

Welcome to Chemistry!

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Textbook: Discovering Design with Chemistry by Jay Wile (published by Berean Brothers)

(We will follow the order of this textbook; however, you can use Apologia's Exploring Creation with Chemistry 3rd edition. This textbook has a slightly different order, so you will need to decide by looking at the schedule (page 3 of this syllabus) what is the best fit for you.)



Course Goals:

1. This course will introduce chemistry through the use of investigative and inquiry labs. Class periods will focus on providing labs which will require application of knowledge gained throughout the prior weeks of study, as well as inquiry labs that will facilitate connection of learned information to the discovery of new content.
2. This course will provide students an opportunity to be collaborative with their peers to solve problems.
3. This course will help to improve students' lab skills including data representation, analysis, and evaluation.
4. This course will provide an opportunity for students to determine their own procedure in the lab, and then analyze the results in order to formulate improvements.
5. Students will learn how to communicate their findings through a proper scientific lab report.

Nature of the course: Every week the in-person class time will include labs, data analysis, and discussion/practice. In my opinion, science is a verb which means that science is “doing” by taking and analyzing data. The in-class part of the course will include a strong focus on helping students improve their lab skills. This means we will be collecting data, analyzing the data as groups and individually, reporting the data through models, graphs, mathematical expressions, and lab reports. These lab skills are at the heart of true science, and they will be the focus of our in-class time work.

The in-class labs will not be the same as those written in the textbook, as such, your students can complete those at home if they want to (optional). The weekly schedule identifies the objectives covered that week during the in class session and the textbook pages that should be read at home after class. The document below will be continually updated, as such I would suggest to always access it online rather than making a printed copy. Some weeks will cover more material than others. We will be able to cover most of the topics in class. However, we will not have time to do a sufficient amount of practice which is required to truly know how to do chemistry problems, thus students should expect to do practice problems from the textbook at home. The textbook provides practice problems as well as an additional test booklet can be purchased. A student/parent can choose if they want to complete those tests/practice problems as they will not be required by me. There are also numerous [videos/resources here](#) that I have created to help with different skills. All these additional resources are optional.

Communications: All communications for this class will be made through Google Classroom. I will send out a weekly post which explains any labs for the week that I will grade. Parents will be invited to receive these same announcements, but they will not be able to view grades unless they are logged in as their student.

Lab Assignments: Any lab assignments that are not completed in class will be turned in via Google Classroom prior to the next class. Turning it in online will allow me to grade them and give more immediate and personal feedback. These grades will be posted in Google Classroom as a lab assignment. There will also be a [lab rubric](#) posted in Google Classroom. This rubric will show all the lab report writing skills that are the focus for this class' Course Goal 4 (listed above). When a student first attempts this skill on their own it will be worth few points on that assignment, but as the year progresses and their skills progress that skill on future labs will be worth more points as these skills should be more easily mastered at that point. There will be one formal and final lab report where students will be graded on all these skills as a sort of "lab final". This "lab final" will be worth more points than an average lab.

Weekly quiz: I will be providing quizzes electronically after each class which will only address the content and skills we discuss in class. I will share these quizzes and grades on Google Classroom. It is up to the parent if students can use notes on the quiz as well as how they wish to use these grades. These quizzes are another way for me to communicate with parents how well students are understanding the material from class. This should give parents a good insight on where students are excelling and areas that need improvement or more time spent at home. The quizzes will include questions on content as well as investigating lab skills. As seen in the weekly schedule below, I have outlined the goals for each class period. These include goals for the weekly content and the lab skills. The quizzes for the week will address these listed goals which align with the goals for the chapter in the textbook.

Grades: The final grade in this class is ultimately up to the parent. The final grade seen in google classroom is posted under the classwork tab, upper left corner, where it says "view your work". This final grade is a weighted grade which comprises 30% of the quizzes, 10% of in class labs (these will most often receive 100% as they are completed in class as a group or with my help) and 60% from the labs completed at home from the data collected in class. These labs focus on lab skills and how to write a lab report. These labs are the most difficult part of the class, but they are also the main focus of the in class time as outlined by the course goals above. I will be grading all at-home labs on a rubric which means students cannot receive a grade lower than a 60% as long as they attempt to complete that part of the lab.

Responsibilities: This class is truly a team effort from the student, parent, and myself. I have created a summary of the responsibilities of each team member [here](#). I look forward to working with everyone to create as enjoyable and educational of a journey through chemistry as I can!

