

# Welcome to Conceptual Chemistry

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## COURSE DESCRIPTION:

This course will focus on developing a deep understanding of core chemistry concepts through real-world applications and problem solving/reasoning skills. All science starts with trying to find answers to questions.... to ask the "Whys"! We will use reasoning and learning to answer these "whys" behind the chemical phenomena, often incorporating interactive learning methods, visual aids, hands-on labs and relevant examples to build a strong understanding and appreciation of the chemistry around us everyday. We will supplement our textbook with current events and "How Stuff Works" projects/activities based on chemistry topics. This course is suitable for students with a variety of science/math backgrounds and, of course, those seeking a broader understanding of the subject and just want to know the Why!

## COURSE STRUCTURE and OUTLINE:

This course will be divided into 13 units. Each with a guiding question that will be referred to throughout the unit. Traditional textbook reading/work, interactive labs, class/group discussions, independent research and collaboration, demos, and critical thinking will be expected. We will value everyone's contribution to the course. It is imperative that students attend the weekly class meeting, participate and thoughtfully complete all assignments with best effort. Live weekly classes will include a variety of discussion, lecture notes, demos, group activities/labs, and practice. Outside of class will require independent habits of completing all assigned work. Weekly quizzes and end of unit test will be assigned.

Unit	Description
1  1 week	<b><u>Unit 1—Introduction to Chemistry</u></b> Chemistry is the study of matter and how it changes. When you study chemistry, then you must be able to analyze matter and determine whether it is changing. This unit reminds students of the basics of why and how to observe and analyze the chemistry that is happening in their daily life. <ul style="list-style-type: none"><li>• Scope of chemistry</li><li>• Scientific process</li><li>• Measurements and implications of uncertainty</li></ul>
2  2 weeks	<b><u>Unit 2—Properties of matter</u></b> Identification and classification of matter is the foundation of chemistry. Students must know from analysis what kind of matter they are studying and group these kinds of matter into an organized system to allow for better understanding. Student will realize that in any chemical or physical process, the total matter and energy involved must remain the same. <ul style="list-style-type: none"><li>• Classification of matter</li><li>• Law of conservation of matter and energy</li></ul>

<p>3</p> <p>3 weeks</p>	<p><b><u>Unit 3-- Atomic Structure</u></b></p> <p>This unit will teach the atom from the historical discovery approach. Students will recognize the scientific method used to develop the modern atomic model. Atomic models will then be used to understand the basics of atomic structure, subatomic particles, and isotopes. • History of the development of the modern atomic theory and model</p> <ul style="list-style-type: none"> <li>• Composition of an atom an isotope</li> <li>• Fundamentals of radioactivity</li> </ul>
<p>4</p> <p>2 weeks</p>	<p><b><u>Unit 4—Electron Arrangement</u></b></p> <p>From fireworks to table salt, the location and arrangement of electrons in an atom is necessary to understand so students can predict and appreciate such reactions and compounds. To understand location and nature of electron arrangement, students will build on the historical models from Unit 3 and apply modern understanding. Students will observe atomic spectra and how it relates to the conservation of energy.</p> <ul style="list-style-type: none"> <li>• Organization of electrons</li> <li>• Source and common use of atomic Spectra</li> </ul>
<p>5</p> <p>3 weeks</p>	<p><b><u>Unit 5—The Periodic Table</u></b></p> <p>Students will begin to look closely at the periodic table. They will be introduced to the basic information and discover how the table is organized. This unit will teach students how to use the periodic table as a tool and begin to recognize elements in their life, building upon classification of matter. Student will apply their new knowledge to why the elements are located in the specific area of the periodic table.</p> <ul style="list-style-type: none"> <li>• Origin and organization of the periodic table</li> <li>• Periodicity</li> <li>• Elemental properties in real life applications</li> </ul>
<p>6</p> <p>3 weeks</p>	<p><b><u>Unit 6-- Bonding</u></b></p> <p>Chemical bonding is one of the most important processes in chemistry because it allows all sorts of different molecules and combinations of atoms to form, which then make up the objects in the complex world around us. This unit will build on previous units and apply knowledge to predict type of bonds and behavior of compounds. Once students understand the behavior of the compound they will learn how to name and recognize these compounds in products.</p> <ul style="list-style-type: none"> <li>• Ionic bonding and real-life applications</li> <li>• Covalent bonding and real-life applications</li> <li>• Polarity</li> <li>• Nomenclature</li> </ul>

