GCS Unit Plan Template

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Unit Overview

Unit Title **Introduction to Chemistry/The Atom** **Unit 1**

Unit Summary

Students will review the scientific method and the importance of following a sound scientific protocol when conducting experiments. They will also learn proper safety technique by analyzing varius classroom scenarios and creating their own scenarios for their peers to analyze. Students will also review basic mathematical skills including significant digits and scientific notation while studying density of matter. Students will also learn about the sub atomic particles located in an atom, ion and/or isotope. This includes determining atomic number and mass, neutron #, proton #, electron #

Subject Area

Chemistry

Grade Level

10 -12

Approximate Time Needed

16 x 90 minutes

Unit Foundation

Targeted Content Standards and Benchmarks

The material covered in the Introduction to Chemistry section is not specifically outlined in the Essential Standards but is critical to the success of the learner.

1.1.1 Analyze the structure of atoms, ions and isotopes.
1.1.2 Analyze an atom in terms of the location of electrons
1.1.3 Explain the mission of electromagnetic radiation in terms of the Bohr model.
1.1.4 Explain the process of radioactive decay.

Student Objectives/Learning Outcomes

Introduction to Chemistry
The learner will…
-understand the use of the International System of Units in chemistry.
-be able to select the appropriate units and SI prefix to measure a given quantity of material.
-understand and be able to apply significant digits to mathematical problems in chemistry.
-understand the concept of density and specific heat capacity.
-solve for variables as they relate to density and specific heat capacity.

The Atom
The learner will…
-understand the charge and mass of protons, neutrons and electrons.
-distinguish between an atom, ion and isotope.
-be able to calculate atomic number, mass number and average atomic mass of an atom.
-understand how to read the Bohr model of the hydrogen atom as it relates to movement of electrons and the type of energy produced.
- understand the basic premise of alpha, beta and gamma radiation as it relates to energy, relative energy and particle absorption and emission.
-be able to write and/or complete transmutation reactions.
-have a basic working knowledge of nuclear energy, both fission and fusion.

Chm.1.1.1 Analyze the structure of atoms, isotopes, and ions.
Characterize protons, neutrons, electrons by location, relative charge, relative mass (p=1, n=1, e=1/2000).
• Use symbols: A= mass number, Z=atomic number
• Use notation for writing isotope symbols:or U-235
• Identify isotope using mass number and atomic number and relate to number of protons, neutrons and electrons.
• Differentiate average atomic mass of an element from the actual isotopic mass and mass number of specific isotopes. (Use example calculations to determine average atomic mass of atoms from relative abundance and actual isotopic mass to develop understanding).

Chm.1.1.2 Analyze an atom in terms of the location of electrons.
• Analyze diagrams related to the Bohr model of the hydrogen atom in terms of allowed, discrete energy levels in the emission spectrum.
• Describe the electron cloud of the atom in terms of a probability model.
• Relate the electron configurations of atoms to the Bohr and electron cloud models.

Chm.1.1.4 Explain the process of radioactive decay using nuclear equations and half-life.
• Use the symbols for and distinguish between alpha ($_{2}^{4}He$), and beta ($_{-1}^{0}e$) nuclear particles, and gamma (γ) radiation include relative mass).
• Use shorthand notation of particles involved in nuclear equations to balance and solve for unknowns.
• Compare the penetrating ability of alpha, beta, and gamma radiation.
• Conceptually describe nuclear decay, including: 1. Decay as a random event, independent of other energy influences
2. Using symbols to represent simple balanced decay equations
3. Half-life (including simple calculations)
• Compare radioactive decay with fission and fusion.

Cross-Curricular Connections

MATH – Students will use calculators to complete calculations and draw graphs.
HISTORY-Students will learn the history behind the discovery of the atom

Curriculum-Framing Questions

Essential Question	Discuss why scientists work to insure their data is a fair and accurate representation of their work? How can a single, submicroscopic atom have the same physical and chemical characteristics as many grams of the element made of trillions of atoms? Why are significant digits used in Chemistry and other math based sciences?
Unit Questions	Why is it essential to understand all safety guidelines, know the location of all safety equipment, and how to use each piece? Why is it important for us to understand the historical development of the atom?
Content Questions	What is a significant digit? What is the proper technique for writing a number in scientific notation? What is density? What is the Bohr Model of the Hydrogen atom? How is it related to the electromagnetic spectrum?

Unit Details

Prerequisite Skills

Basic mathematical computational skills, understanding of standard safety measures and proper etiquette in the science classroom.

Instructional Procedures

Day 1

1- Intro to the course

-teacher expectations of the student and student expectations of the teacher

-classroom forms for parent and student to read and sign

-classroom procedures

2- Intro to safety using Safety with a Safety Rap

3- Review lab safety rules with handout

Day 2

1- collect forms

2- review safety rules

3- students will work in student teams to complete a Safety Scenario activity

4- The *What If* science safety activity sheet

5- Science safety quiz tomorrow Must make a 90% or higher to conduct labs.