Textbook reading: Below is the schedule for each week. I have separated it into two different levels: regular and honors chemistry. Please choose the option that is best for you. My topics/textbook pages are determined from my years teaching both honors and regular chemistry in the public

school system. Note: if you do not do any textbook reading/practice outside of class you will find in class work/labs to be difficult. The topics build on another, so I do expect that students are completing the work assigned in one of the categories below. I assume that students will not read the textbook ahead of time (that way everyone is on the same “playing field”); however, you may want to read the pages ahead of class time especially if in-person class time seems difficult. Please determine what is best for you!

Schedule and Resources:

Periodic table: [front](#) - [back](#)

Week	Chap.	Goals we will accomplish in class	What to complete/read for the week		
			Discovering Design with Chemistry by Jay Wile (Berean Brothers) - order of class will follow this textbook's order		Apologia 3rd edition
			Regular Chemistry	Honors Chemistry	
1 - Sept 17	1	Sig Figs: - I can measure length, volume, and mass with proper significant figures. - I can add/subtract/multiply/divide using sig figs. - I can calculate density. Lab skill: I can measure using proper sig figs. Bible connection: Proverbs 12:22, Psalm 119:14, Proverbs 14:25 Textbook pages covered in class: Wile: pg. 1-9, 15-16, 22-25 Problems from pg. 34 that you can do from what you learned in class this week: 3-4, 6-12, 17, 21-22	Wile: Complete Chap 1	Wile: Complete Chap 1	Pg. 19-36 (complete module 1)
**Note: You should be completing the “Comprehension Check” questions when you meet them as you are reading. **My suggestion: You should also be taking notes or doing some other graphic organizer to make sure you are synthesizing the information in the textbook. ** “Complete Chapter 1” means the Review questions for Chap 1 should be completed this week as well as the test for Chap 1 should be completed					
2 - Sept 24	2	Atomic Theory: - I can describe the evidence and claims made that led to the modern model of the atom including the discoveries by Dalton, Thomson, and Rutherford. - I can explain the law of mass conservation. Lab skill: I can identify claim and evidence. I can create a model to properly represent a concept. Bible connection: Hebrews 11:1-3 Textbook pages covered in class:	Wile: Complete Chap 2	Wile: Complete Chap 2	In class we will cover: pg 57-76 84 - top 96 (many of the other topics we will come back to again later, but it may be easiest to

		Wile: pg. 42-44, 47-57 Problems from pg. 64 that you can complete from just in class work: 3-11, 16-17, 22			complete Module 2 now)
3 - Oct 1	3	Atomic Theory: 1. I can explain how colored light is emitted from an atom using Bohr's model of the atom. 2. I can calculate wavelength, frequency, and energy using different equations. Lab skill: I can identify a claim with its corresponding evidence. I can create a model to properly represent a concept. Bible connection: Ephesians 4:4-6 Textbook pages covered in class: Wile: pg. 67-71, 75-78, 81-90 Problems from pg. 95 that you can complete from just in class work: 9-12, 15-23	Wile: Complete Chap 3 **Skip all the math parts. Focus on these objectives: I can explain how colored light is emitted from an atom using Bohr's model of the atom.	Wile: Complete Chap 3	Pg. 96-114
4 - Oct 8	4	Electron configuration: 1. I can explain the Wave Mechanical model (pg. 100-103) 2. I can write the correct electron configuration of an atom (not including the f block). (pg. 105-108) 3. I can explain what each number and letter in an electron configuration means. (pg. 105-108) 4. I can "draw" an atom using Bohr's model and the wave mechanical model. (pg. 108-110) Bible connection: Exodus 25-31 Textbook pages covered in class: Wile: pg. 100-110 Problems from pg. 124: 2, 6-8, 11, 13-14, 17	Focus on these two objectives: 1. I can explain the Wave Mechanical model (pg. 100-103) (these pages can seem very complex so it's ok to "sorta" get it.) Here is an article that summarizes the key information I would get from those pages 4, I can "draw" an atom using Bohr's model and the wave mechanical model. (pg. 108-110) I do not teach electron configurations (objectives 2 and 3) in regular chemistry at the public school I taught at, but I do teach it at HSLDA. - you will need to decide with your parents if you want to cover this	Options: Wile: 97-110	Electron configuration pg. 114-125 (complete module 3)

