSchool – 5 minutes

Introduction (I Do): 5 minutes Teacher will define and discuss what a chemical reaction is and how symbols are an important part of how we express chemical equations.

Lesson A Activities (We Do): 25 minutes As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slide 2 Teacher will discuss what is a chemical reaction. Students will watch video and complete activity while teacher checks for understanding

Slide 3 Teacher will discuss what is a ground state electron configuration is. Students will watch video and complete activity while teacher checks for understanding

Slide 4 Teacher will discuss what valence electron are. Students will watch video and complete activity while teacher checks for understanding

Slide 5 Teacher will discuss electrons and chemical reactivity. Students will watch videos and complete activities while teacher checks for understanding.

Slide 6 Teacher will discuss electron transfers and the terms oxidation and reduction. Students will watch video and complete activity while teacher checks for understanding.

Slide 7 Student will complete review activity while teacher checks for understanding

Lesson B Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Redox Reaction: A reaction in which both reduction and oxidation take place.

Reduction: Addition of one or more electrons to an element.

Valence electrons: The electrons present in the outermost energy level of an atom.

Chemical bond: Force of attraction between atoms in a molecule or a compound.

Electrostatic attraction: Force of attraction between opposite charges and hold them together.

Precipitate: Insoluble solid that settles down from a liquid solution.

Lesson B Activities (We Do) 20 minutes - As a whole group, complete the Practice Activities. Discuss.

Slide 1 Objectives

Slides 2 – 3 Teacher will discuss symbols and formulas used in chemical equations

- Slide 4** Teacher will discuss Naming Ionic compounds and oxidation numbers. Students will complete activity while teacher checks for understanding.
- Slide 5** Teacher will discuss how to write ionic compounds and students will complete activity while teacher checks for understanding
- Slide 6** Teacher will discuss using polyatomic ions when writing ionic compounds. Students will complete activity while teacher checks for understanding.
- Slide 7** Teacher will discuss naming covalent compounds. Students will complete activity while teacher checks for understanding.
- Slide 8** Teacher will discuss chemical changes and balancing equations. Students will complete activity while teacher checks for understanding
- Slides 9 – 10** Students will complete review activities while teacher checks for understanding.

Lesson A **Review: Slide 8 - 5 minutes** Review and summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Lesson B **Review: Slide 11 - 5 minutes** Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - 1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 9

Topic/Lesson Title & Grade Results #: Part 1 Oxidation numbers Lesson 9

Objective(s): Students will

1. Describe the oxidation number
2. Assign oxidation numbers to atoms.

Guiding Question(s): What types of interactions between matter generate new substances

TN Curriculum Standard(s): **CHEM1.PS1.13** Use the periodic table and electronegativity differences of elements to predict the types of bonds that are formed between atoms during chemical reactions and write the names of chemical compounds, including polyatomic ions using the IUPAC criteria.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Reducing agent: The species in a redox reaction that donates electrons.

Spectator ion: Ion in an ionic equation that does not take part in the reaction.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher define and discuss oxidation reduction and how these two terms relate to what happens to electrons and how they will be used to describe an equation or write a formula.

Lesson Activities (We Do): 50 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slides 2 – 5 Teacher will discuss Oxidation numbers and 10 rules for assigning oxidation numbers. Students will do activities while teacher checks for understanding

- Slides 6 – 8** Students will watch video and teacher will discuss and help students determine oxidation numbers in activities.
- Slide 9** Teacher will discuss Redox reactions and terms oxidation and Reduction
- Slide 10** Teacher will discuss half reactions, oxidation and reducing agents. Students will watch video while teacher checks for understanding.
- Slides 11 – 12** Teacher will discuss balancing Half reaction in acidic solutions. Students will watch a video and do activity while teacher checks for understanding
- Slides 13-14** Teacher will discuss balancing Half reaction in basic solutions. Students will watch a video and do activity while teacher checks for understanding

Supplemental: Teacher led problems/Textbook

Lesson Review: 5 minutes

- Slide 15** Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes Review Study Guide take a moment to reflect the lesson of the day. Use an exit ticket