<p>7</p> <p>3 weeks</p>	<p><b><u>Unit 7—Chemical Reactions</u></b></p> <p>Many changes can occur when elements are combined with one another. These changes may either be <i>physical</i> or <i>chemical</i>. In this chapter we will look at chemical changes. Students will apply prior knowledge to learn to distinguish between physical and chemical reactions, make predictions, apply the law of conservation of mass and represent reactions with equations and symbols. By the end of this unit, students will understand the reactions behind fire, hot/cold packs, production of plastics, and fuel combustion.</p> <ul style="list-style-type: none"> <li>• Types of chemical reactions</li> <li>• Balancing reactions</li> <li>• Classify and predict results</li> </ul>
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<p>8</p> <p>2 weeks</p>	<p><b><u>Unit 8--Stoichiometry</u></b></p> <p>It is important to know exactly how many particles are in a sample of a substance, or what quantity of a substance is needed for a chemical reaction to take place. Students will be introduced to Stoichiometry and quantitative relationships in a balanced chemical equation. This unit will also teach students how to quantitatively analyze samples and reactions. By applying the skills introduced in this chapter, you will be able to explain what happens to the sugar in a candy bar you eat, what reaction occurs in a battery when you start your car, what may be causing the “ozone hole” over Antarctica, and how we might prevent the hole’s growth.</p> <ul style="list-style-type: none"> <li>• Percent compositions</li> <li>• Quantitative relationships/ratios</li> <li>• Avogadro’s number</li> <li>• Actual versus expected yield</li> </ul>
<p>9</p> <p>4 weeks</p>	<p><b><u>Unit 9 -- Gases</u></b></p> <p>Students will explore the relationships among pressure, temperature, volume, and the amount of gases. Students will learn how to use these relationships to describe the physical behavior of a sample of both a pure gaseous substance and mixtures of gases. By the end of this chapter, your understanding of the gas laws and the model used to explain the behavior of gases will allow you to explain how straws and hot air balloons work, why hand pumps cannot be used in wells beyond a certain depth and why helium-filled balloons deflate so rapidly.</p> <ul style="list-style-type: none"> <li>• Properties and behavior of gases</li> <li>• History of gas laws</li> <li>• Gas laws</li> </ul>

10  3 weeks	<p><b><u>Unit 10 -- Solutions</u></b></p> <p>A solution is a homogeneous mixture in which substances present in lesser amounts, called solutes, are dispersed uniformly throughout the substance in the greater amount, the solvent. Student will apply knowledge of types of chemical bonds to predict resulting solutions. By the end of this unit, students will know enough about aqueous solutions to explain what causes acid rain, how drink mix powders work, why some things don't dissolve in water and a possible chemical reason for the decline and fall of the Roman Empire.</p> <ul style="list-style-type: none"> <li>• Characteristics of solutions</li> <li>• Solubility</li> <li>• Concentrations</li> </ul>
11  2 weeks	<p><b><u>Unit 11 -- Reaction Rates and Equilibrium</u></b></p> <p>Reaction rates are a fundamental concept in chemistry. Students will learn that the speed at which chemical reactions occur is a result of how quickly reactants are consumed and products are formed. Understanding reaction rates is crucial for various applications, from predicting the efficiency of industrial processes to designing new drugs and understanding biological systems.</p> <ul style="list-style-type: none"> <li>• Factors that affect the rate of reactions</li> <li>• Changes that occur in a chemical reaction</li> <li>• Equilibrium</li> </ul>