			topic or not		
5 - Oct 15	4-5	Making compounds: 1. I can compare and contrast the bonding in ionic compounds and molecular compounds. 2. I can relate ion formation to electron configurations and valence electrons. 3. I can draw lewis Dot structures for ionic and molecular compounds Lab skill: I can create models of an ionic and molecular compound. Bible connection: Genesis 2: 19-20 Textbook pages covered in class: Wile: pg. 110-119, 127-134 Problems from pg. 124: 18-19, 21-25 Problems from pg. 159: 3	Pg. 110-119, 127-134 Skip naming compounds **see note below** Complete chapter 4 test if you are doing tests	Wile: pg. 110-120, 127-134 Complete chapter 4 test if you are doing tests Optional: Naming ionic: pg. 116-118 Naming molecular: pg. 134-135 **see note below**	Compounds: Pg. 132-144, 150-163 Complete module 4
Naming compounds is taught at HSLDA, but I did not teach it the last few years I was at the public school so you decide with your parents what you want to do here. If you choose to do naming know that the textbook has very few instructions so I have provided some extra work here that I would complete to really know how to name compounds (ionic naming video by Stoub) Determining the charges on the ions when you are given a formula: practice problems with answers Naming ionic practice (answers included on page 2) mixed WS and other practice sheets with answers pg1, pg2					
6 - Oct 22	5	Periodic Table: 1. I can identify various features of the periodic table including names of families, location of metals/nonmetals/metalloids, periods, groups, and why it was organized in this way. 2. I can distinguish, explain, and relate the trends of atomic size, ionization energy, and metal reactivity. Lab skill: I can examine data to determine a trend. Bible Connection: Ecclesiastes 4:9-12 Textbook pages covered in class: Wile: pg. 136-139 Problems from pg. 159: 5,6	pg. 136-139	Wile: pg. 136-139	Pg. 145-top of 150
7- Oct 29	5	VSEPR and Polarity: 1. I can use VSEPR theory to determine the molecular shape of covalent compounds 2. I can determine the polarity of a molecule.	Wile: 139-153 (complete chap 5)	Wile: 139-153 (complete chap 5)	Relook at: Pg. 63-66 Module 5: pg 172-197

		3. I can use my understanding of polar and nonpolar molecules to explain physical processes such as dissolving Lab skill: I can create and analyze models. Bible connection: Psalm 44:4-7 Textbook pages covered in class: Wile: pg. 139-153 Problems from pg. 159: 7-12			(complete module 5)
8 - Nov 5	6	Reactions: 1. I can compare and contrast a physical and chemical change. 2. I can balance equations. Lab Skill: I can take detailed observations and use these to determine what occurred in the lab. Bible connection: Genesis 1:1 Textbook pages covered in class: Wile: pg. 161-162, 172-181 Problems from pg. 195: 2, 13-14	Wile: 161-top 181	Wile: 161-top 181	Pg. 207-232 (complete module 6)
9 - Nov 12	6	Reactions: 1. I can identify where atoms are going during a reaction. 2. I can predict the products of a formation, decomposition, single displacement, double displacement, or combustion reaction. 3. I can use the solubility table to determine the precipitate in a lab. Lab Skill: I can use observations to determine what is occurring during a reaction. Bible connection: 1 Corinthians 13:33, 1 Peter 2:24 Textbook pages covered in class: Wile: pg. 181-188 Problems from pg. 195: 15-16	Wile pg: 181-196 (complete chap 6)	Wile pg: 181-196 (complete chap 6)	pg. 241-254 (types of reactions)
10- Nov 19	7	Mole 1. I can explain how a mole is used to indirectly count the number of particles of matter. 2. I can calculate unknowns using the mole map Lab skill: I can create a proper procedure and data table. Textbook pages covered in class: Wile: pg. 197-204 Problems from pg.224: 1-11	Wile: pg 197- 204	Wile: pg 197- 204	Pg. 254-265 (mole) <i>This textbook does some extra math with finding the mass of one atom that we did not do in class</i>
11 - Dec	7	Stoich 1. I can calculate unknowns using the big mole map. Lab skills:	Wile pg 204-217	Wile pg 204-217	Pg. 265-269, 276-279,