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 10

Topic/Lesson Title & Grade Results #: Final Post-Test Review & Post-Test

Objective(s):

- Students will review lessons to prepare for final post-Test.
- Final Post-test will open. All students must complete the final Post-Test

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Lesson Introduction (I Do):

Identify the purpose of the course

Connect the course to missing or future coursework and Post-test

Lesson Activities/Supplemental (We Do) – 30-60 minutes

Lesson Activities and Review (We Do):

Check Grade Results and have students to review activities/lesson that they have not completed or need assistance with. Hold an open Q&A for students to ask questions regarding the activities/lessons they are reviewing.

Independent Work – Posttest (They Do):

Students will review and complete any incomplete/missed/failed coursework.

Closing/Wrap Up:

SEMESTER 2

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 11

Topic/Lesson Title & Grade Results #: Part 2 Structure and bonding - Lesson 1

Objective(s): Students will

1. Explain the types of chemical bonds
2. Draw Lewis dot structures of atoms, showing the formation of ionic and covalent bonds

Guiding Question(s): What types of interactions between matter generate new substances?

TN Curriculum Standard(s): **CHEM1.PS2.1** - Draw, identify, and contrast graphical representations of chemical bonds (ionic, covalent, and metallic) based on chemical formulas. Construct and communicate explanations to show that atoms combine by transferring or sharing electrons.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Atomic orbital: Regions of space around the nucleus of an atom where an electron is likely to be found.

Covalent compound: A compound formed when atoms share electrons.

Ionic compound: A substance formed from a cation and an anion.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes - Teacher will review what a covalent bond is and how they are formed

Lesson Activities (We Do): 50 minutes as a whole group, complete the Practice Activities. Discuss

(Note to Teacher please remember to give students 10 min break midway during lesson)

- Slide 1** Objectives
- Slide 2** Teacher will discuss Bonding, Covalent double, single and triple bonds
- Slide 3** Teacher will discuss Lewis Structures of atoms, ionic compounds, anions and cations. Student will do activity while teacher checks for understanding
- Slide 4** Teacher will discuss Lewis Structures and steps for drawing. Students will do activity while teacher checks for understanding.
- Slide 5** Teacher will discuss Resonance and formal charge. Students will do activity while teacher checks for understanding
- Slide 6** Teacher will discuss Lewis Structures for polyatomic ions. Expanded and deficient octets. Students will do activity while teacher checks for understanding
- Slide 7** Students will complete concept review activity while teacher checks for understanding

Supplemental: Teacher Led personal examples

Additional Teacher Resources: Current Textbook

Lesson Review: 5 minutes

- Slide 18** Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 12

Topic/Lesson Title & Grade Results #: Part 2 Chemical Reactions and Equations and Balancing Equations - Lesson 2

Objective(s): Students will

Lesson A

1. Describe a physical change.
2. Describe a chemical change.
3. Differentiate between physical and chemical change.
4. Represent a chemical change using a chemical equation.
5. Describe thermo-chemical equation.

Lesson B

1. Balance chemical equations and discuss the types of chemical reactions.

Guiding Question(s):

Lesson A

What mathematical skills and understandings are needed to investigate chemistry?

Lesson B

What mathematical skills and understandings are needed to investigate chemistry?

TN Curriculum Standard(s):

- A. **CHEM1.PS1.4** - Use the reactants in a chemical reaction to predict the products and identify reaction classes (synthesis, decomposition, combustion, single replacement, double replacement).
- B. **CHEM1.PS1.4** - Use the reactants in a chemical reaction to predict the products and identify reaction classes (synthesis, decomposition, combustion, single replacement, double replacement).

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Lesson A Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Chemical change: Change of matter that takes place with change in the chemical composition of matter.

Enthalpy: Measure of amount of heat released or absorbed by a system at constant pressure. It is represented by H.

Physical change: Change of matter that takes place without changing the chemical composition of matter.

Precipitate: Insoluble solid that settles from a liquid solution.

Product: Substance which is formed during chemical changes.

Reactant: Substance which undergoes chemical changes.