12  3 weeks	<p><b><u>Unit 12 – Acids and Bases</u></b></p> <p>Acids and bases are fundamental chemical concepts that describe substances with distinct properties and behaviors. They play crucial roles in various chemical reactions and are essential for understanding many natural phenomena and industrial processes. This introduction explores the core concepts surrounding acids and bases, including their definitions, properties, and how they interact. Students will apply knowledge of the pH scale to products in and around their home and life.</p> <ul style="list-style-type: none"> <li>• Characteristics of acids and bases</li> <li>• Acid base reactions</li> <li>• pH scale</li> </ul>
13  1 week	<p><b><u>Unit 13 -- Organic Chemistry</u></b></p> <p>Students will have the opportunity to get a peek into the world of Carbon Chemistry. This is organic matter in its various forms that contain carbon atoms. Students will see applicable examples of how structure of molecules determines the function of the molecule in life and physical science.</p> <ul style="list-style-type: none"> <li>• Inorganic versus organic compounds</li> <li>• Diversity of organic compounds</li> </ul>

Standards and curriculum are based on California Department of Education, A-G requirements and NGSS

## A successful student will need:

1. \*\*\*An enthusiastic and curious nature!\*\*\*
2. Discipline to complete all assigned work!
3. Habits to ALWAYS check Canvas
4. Communication Skills.... NEVER hesitate to reach out to me with questions or cool stuff you want to share! I believe that communication is key to success and lifelong learning!
5. A GROWTH MINDSET..... we are all learning everyday! Be open minded to ideas and perspectives!
6. Use all available resources.... I will post many related videos and websites that can help.
7. Of course... your school supplies: \* These are your basic supplies that I would expect you to have accessible.
  - a. 3 ring notebook with unit dividers with a few page protectors for use throughout the year.
  - b. Calculator
  - c. School Supplies (Pencils, highlighter, other writing utensil)
8. TEXTBOOK: Conceptual Chemistry by John Suchocki. 5<sup>th</sup> edition ISBN: 978-0321804419 (new, used and digital versions are available on sites such as [amazon](#) and [Abebooks](#))
9. LAB MATERIALS: a list of supplies needed will be sent no later than 4-6 weeks before the start of the course. MOST SUPPLIES WILL BE HOUSEHOLD TYPE PRODUCTS.

## GRADING:

- Grades will always be available in Canvas for students and parents. I recommend checking often to keep up to date on your progress. Averages will be given at the end of each semester.
- Grades will be given on a point system and put into categories with varying weight percentages:
  - Homework Assignments = 25%
  - Labs = 20%
  - Weekly quizzes = 25%
  - Large Assessments (Unit Tests, Projects) = 30%

## LATE POLICY:

All assignments are designed in a scaffolded way to help students perform well on the unit tests. Therefore, the expectation is to complete and submit assignments in the order they are assigned.

- To reward students for assignments submitted ON the DUE DATE, a  $\frac{1}{4}$  extra credit point will be given for each assignment submitted on the DUE DATE.

- Assignments will be accepted past the due date (without the extra credit) until the close of a unit which will be on the UNIT TEST DAY.
- After the unit test day, NO credit will be given for an assignment.

## CHEATING:

Cheating will not be tolerated. If a student is suspected of cheating, the assignment will result in a zero and disciplinary action will result. This applies to copying another students' work or plagiarism.

## OFFICE HOURS:

- While I am always an email away...sometimes it may take me a little while to respond. It is my priority to respond quickly and within 24 hrs.
- I will provide one hour outside of weekly live classes to be immediately available for your questions. I will let you know and remind you often of this hour before the beginning of the school year. If ever this office hour changes, I will give you plenty of notice.

## TECHNOLOGY REQUIRED:

1. High speed, broadband Internet
2. Sound card and microphone (for live sessions)
3. Streaming video capabilities to watch video lectures and other videos as assigned
4. Computer Access
5. Microsoft Word, Excel and PowerPoint or Google Docs, Sheets and Slides Access. PDF reader
6. Printer
7. Scanner/Ability to scan with phone or tablet.