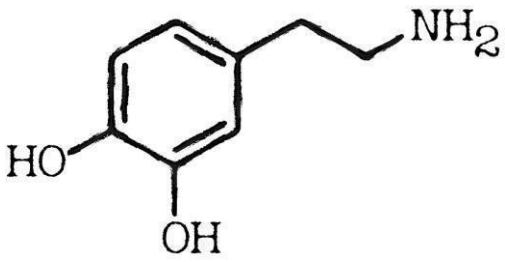
Honors
Chemistry



Instructor: Mr. Becerra

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Textbook: Living by Chemistry by Angelica M. Stacy

Description: Chemistry is the study of matter & its changes. The primary goal of science is discovering the natural laws for which nature operates. In this course we will learn about the principles of Chemistry and its processes which include dimensional analysis, matter, atomic structure, basic quantum mechanics, thermodynamics, physical & chemical changes, the periodic table, chemical bonds, chemical reactions, stoichiometry, and more. In addition, we will be practicing lab etiquette, proper use of lab equipment, measurement skills, and chemical identification. **Students will combine math with science to conduct investigations in the lab. This class is treated as a Pre-AP class to prepare you for AP Chemistry. Math prerequisite: Algebra.**

"What I cannot create, I do not understand. The first principle is that you must not fool yourself and you are the easiest person to fool. For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled."- Richard Feynman

Supplies:

These are the items to be brought to class DAILY

- Binder (if you want)
- **Folder**
- **Spiral Notebook**
- **Composition notebook (bring on lab days)**
- **Writing Utensils**
- Scientific Calculator (NO PHONES)

Classroom expectations:

The following policies will be in place throughout the year:

1. **Student Conduct:**
   - **Students are expected to act according to the values of the Collegiate School of Medicine and Bioscience. Our students are those of Integrity, Self-discipline, Respect, Strong Academic Habits, Intellectual Curiosity, and Compassion and Ethics.**
   - **All students will follow the discipline policy of Collegiate (found in the Student Handbook)**
   - **While instruction is happening, remain engaged and respectful: asking and responding to questions, sharing ideas about understanding. Speak when called on, and discuss in small groups.**
   - **Use the technology (phones, laptops, etc.) for class purposes only during class time.**

2. **Late Work**
   - **Students are expected to adhere to the late work policy laid out in the Student Handbook**
   - **I will deduct 20% for any assignment submitted 24 hours after the due date. If the assignment is not submitted after one week from the due date then it is a permanent zero in the gradebook.**

3. **Attendance and Participation**
   - **To be considered "present" during any given class period, you need to be actively engaged in all activities. This includes note taking, group work, labs, and individual student work time.**

4. **Retake Policies**
   - **Retakes will be offered following every test. To retake an assessment, the student must complete test corrections and complete a Microsoft team form questionnaire. The student must abide by all guidelines of the Microsoft retake form. I do not do retakes for open-notes quizzes; I offer retakes for pop-quizzes.**

Grades:

Grades are weighted. Semester grades will be calculated as follows:

1. **Daily Work: 15%**
2. **Homework: 5%**
3. **Labs: 20%**
4. **Tests: 35%**
5. **Projects/Quizzes: 25%**

The above formulas as shown will calculate progress grades and term grades ONLY

Final semester grades calculation

- 20% final exam
- 80% 3rd term grade for first semester or 4th term grade second semester

Please keep all graded materials to review for studying for SIS discrepancies

Weighted average formula: weighted percentage (decimal) x average percent= ?