Stoichiometric coefficient: Numbers (integers) present in front of formulas of atoms, ions, or molecules in a balanced chemical equation.

Surrounding: Everything in the universe outside the system.

System: Part of universe under investigation.

Attendance in PowerSchool – 5 minutes

Introduction (I Do): 5 minutes - Teacher will define and discuss what balancing an equation is and how it related to the Law of Conservation of mass.

Lesson A Activities (We Do): 25 minutes As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Lesson A

Slide 1 Objectives

Slide 2 Teacher will discuss chemical and physical changes. Students will watch video and complete activity while teacher checks for understanding

Slide 3 Teacher will discuss chemical reactions and types of equations. Students will watch video while teacher checks for understanding.

Slide 4 Teacher will discuss chemical representations of reactions and symbols used, skeletal equations, word equations and how to balance equations. Students will watch video while teacher checks for understanding.

Slide 5 Teacher will discuss thermo-chemical equations

Slide 6 Teacher will discuss the 5 types of chemical reactions. Students will watch a video while teacher checks for understanding.

Slide 7 Students will complete review activity while teacher checks for understanding.

Lesson B Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Law of conservation of mass: Matter can neither be created nor be destroyed. In a chemical reaction, the total mass of reactants is equal to the total mass of the products.

Molecular formula: Represents the actual number of atoms of each element present in one molecule of the compound.

Polyatomic ions: A charged particle which has two or more atoms held together by covalent bonds.

Lesson B **Activities (We Do): 20 minutes** as a whole group, complete the Practice Activities. Discuss.

Lesson B

Slide 1 Objectives

Slide 2 Teacher will discuss what a chemical reaction is, products and reactants. Students will complete activity while teacher checks for understanding.

Slide 3 Teacher will discuss word equations and symbols used in equations.

Slide 4 Teacher will discuss skeletal equations. Students will complete activity while teacher checks for understanding

Slide 5 Teacher will discuss conservation of mass in chemical equations

Slide 6 Teacher will discuss balancing equations and steps to balancing equations

Slide 7 Students will complete review activity while teacher checks for understanding.

Lesson A

Review: Slide 8 - 5 minutes

Review and summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Lesson B

Review: Slide 8 - 5 minutes

Review and summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 13

Topic/Lesson Title & Grade Results #: Part 2 The Mole - Lesson 3

Objective(s): Students will

1. Define Avogadro's number.
2. Describe the mole-mass relationship.
3. Calculate the molar mass of compounds.
4. Describe the mole-volume relationship.
5. Identify limiting reactants, excess reactants, and solve stoichiometric problems using the factor-label method.

Guiding Question(s): What mathematical skills and understandings are needed to investigate chemistry?

TN Curriculum Standard(s): **CHEM1.PS1.3a Perform** stoichiometric calculations involving the following relationships: mole-mole; mass-mass; mole-mass; mole-particle; and mass-particle. Show a qualitative understanding of the phenomenon of percent yield, limiting, and excess reagents in a chemical reaction through pictorial and conceptual examples. (States of matter liquid and solid; excluding volume of gasses)

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Avogadro's number: The number of particles in a mole, 6.02×10^{23} .

Excess reactant: Reactant that is not completely consumed in a chemical reaction.

Limiting reactant: Reactant that is completely consumed and limits the amount of product in a chemical reaction.

Mole: The amount of a substance containing as many particles (atoms, ions, molecules) as the atoms in exactly 12 g of the ^{12}C isotope.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will define and discuss the concept of the mole and how it is widely used as the SI unit of measurement for chemistry.