3		1. I can write a proper procedure. 2. I can create a proper data table. Textbook pages covered in class: Wile: pg. 197-204 Problems from pg.224: 12, 14-16, 18, 19, 20			289-295 (complete module 7)
12 - Dec 10	8	Stoich 1. I can use my knowledge of limiting reactants to determine the percent yield and the amount of product produced. Lab skills: 1. I can write a proper error. 2. I can create a proper data table. Textbook pages covered in class: Wile: pg. 197-204, 227-232 Problems from pg.224: 13, 17 Problems from pg.254: 3-5	Pg. 227-232 (complete chapter 7) <i>**see notes below</i>	Wile pg: 227-232 (complete chapter 7) <i>**see notes below</i>	Pg. 279-287 (complete module 8) <i>**see note below about pg. 295-303 in the Apologia book</i>
Note: I will not be doing Pg 232-247 in class on the topics of empirical and molecular formulas. I would teach pg. 232-237, 241-246 in an honors chemistry class. Here are some of my resources to help you: Empirical / molecular formula (videos in links): 344-350 Problems Answers Note: I would only teach pages 237-241 in an AP chem class					
13 - Dec 17	9	Solubility: 1. I can calculate molarity. 2. I can calculate using molarity in stoich problems. Lab skill: I can create a procedure and data table. Bible connection: We need maps! God's "map" is the bible. Textbook pages covered in class: Wile: pg. 257-272 Problems from pg.	Pg. 257-272	Wile: 257-272	pg. 349-364
14 - Jan 14	9	Solubility: 1. I can calculate molality 2. I can explain the colligative properties of freezing point depression and boiling point elevation. 3. I can calculate the new freezing point and boiling point of a solution. Lab skill: I can create a proper procedure Bible connection: John 10:27-30 Textbook pages covered in class: Wile: pg. 273-279 Problems from pg. 287: 16-23	Wile: 272-279 complete chapter 9	Wile: 272-279 complete chapter 9	Pg. 365-374 (complete module 10)

15 - Jan 21	10	Gas Laws 1. I can explain the relationships between pressure, volume, and temperature. 2. I can predict and interpret graphs of pressure, volume, and temperature. 3. I can use a molecular level drawing to explain what is happening at the molecular level to cause changes for gasses. Lab skill: I can create models and graphs to represent lab observations. Bible connection: Psalm 92:5-6 Textbook pages covered in class: Wile: pg. 289-297, 300-301 Problems from pg. 323: 1a-c, 2-6	Wile: pg. 289-297, 300-301 (ideal gas)	Wile: pg. 289-297, 300-301 (ideal gas)	pg 382-top of 391 (Boyles and Charles Law)
16 - Jan 28	10	Gas Laws 1. I can calculate unknown variables using gas laws. Lab skill: I can create models and graphs to represent lab observations. Bible connection: 1 Corinthians 1:25 Textbook pages covered in class: Wile: pg. 298-306 Problems from pg. 323: 7-14, 15 (look for the values close to STP), 16-19	Wile: pg. 298-306	Wile: pg. 298-306 **Note: pg 306-316 are topics I would do in my AP chem class **See note below	Pg. 391-410 (combined gas law and ideal gas law) (complete module 11) **See note below
** We will not have time to cover the math of Dalton's law in class. We did address the idea that the type of gas does not matter; only the number of moles of gas. That is the part of Dalton's law I was able to get to in class and something I would cover in all levels of chemistry classes (this is on page 305 under Avogadro's law). The math involved with Dalton's law would be an Honors chemistry topic only (this is pg 306-equation 10.7). I would not cover page 307(bottom)-309 in Wile (in Apologia it's the section called "An alternative statement of Dalton's laws") until AP chemistry. In all my chemistry classes I would talk about what boiling is (pg.310-313) and how it works at the molecular level which I did cover in our class during Module 9 with boiling point elevation. The math associated with the vapor pressure of water (pg313-316) is a skill (specifically in step 18 of lab 10.4) that I would do in my honors chemistry class with my specifically stating what to do in the math as Wile has done here and AP chemistry classes would be expected to know this on their own.					
17 - Feb 4	11	Neutralization: 1. I can compare and contrast acids and bases by chemical structure. 2. I can complete neutralization reactions and calculations. 3. I can perform a titration Lab skill: I can identify and explain sources of error. Bible connection: 1 Peter 2:24 Textbook pages covered in class: Wile: pg. 329-337 Problems from pg. 7-12, 14-16, 18	Pg. 325-337, 341-347	Wile: all of Chap 11	complete module 9