6- Measuring and the SI unit system used in Science - lecture

honors –Critical Reasoning Activity on Brain Pop

7- VCR video on Measurement (video in room 316 back cabinet)

8- Basic Math Skills worksheet

Day 3

1- review safety

2- safety test

3- review measurements and go over homework

4- Lecture – significant digits and scientific notation

guided practice on the problems
individual practice with worksheet
5- Circle map on density
6- calculating density

Day 4
1- return safety quizzes (retest for those with below 90 at the end of class tomorrow) collect safety test for placement in student folder and held for OSHA records
2- Review of sig. figs, scientific notation and density
3- Density lab (all students may participate as there are no chemical or fire dangers in this activity)
4- student to complete lab sheet for homework.

Day 5
1- Discuss density lab
2- collect lab sheets
3- Quiz on significant figures, scientific notation and density.
3- Graphing activity to ascertain the level of understanding student has of graphing in science.
4- Safety re-test #1 (other students will complete a graphing assignment)

Day 6
1- lecture – history of the atom (scientists and their discoveries including the constantly evolving model of the atom)
honors will be learn about the Large Hadron Collider and bosons
2- lecture – on atoms, ions, isotopes, proton, neutron, & electron #'s, atomic and mass number
honors will calculate average atomic mass of elements
3- Element chart worksheet
Day 7
1- Review element chart from homework
2- Element chart quiz
3- Introduction to the physical and chemical properties of matter
4- Use of the equation Q = mΔTCp with a focus on specific heat capacity
honors will calculate final and initial temp of systems using this equation
5- Q = mΔTCp homework

Day 8
1- review homework
2- work 5 additional Q = mΔTCp problems
3- Quiz on Q = mΔTCp
4- Intro to specific heat capacity lab
5- outline of test material to study and problems for practice
6- Introduction to constructed response questions (two for homework)

Day 9
1- Students will conduct the Specific Heat Capacity Lab and complete the report template
2- address any questions regarding the test

Day 10
1- Test – 1 hour remainder of time to be used to complete the lab template

Day 11
1- Intro to nuclear energy (good and the bad) video clips www.youtube.com/watch?v=DsvwHEoeDjw
http://www.youtube.com/watch?v=QZQq7chGoO4

honors - students will be given a nuclear project guideline and rubric to begin their projects
2- Lecture on types of radiation (alpha, beta and gamma) Working transmutation problems with chapter 3 worksheets
3- Introduction to half life with the use of the bean half life activity
4- half life calculations using the Worksheet from Chpt 24
5- homework- calculations

Day 11
1- review of transmutation problems
2- review of half life problems
3- Quiz on transmutations and half life
4- nuclear bombardment problems (internet worksheet)

Day 12
1- review bombardment
2- discussion of the Bohr Model of the Hydrogen Atom and the electromagnetic spectrum
3- using the Bohr model to determine the type of energy emitted or absorbed by electrons
4- brief discussion of quanta
5- Outline of Test material to study for the unit test

Day 14
1- Study for unit test (students will work in small groups for 45 minutes on test related questions)
2- 45 minutes of teacher led review
honors will use this time to wrap up project work

Day 15
Unit test

☐ Interactive Technology	X Student Response System/Clickers	☐ Cell Phone
XComputer(s)/iPads, etc.	☐ Printer	☐ Video Camera
☐ Digital Camera	X Projection System	☐ Video Conferencing Equip.
X DVD Player	☐ Scanner	☐ Document Camera
X Internet	X Television	☐ Other

Accommodations for Differentiated Instruction

Special Needs	Preferred grouping, modified assignments, graphic organizers, enhanced
Gifted, Talented	Detailed project on Nuclear Power in the United States. Calculating average atomic mass of elements (in depth mathematical
Printed Materials	Merrill & Prentice Hall Chemistry text Worksheets Merrill and Prentice Hall brace map on characteristics of matter
Supplies	graduated cylinders, electronic balances Metal samples, calorimeters, temperature probes *The Atom* video Atom powerpoint *Inviting Disaster* video (Chernobyl and Three Mile Island) Smoke detector, Geiger counter, mantle from lantern Powerpoint from former students on nuclear energy Guest speaker from the US Navy if available Possible trip to the Surry Nuclear Power Plant(may occur at a later data)

Technology – Software (Click boxes of all software needed.)

☐ Database/Spreadsheet	☐ Image Processing	☐ Web Page Development
☐ Desktop Publishing	X Internet Web Browser	X Word Processing
☐ E-mail	☐ Multimedia	☐ Other
X Web Based Encyclopedia		

Unit Plan Reflection

Describe any adaptations or "tweaks" to the resource or lesson plan that were needed:
What do you plan to do differently the next time you teach this unit?:

Due to opening week schedule we got behind from the beginning. No longer will we spend any time drawing safety posters. It equates to loss time and loss resources.