Lesson Activities (We Do): 50 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

- Slide 1** Objectives
- Slide 2** Teacher will discuss measuring matter. Students will watch video while teacher checks for understanding
- Slide 3** Teacher will discuss the mole concept. Student will watch a video while teacher checks for understanding
- Slide 4** Teacher will discuss mole to mass relationship. Students will do activity while teacher checks for understanding
- Slides 5 – 6** Teacher will discuss the mole of a compound. Student will watch a video and do activity while teacher checks for understanding
- Slide 7** Teacher will discuss conversions using moles. Students will do activity while teacher checks for understanding
- Slide 8** Teacher will discuss mole volume relationship. Students will watch a video while teacher checks for understanding
- Slide 9** Teacher will discuss mole road map. How to solve equations.
- Slides 10 – 11** Teacher will discuss Limiting and excess reactant. Students will watch a video while teacher checks for understanding
- Slide 12** Teacher will discuss how to check answers
- Slide 13** Students will complete review activity while teacher checks for understanding

Lesson Review: 5 minutes

- Slide 14** Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 14

Topic/Lesson Title & Grade Results #: Part 2 Calculations with Chemical Formulas and Equations - Lesson 4

Objective(s): Students will

1. Inter-convert moles, mass, molar mass, and representative particles.
2. Predict the mass/volume/mole of the products from the given mass/volume/mole of the reactants.
3. Determine theoretical, actual, and percent yield by conducting an investigation.

Guiding Question(s): What mathematical skills and understandings are needed to investigate chemistry?

TN Curriculum Standard(s): **CHEM1.PS1.3b** Perform stoichiometric calculations involving the following relationships: mole-mole; mass-mass; mole-mass; mole-particle; and mass-particle. Show a qualitative understanding of the phenomenon of percent yield, limiting, and excess reagents in a chemical reaction through pictorial and conceptual examples. (states of matter liquid and solid; excluding volume of gasses)

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Actual yield: Actual amount of product that is formed in a chemical reaction.

Empirical formula: The simple whole-number ratio of atoms present in one molecule of the compound.

Molar mass: Mass of one mole of a substance.

Percent yield: Percent of product that is made of the total possible amount of product.

Percentage composition: The percent of the mass of an element from the total mass of its compound.

Theoretical yield: Maximum amount of product that can be formed in a chemical reaction

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will discuss provide overview of the kind of chemical arithmetic that will be performed and its reliance on the math skills that were presented and taught in lesson 1 Part one of this course.

Lesson Activities (We Do): 50 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slides 2 – 4 Teacher will discuss conversion factors. Students will watch video and do activities while teacher checks for understanding.

Slides 5 – 7 Teacher will discuss mole concept. Students will watch video and do activity while teacher checks for understanding

Slides 8 – 10 Teacher will discuss molar mass. Students will watch video and do activity while teacher checks for understanding

Slide 11 Teacher will discuss conversions using moles

Slides 12 – 13 Teacher will discuss percent composition. Students will do activity while teacher checks for understanding.

Slides 14 – 15 Teacher will discuss balancing equations and the steps involved. Students will watch video while teacher checks for understanding.

Slides 16 – 17 Teacher will discuss Law conservation of mass. Students will watch a video while teacher checks for understanding

Slides 18 – 19 Teacher will discuss Theoretical, Actual and Percent Yield. Students will do activity while teacher checks for understanding.

Slide 20 Teacher will tie concepts together in wrap up.

Lesson Review: 5 minutes

Slide 21 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 15

Topic/Lesson Title & Grade Results #: Part 2 The Gas Laws Lesson 5

Objective(s): Students will

1. Describe Boyle's law, Charles's law, and Gay-Lussac's law.
2. Verify the combined gas law.
3. Illustrate Avogadro's number and Avogadro's law.
4. Demonstrate Dalton's partial pressure law.

Guiding Question(s): What mathematical skills and understandings are needed to investigate chemistry?

TN Curriculum Standard(s): **CHEM1.PS1.5, CHEM1.PS1.6** Conduct investigations to explore and characterize the behavior of gases (pressure, volume, temperature), develop models to represent this behavior, and construct arguments to explain this behavior. Evaluate the relationship (qualitatively and quantitatively) at STP between pressure and volume (Boyle's law), temperature and volume (Charles's law), temperature and pressure (Gay-Lussac law), and moles and volume (Avogadro's law), and evaluate and explain these relationships with respect to kinetic-molecular theory. Be able to understand, establish, and predict the relationships between volume, temperature, and pressure using combined gas law both qualitatively and quantitatively.