18-Feb 11	12	Oxidation Numbers 1. I can determine the oxidation number of an atom in any equation/compound. 2. I can identify the oxidized and reduced atoms of a reaction. Lab skill: I can analyze experiments to improve lab designs Bible connection: John 3:30 Textbook pages covered in class: Wile: pg. 357-367 Problems from pg. 385: 3-4	Wile: pg.357-367	Wile: pg.357-367	Pg. 559-570
19 - Feb 18	12	Structure/ Function of Voltaic cells 1. I can use an activity series and explain its relationship to electronegativity. 2. I can draw, explain, and create all the parts/labels of a voltaic cell. Lab skill: I can analyze experiments to improve lab designs Bible connection: Matthew 5:13 Textbook pages covered in class: Wile: pg. 368-374 Problems from pg. 385: 5-8	Wile: pg 368-374 complete chapter 12	Wile: pg 368-380 complete chapter 12	voltaic: pg. 570-582 (complete module 16)
20 - Feb 25	13	Energy: 1. I can compare and contrast the general properties of energy, heat, and temperature. 2. I can explain what specific heat is and use it to solve for unknowns. Lab skills: 1. I can create a proper model. 2. I can interpret graphs. Bible connection: Christian Scientist James Joule Textbook pages covered in class: Wile: pg. 387-395 Problems from pg. 415: 2-6, 8-15	Wile: pg. 387-399	Wile: pg. 387-401	Pg. 418-421, 427-440
21-Mar ch 4	13	Energy: 1. I can explain what is happening throughout a heating and cooling curve. 2. I can calculate parts on a heating and cooling curve. Lab skills: 1. I can identify and explain sources of error. Bible connection: James 1:2-4 Textbook pages covered in class: Wile: pg. 402-408 Problems from pg. 415: 1, 19-23	Wile: pg. 402-408 complete chap 13	Wile: pg. 402-408 complete chap 13	Pg. 421-427 (Complete 12)

22 - Mar ch 11	14	Energy: 1. I can explain the parts of the reaction coordinate diagram. 2. I can explain and use enthalpy to calculate the heats of reaction using stoichiometry. 3. I can calculate enthalpy using bond energies. Lab skills: 1. I can identify and explain sources of error. Bible connection: 2 Timothy 2:13 Textbook pages covered in class: Wile: pg. 417-422, 426-430 Problems from pg. 3-6, 11	pg. 417-422, 426-430	pg. 417-422, 426-430 **See info below	Pages covered in class pg 448-460 (complete module 13) **See info below
<i>(FYI: I have chosen to do this module in 1 week because much of the information is more than than a typical first year chemistry student would need to know. At the public school I did not teach Hess' Law, heats of formation, entropy nor Gibbs Free Energy in a first year chemistry class. These are AP chemistry topics. I do teach these topics with HSLDA as they follow most of the textbook as outlined (they do skip many things also though). I have provided videos on these topics linked below to help if you chose to complete these topics. It is completely up to the parent/student to decide what they wish to address in this chapter. I wanted to provide you with the information so you can make a decision from here.)</i> Heats of formation - video and notesheet Entropy and Gibb's Free Energy - video 1 and video 2 (just the last problem)and ppt					
23 - Mar ch 18	15	Understanding reaction rates: 1. I can calculate rates of chemical reactions from experimental data. 2. I can explain what happens to reaction rate over time and why. 3. I can explain how a catalyst works. Lab skill: I can create and interpret a proper graph. Bible connection: Hebrews 10:36 Textbook pages covered in class: Wile: pg. 453-459, 469-475 Problems from pg. 1-9	Wile: pg. 453-459top, 467-475 (Complete Chap 15)	Wile: pg. 453-459, 467-475 (Complete Chap 15) **See info below and see note about next week	pg. 492-497, 512-517 Complete module 14 **See info below
<i>(Rate laws are covered in this chapter in the textbook. I have only taught Rate laws in an AP chemistry class. I do not teach this topic with HSLDA. You can choose what you do and do not want to do)</i> <i>Here are extra resources in case you would like them:</i> Rate law video by Stoub and note sheet to go with it Rate law practice WS (the third one is quite tricky) and answers					
24 - Apr 1	15	Understanding reaction rates: 1. I can explain the factors that affect the rates of chemical reaction and apply collision theory in my explanation.	No new pages - This week should be spent writing an amazing lab report. It will be worth numerous points and is the compilation of all the lab work we have been doing this year - I know you are ready! You got this!		

		Lab skill: I can write a procedure and choose how to most effectively represent data. I can write a formal lab report.			
25 - Apr 8	16	Equilibrium: - I can explain equilibrium using the rate of the forward and the rate of the reverse reactions. - I can calculate Keq and explain what it means. Lab skill: I can create and interpret graphs Bible connection: Romans 12:21 Textbook pages covered in class: Wile: pg. 483-494 Problems from pg. 511: 2-7, 9-10	Wile: pg 483-494	Wile: pg 483-494, 504-507	Keq: Pg. 524-537, 547-552
26 - Apr 15	16	Equilibrium: I can use Le Chatelier's principle to qualitatively predict and explain changes in the equilibrium position. Lab skill: I can use modeling to explain what is happening. Bible connection: James 4:7 Textbook pages covered in class: Wile: pg. 494-504 Problems from pg. 511: 12-13	Wile: pg. 494-504 (complete chap 16)	Wile: pg. 494-504 (complete chap 16)	complete module 15