Example calculation:

Student Grade (quarter)	**Average**	**Weighted Average**
Test: 75, 80%	78%	**0.40** x 78= 31.2
Quizzes: 100%, 90%	95%	**0.30** x 95= 28.5
Labs: 85%, 85%	85%	**0.15** x 85= 12.75
Homework: 100%, 90%, 70%	87%	**0.05** x 87= 4.35
Class work: 100%, 95% 98	98%	**0.05** x 98= 4.9
Do Now: 100%, 75%, 80%	85%	**0.05** x 85= 4.25
Final Grade:		**85.95%**

Classroom procedure:

Beginning of Class 1. Walk in, put the phone away (Place in the pouch for charging), and have a seat. Once you are seated, quietly complete the Do Now/DFQ (posted on the board, BBC slide, and/or near pod). The ONLY times you can use your phone are: if you see the near pod code, QR code, or if the teacher says it is appropriate. Phones should automatically be put into the pouch on test & quiz days! 2. Turn homework into the tray. 3. Check to see if you have returned papers in green crate. At the end of class, do not leave until I dismiss. Wait at your seat. Place your seat under the table. Leave you space better than you found it (aka clean up after yourself)! If your space is not clean, you do not leave.

Course Outline/objectives

Unit Topics	Standards/Objectives	Questions to Answer	Assessment
Unit 1: the Search for Life; Periodic table, trends, electrons, chemical bonds, electrostatic forces, molecular structure, quantum numbers, electron configuration, nomenclature	**9-12.PS1.A.1 (HS-PS1-1)*** **Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.** **9-12.PS1.A.2 (HS-PS1-2)*** **Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.** **9-12.PS1.A.3 (HS-PS1-3)*** **Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.** **HS-PS2-6 (no MLS): Communicate scientific and technical information about why the molecular-level structure is important in the functioning of**	**Lesson 1: Are we alone?** **Lesson 2: Why are these substances such important supports for life?** **Lesson 3: Why is water so important?** **Lesson 4: How can we explain charges and electricity, and why might they be important to explaining why water is so important for life?** **Lesson 5: What is an electrolyte and how does it support life?** **Lesson 6: Why don't all salts make a one-to-one ratio?** **Lesson 7: Is water a salt?** **Lesson 8: Why is water so good at dissolving salts?** **Lesson 9: How does what we've figured out so far help us in our search for life in outer space?** **Lesson 10: How are living things' molecules formed?** **Lesson 11: Can arsenic "switch" for phosphorus in DNA?** **Lesson 12: Can we substitute another compound for water?** **Lesson 13: How do scientists currently look for life and its**	**Unit test: Electrons, chemical bonds & periodic trends** **Unit test: molecular structure & nomenclature** **Exit tickets** **Homework** **Labs**

	designed materials. **Partial: 9-12.ESS2.C.1 (HS-ESS2-5)* Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.** **9-12.ESS1.A.2 (HS-ESS1-2)* Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.**	**substances?** **Lesson 14: Should scientists look for life on other planets, and if so, where should they look?**	
Unit 2: Fuels; introduction to chemical reactions, bond energy, temperature, combustion reactions, basic thermodynamics, enthalpy, conservation of mass, entropy, Gibbs Free energy, endo and exothermic reactions	**9-12.PS1.A.5(HS-PS1-4)***** **Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.** **9-12.PS3.C.1 (HS-PS3-5)***** **Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.** **9-12.ESS3.A.2 (HS-ESS3-2)*** **Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. Partial: 9-12.PS3.A.1 (HS-PS3-1)*** Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are**	**Lesson 1: Why do cars run on gasoline and not rocket fuel?** **Lesson 2: What's the connection between the energy you get from burning a fuel and moving a car or rocket** **Lesson 3: What is burning and how does it give us energy?** **Lesson 4: Could any chemical reaction be used to fuel a car? Do all reactions "release" energy** **Lesson 5: Can we model what is happening when particles are rearranging to help us explain the changes we see in energy?** **Lesson 6: Why might the breaking and making of bonds lead to temperature changes?** **Lesson 7: Why doesn't the energy that goes IN to break bonds and that comes OUT when bonds are made just balance out?** **Lesson 8: What makes some bonds stronger and other bonds weaker? Why do atoms bond anyway and what's 'stability'** **Lesson 9: Can we explain why**	**Unit Test** **Exit tickets** **Homework** **Labs**