- Use the ideal gas law, $PV = nRT$, to algebraically evaluate the relationship among the number of moles, volume, pressure, and temperature for ideal gases.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Avogadro's law: Equal volumes of all gases at constant temperature and pressure contains equal number of molecules.

Boyle's law: For a fixed mass of gas, the pressure is inversely proportional to the volume if the temperature remains constant. When the temperature is constant, the process is called isothermal process.

Charles's law: For a fixed mass of gas, the volume is proportional to the absolute temperature if the pressure remains constant. When the pressure is constant, the process is called isobaric process.

Combined gas laws: A combination of Boyle's, Charles's, and Gay-Lussac's laws.

Dalton's law of partial pressure: The relationship between the partial pressures of non-reacting gases and the total pressure of the mixture of the gases.

Frequency: Number of events in a second.

Gay-Lussac's law: The pressure of a gas is directly proportional to the Kelvin temperature if the volume remains constant.

Kinetic energy: Energy possessed by an object due to its motion.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will define, discuss, and relate how gases are commonplace in everyday life. Teacher will discuss how two simple gas Law equations will solve most any gas problem.

Lesson Activities (We Do): 50 minutes as a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 15 min break midway during lesson)

Slide 1 Objectives

Slide 2 Teacher will discuss properties of gases

Slide 3 Teacher will discuss Boyle's Law. Students will do activity while teacher checks for understanding.

Slide 4 Teacher will discuss Charles' Law

Slide 5 Teacher will discuss Gay-Lussac's Law

Slide 6 Teacher will discuss Combined Gas Law. Students will complete activity while teacher checks for understanding.

Slide 7 Teacher will discuss Avogadro's number and Avogadro's Law. Students will complete activity while teacher checks for understanding.

Slide 8 Teacher will discuss Dalton's Law

Slide 9 Students will complete review activity while teacher checks for understanding.

Supplemental: If time permits students will complete videos in Safari **"Describing the Individual Properties of Gases"** 3:25 **"ABC's of Gases"** 2:49, **"The Ideal Gas Law"** 5:56 **"Temperature Effects on Gases"** 1:02

Additional Teacher Resources: N/A

Lesson Review: 5 minutes

Slide 10 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest. n.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 16

Topic/Lesson Title & Grade Results #: Part 2 Gas Stoichiometry Lesson 6

Objective(s): Students will

1. Solve gaseous stoichiometry problems using the ideal gas law.
2. Apply gaseous stoichiometry and law of conservation of mass in designing an airbag.

Guiding Question(s): What mathematical skills and understandings are needed to investigate chemistry?

TN Curriculum Standard(s): **CHEM1.PS1.5a, CHEM1.PS1.6a** Conduct investigations to explore and characterize the behavior of gases (pressure, volume, temperature), develop models to represent this behavior, and construct arguments to explain this behavior. Evaluate the relationship (qualitatively and quantitatively) at STP between pressure and volume (Boyle's law), temperature and volume (Charles's law), temperature and pressure (Gay-Lussac law), and moles and volume (Avogadro's law), and evaluate and explain these relationships with respect to kinetic-molecular theory. Be able to understand, establish, and predict the relationships between volume, temperature, and pressure using combined gas law both qualitatively and quantitatively.

- Use the ideal gas law, $PV = nRT$, to algebraically evaluate the relationship among the number of moles, volume, pressure, and temperature for ideal gases.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Molar Mass: The mass of one mole of a substance.

Molar volume: The volume occupied by one mole of any substance at a given temperature and pressure.

STP: The condition of 273 K and 1 atm.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will provide overview of what kinds of gases the laws involved in solving everyday gas problems.

Lesson Activities (We Do): 50 minutes as a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

- Slide 1** Objectives
- Slides 2 – 4** Teacher will introduce stoichiometry to gas laws. Students will watch video and complete activity while teacher checks for understanding
- Slides 5 – 6** Teacher will discuss gas stoichiometry problem. Students will complete activities while teacher checks for understanding
- Slides 7 – 8** Teacher will discuss molar volume. Students will complete activity while teacher checks for understanding.
- Slide 9** Teacher will discuss and help solve problems with students.
- Slides 10 – 12** Teacher will discuss airbag stoichiometry. Students will watch video and complete activity while teacher checks for understanding.
- Slide 13** Students will solve air bag problem while teacher checks for understanding.
- Slides 14 – 17** Teacher will discuss designing, preparing and improving an airbag
- Slide 18** Teacher will tie everything together in wrap up.

Lesson Review: 5 minutes

- Slide 19** Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question.

Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 17

Topic/Lesson Title & Grade Results #: Part 2 Energy in Chemical Processes Lesson 7

Objective(s): Students will

1. Define chemical potential energy.
2. Explain how heat is transferred from one object to another.
3. Demonstrate the conversion of one form of energy to another.
4. Describe the transfer of thermal energy between two objects.

Guiding Question(s): What is the relationship between matter and energy?

TN Curriculum Standard(s): **CHEM1.PS3.1** Contrast the concepts of temperature and heat in macroscopic and microscopic terms. Understand that thermal energy is a form of energy and temperature is a measure of average kinetic energy of a group of particles

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Calorimeter: An instrument used to measure the absorption or release of heat during a chemical reaction.

Chemical potential energy: The energy stored in the chemical bonds of atoms and molecules.

Endothermic reaction: A reaction which absorbs heat energy.

Enthalpy: The measure of the total energy of the system at constant pressure.

Exothermic reaction: A reaction which releases heat energy.

Fusion: Phase change from solid to liquid.

Heat: A form of energy that transfers due to the difference in temperature.

Kinetic energy: Energy possessed by an object during its motion.

Latent heat: Amount of heat required to change a substance from one state to another.

Specific heat capacity: The amount of heat required to raise the temperature of 1 g of a substance by 1°C.

Temperature: Indication of the amount of heat energy in matter.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will define and discuss how energy and how a particular facet of energy (Specific Heat) relates to our everyday lives.

Lesson Activities (We Do): 50 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Slide 1 Objectives

Slides 2 – 3 Teacher will discuss energy changes associated with physical and chemical changes. Students will watch a video while teacher checks for understanding.

Slides 4 – 5 Teacher will discuss chemical potential energy. Students will watch a video and complete activity while teacher checks for understanding.

Slides 6 – 7 Teacher will discuss Heat, Temperature, Units of heat, and heat capacity. Students will watch a video while teacher checks for understanding

Slides 8 – 10 Teacher will discuss endothermic and exothermic reactions. Students will watch a video and complete activity while teacher checks for understanding.

Slide 11 Teacher will discuss Heat of solution and enthalpy changes.

Slides 12 – 13 Teacher will discuss measuring Heat of Solutions. Students will watch a video while teacher checks for understanding.

Slides 14 – 17 Teacher will discuss designing hot and cold packs. Students will watch video and complete activity while teacher checks for understanding.

Slide 18 Teacher will discuss determining Heat of Fusion of ice

Slides 19 – 21 Teacher will discuss how to determine unknown metal using heat capacity. Students will watch a video and complete activity while teacher checks for understanding.

Slide 22 Students will complete review activity while teacher checks for understanding

Lesson Review: 5 minutes

Slide 23 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 18

Topic/Lesson Title & Grade Results #: Part 2 Acids and Bases - 8

Objective(s): Students will

1. Describe acids, bases, and alkalis in terms of H⁺ and OH⁻ ions.
2. List and explain the properties of acids and bases.
3. Describe the concept of pH for an aqueous solution.
4. Calculate the hydrogen ion concentration from the pH value, and vice versa.
5. Compare and contrast acids and bases.
6. Explain the color change of an indicator in different pH solutions.

Guiding Question(s): What types of interactions between matter generate new substances?

TN Curriculum Standard(s): CHEM1.PS1.8 Identify acids and bases as a special class of compounds with a specific set of properties

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms:

Acid: A substance that can donate hydrogen ions in an aqueous solution.

Acid-base indicator: A substance that changes its color when added to an acid or a base.