	known. **9-12.PS1.B.3(HS-PS1-7)*** Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction**	**hydrogen has such a high energy output per gram compared to other fuels?** **Lesson 10: What are the similarities and differences between one mole and one gram of hydrogen and gasoline?** **Lesson 11: Why does burning one mole of gasoline result in more energy than burning one mole of hydrogen?** **Lesson 12: What technology exists now to allow us to use a form of rocket fuel in a car?** **Lesson 13: So... Why aren't we using hydrogen again? Where does hydrogen come from?** **Lesson 14: How could we change transportation systems that would reduce or eliminate carbon emissions?** **Lesson 15: What should we do to decarbonize transportation and how can it be done? What part, if any, does hydrogen fuel play moving forward**	
Unit 3: Oysters & oceans; elementary kinetics & equilibrium, acids & bases, acid-base chemical reactions, pH, weak vs. strong acids & bases, dissociation, electrolytes, solubility	**9-12.PS1.B.1 (HS-PS1-5)*** **Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.** **9-12.PS1.B.2 (HS-PS1-6)*** **Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.** **9-12.PS1.B.3 (HS-PS1-7)*** **Use mathematical representations to support the claim that atoms,**	**Lesson 1 What is happening to oysters on the West coast?** **Lesson 2 Does carbon dioxide make water more acidic?** **Lesson 3 What is an acid?** **Lesson 4 How does carbon dioxide interact with water to make it more acidic?** **Lesson 5 How do Oysters make their shells?** **Lesson 6 How does increased acidity impact oyster shell formation?** **Lesson 7 Does acid destroy oyster shells?** **Lesson 8 Why isn't the ocean super acidic?** **Lesson 9 What have we figured out so far about why shellfish are dying?**	**Unit Test** **Exit tickets** **Homework** **Labs**

	and therefore mass, are conserved during a chemical reaction. **9-12.ESS3.A.1(HS-ESS3-4)* Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.** **HS-ESS3-6 (no MLS) Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.** **9-12.ESS3.A.1(HS-ESS3-4)* Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. HS-ESS3-6 (no MLS) Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.** **.**		
Unit 4: Nuclear Chemistry	**9-12.PS1.C.1 (HS-PS1-8)*** Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. **HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios** **9-12.PS1.B.3 (HS-PS1-7)*** **Use mathematical representations to support the claim that atoms,**	**Lesson 1: What can a nuclear chain reaction do?** **Lesson 2 What's going on in a nuclear chain reaction?** **Lesson 3 What's the difference between different types of uranium?** **Lesson 4 Why does adding neutrons make uranium so unstable that it splits?** **Lesson 5 What is happening in the nuclear chain reaction in an atomic bomb?** **Lesson 6 Why does this "splitting" in fission produce so much more energy than typical fuel sources?** **Lesson 7 How can we capture and use this energy for something other than for a**	**Unit Test** **Exit tickets** **Homework** **Labs**

	and therefore mass, are conserved during a chemical reaction.	**bomb?** **Lesson 8 Why aren't all power plants nuclear?**	
Unit 5: Polar Ice; thermal energy, second law of thermodynamics, miscellaneous information	**9-12.PS3.A.1 (HS-PS3-1)***** **Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.** **9-12.PS3.B.1 (HS-PS3-4)***** **Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).** **9-12.ESS2.A.2 (HS-ESS2-2)* Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.**	**Lesson 1: Why are some people who live on coasts facing trouble?** **Lesson 2: How could ice melting so far away affect people in these different places?** **Lesson 3: How is Antarctic ice getting in the ocean?** **Lesson 4: Where are the glaciers?** **Lesson 5: What makes the most difference in ice melting?** **Lesson 6: Why does water melt ice faster than land and air?** **Lesson 7: How is polar ice melting creating global climate refugees?** **Lesson 8: Can we do anything to slow how fast Thwaites glacier is melting?** **Lesson 9: How can we make the best decision about which design solution to implement?** **Lesson 10: In the meantime, what are communities doing now to deal with rising sea levels** **Lesson 11: What scientific, social, and justice considerations are important to keep in mind as we design solutions to deal with rising seas?**	**Unit Project!**