Activity series: A list of elements, organized according to the ease with which the elements undergo certain chemical reactions.

Alkali: A base that is soluble in water.

Base: A substance that can accept hydrogen ions in aqueous solution.

Electrolyte: A solution that conducts electricity.

Hydronium ion: A hydrated proton, H₃O⁺.

Ionization: The process of formation of an ion by the action of the solvent.

Litmus: A purple organic compound extracted from lichens that change to red in acidic solution and blue in basic solution.

Litmus paper: A paper impregnated with litmus.

Neutral: A solution containing equal number of hydrogen and hydroxide ions.

Neutralization reaction: A chemical reaction between an acid and a base, producing a salt and water.

pH: A measure of the hydronium ion concentration of a solution.

Strong acid: An acid that completely ionizes in water.

Strong base: A base that completely ionizes in water.

Weak acid: An acid that does not completely ionize in water.

Weak base: A base that does not completely ionize in water.

Attendance in PowerSchool – 5 minutes

Lesson Introduction (I Do): 5 minutes Teacher will emphasize the two very important classes of compounds to be studied in this lesson, acids and base. Teacher will tell the students we will learn how to identify acids from bases and look at several of their characteristics including the pH scale.

Lesson Activities (We Do): 50 minutes as a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

- | | |
|---------------------|--|
| Slide 1 | Objectives |
| Slide 2 | Teacher introduce and discuss what are acids and bases |
| Slide 3 | Teacher will discuss Arrhenius definition of Acids and Bases. Students will watch a video while teacher checks for understanding |
| Slide 4 | Teacher will discuss properties of acids and bases with metals (activity series), conductivity, double replacement reactions, Basicity of acids, and neutralization reactions. |
| Slide 5 | Teacher will discuss properties of bases including taste, denaturing of proteins, conductivity, precipitations, reactions with ammonium compounds, saponification, acidity of bases and neutralizations. |
| Slide 6 | Teacher will discuss the pH scale, pH and pOH. Students will complete activity while teacher checks for understanding |
| Slide 7 | Teacher will discuss Indicators including Phenolphthalein, methyl orange, and universal indicators. Students will complete activity while teacher checks for understanding |
| Slides 8 – 9 | Students will complete activities while teacher checks for understanding |

Lesson Review: 5 minutes

Slide 10 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes - Review Study Guide take a moment to reflect the lesson of the day. Use an exit ticket

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 19

Topic/Lesson Title & Grade Results #: Part 2 Nuclear Chemistry, Radio isotopes and Half Life - Lesson 9

Objective(s): Students will

Lesson A

1. Describe radioactivity.
2. Explain alpha, beta, gamma radiation.
3. Explain the mass and charge of radiations. Describe the penetration power of alpha, beta, and gamma rays

Lesson B

1. Describe radioactivity.
2. Explain alpha, beta, gamma radiation.
3. Explain the mass and charge of radiations.
4. Describe the penetration power of alpha, beta, and gamma rays

Guiding Question(s):

Lesson A

What types of interactions between matter generate new substances?

Lesson B

What types of interactions between matter generate new substances?

TN Curriculum Standard(s):

- A. CHEM1.PS1.9** - Draw models (qualitative models such as pictures or diagrams) to demonstrate understanding of radioactive stability and decay. Understand and differentiate between fission and fusion reactions. Use models (graphs or tables) to explain the concept of half-life and its use in determining the age of materials (such as radiometric dating).
- B. CHEM1.PS1.10** - Compare alpha, beta, and gamma radiation in terms of mass, charge, and penetrating power. Identify examples of applications of different radiation types in everyday life (such as its applications in cancer treatment).

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Lesson A Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Alpha particle: A positively charged particle consisting of two protons and two neutrons.

Beta particle: An electron or positron emitted from an atomic nucleus in a certain type of radioactive decay.

Gamma particle: A neutral particle emitted from an atomic nucleus in a certain type of radioactive decay.

Nuclear chemistry: The study of nuclear reactions.

Radioactivity: The spontaneous disintegration of atomic nuclei by emitting radiation.

Attendance in PowerSchool – 5 minutes

Introduction (I Do): 5 minutes Teacher will provide overview and discuss the 3 different types of radiation to be studied and how radiation is so common in our everyday lives.

Lesson A - Activities (We Do): 25 minutes - As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Lesson A

Slide 1 Objectives

Slide 2 Teacher will define and introduce Radioactivity. Students will watch a video while teacher checks for understanding.

Slide 3 Teacher will discuss Alpha Radiation. Students will watch a video and complete activity while teacher checks for understanding.

Slide 4 Teacher will discuss Beta Radiation. Students will watch a video and complete activity while teacher checks for understanding.

Slide 5 Teacher will discuss Gamma Radiation. Students will watch a video and complete activity while teacher checks for understanding.

Slide 6 Teacher will discuss Mass of Radiation

Slide 7 Teacher will discuss the charge of radiation

Slide 8 Teacher will discuss the penetrating power of radiation

Slide 9 Students will complete review activity while teacher checks for understanding

Lesson B Key Vocabulary/Terms: Teacher / Students will review, define and / or discuss vocabulary words for lesson

Half-life: Time taken for a substance to decay to half of its original amount by spontaneous radiation.

Radioactive decay: The spontaneous disintegration of radioactive substances.

Neutron activation analysis: A technique that is used to detect amounts of elements in a sample.

Radiochemical dating: Process of determining the age of an object by measuring the amount of a certain radioisotope remaining in the object.

Transmutation: The process in which one element is converted to another element by radiation.

Tracer technique: A technique in which a radioactive isotope compound is introduced into a substance and the movement or metabolism of the radioactive compound is studied by measuring radioactivity in different parts.

Lesson B Activities (We Do): 20 minutes As a whole group, complete the Practice Activities. Discuss.

(Note to Teacher please remember to give students 10 min break midway during lesson)

Lesson B

Slide 1 Objectives

Slide 2 Teacher will discuss isotopes and radioisotopes

Slide 3 Teacher will discuss half-life. Students will watch video and complete activity while teacher checks for understanding.

Slide 4 Teacher will discuss disintegration rates and constant, and Radioactive decay rates.

Slide 5 Teacher will discuss Radiochemical dating and carbon 14 dating. Students will watch video while teacher checks for understanding.

Slide 6 Teacher will discuss food preservation by radiation

Slide 7 Teacher will discuss neutron activation analysis and tracer techniques.

Slide 8 Teacher will discuss cancer treatments and students will watch video and complete activity while teacher checks for understanding.

Slide 9 Students will complete review activity while teacher checks for understanding

Lesson A Review - 5 minutes

Slide 10 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Lesson B Review - 5 minutes

Slide 10 Review summarize the lesson with lesson review in grade results. Review notes and daily vocabulary words restating the guiding question to see if the students can answer the question. Have students review the slides and their notes to prepare for the Posttest.

Independent Work – Posttest (They Do): 50 minutes Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their very best on the post test. The posttest will count as the grade for the daily lesson. All students are required to complete student activities as part of their class assignments.

Closing/Wrap Up/Notes Review: 5 minutes (1) Repeat the Lesson Review, (2) Use an exit ticket: Ask students: What did you learn? What Surprised you? What is unclear?

Summer School Lesson Plan

Subject/Grade: Chemistry

Day: 20

Topic/Lesson Title & Grade Results #: Final Post-Test Review & Post-Test

Objective(s):

- Students will review lessons to prepare for final post-Test.
- Final Post-test will open. All students must complete the final Post-Test

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Lesson Introduction (I Do):

Identify the purpose of the course

Connect the course to missing or future coursework and Post-test

Lesson Activities/Supplemental (We Do) – 30-60 minutes

Lesson Activities and Review (We Do):

Check Grade Results and have students to review activities/lesson that they have not completed or need assistance with.

Hold an open Q&A for students to ask questions regarding the activities/lessons they are reviewing.

Independent Work – Posttest (They Do):

Students will review and complete any incomplete/missed/failed coursework.

Closing/Wrap Up: