TENTATIVE COURSE SYLLABUS
Chemistry 50a Full Semester (Sections 2, 3, 4)
Fall Semester 2022

Iowa State University Catalog: 0 Cr. *Prereq: 1 year high school algebra.*
"An in-depth active learning experience designed to impart the fundamental concepts and principles of chemistry, with an emphasis on mathematics skills and logical thinking. For students intending to enroll in general chemistry and who have not taken high school chemistry or who have not had a high school college preparatory chemistry course. Credit for Chem 50 does not count toward graduation."

College Learning Philosophy: Have you learned a skill like dancing, gymnastics, glassblowing, playing an instrument, video gaming, or playing a sport? You can learn *about* a skill, but you must ***practice*** to become better at the skill. If you have watched any television programming about Olympic athletes, you have seen how much time they have practiced to become top contenders for medals in their sport(s). Learning is an individual and a personal thing. No one can learn for you. You, alone, are responsible for learning a skill or a concept. No one can ***make*** you learn. You cannot attend a lecture, have the knowledge poured into your brain, and voilá, you have learned the material!

You are the active participant in your own learning. We want you to become involved from the outset! We will provide you lots of help, but, in this course, it is you who must build the concepts of chemistry one by one to create a strong foundation for later in this course, later in other courses. If you merely sit back and watch, you will not derive maximum value from the course. You will struggle during the chemistry course(s) you take after Chemistry 50.

You are in control of whether you learn or not. Helpful and considerate teaching assistants and instructors can make your job a little easier, but they are not accountable – you are. Most of you are taking Chemistry 50 in order to be successful in your next chemistry course. We can help you to do that!

Your Chem 50 team members have planned what they hope will be a beneficial course of study for you. We hope that you will learn to appreciate a little of the wonder of chemistry that brought each of us to the field and that you will have fun along the way—with your peers, your teaching assistant, and your instructor.

The top 5 reasons students enroll in Chemistry 50: Most of you are taking Chemistry 50 as preparation for other chemistry coursework. What are some reasons that students enroll in Chem 50?

1. As review—it has been several years since you have taken a chemistry course;
2. To build an English vocabulary in chemistry terminology—an international student, you may have enrolled in a chemistry course in another country and might struggle with making the transition from your native country to America;
3. You were enrolled in a higher-level chemistry course but struggled because of the background you had. With the advice of your original chemistry professor and advisor, you opted to drop back to review the material in Chemistry 50 before taking the higher level course;
4. You need to make up a science deficiency in your background;
5. You did not take a college chemistry preparatory course during high school or at a community college.

Some of you may recall the chemistry you learned during general science better than others. We teach this course as if you have had no previous chemistry course.

Instructor:	kathy burke
Office:	3760 Gilman Hall
Office Phone:	515-294-7718 (with voice mail)
WWW Address:	http://courses.chem.iastate.edu/courses/2021/fall/chem-50
E-Mail Address:	kbrk@iastate.edu (please ALWAYS use "Subject: Chemistry 50")
Student Hours:	*Tuesday, 11:00 a.m.; Wednesday, 12:05 p.m., Room 3758 Gilman Hall, others by appointment
E-Mail Student Hours:	*Tues., Thurs. 12:05-12:55 pm, MWR 6-7 p.m. (*some weeks these hours may change or be cancelled due to scheduling conflicts)
***Rescheduled Student Hours**	September 12-October 7: Tuesday: 6-7 p.m. and Wednesday 5:30-6:30 p.m. (cancel 9/14 and 10/5)
TA team	Our course team includes one teaching assistant, Emily King, whose contact information and office hour is shown below. Emily is also our course head TA.

Meeting Times
Formal Instruction: Monday and Friday at 9:55 a.m. in 1352 Gilman

Recitation Section	Time	Room	Teaching Assistant	Teaching Assistant e-mail address	TA Student Hours
2	8:50 - 9:40 a.m.	2354 Gilman	Emily King	eross@iastate.edu	Thursday, 3 p.m.
3	9:55 -10:45 a.m.	2354 Gilman	Emily King	eross@iastate.edu	Thursday, 3 p.m.
4	11:00 -11:50 a.m	2354 Gilman	Emily King	eross@iastate.edu	Thursday, 3 p.m.

Your Chemistry 50 TA

eross@iastate.edu

Emily King

Student hour
Thursday 3 p.m.

1. TEXTBOOK REQUIRED: "*Introductory Chemistry*" 6th ed. By N.J. Tro, ISBN: 978-0-13-430238-6. Be sure to get the ***6th edition***! That way the homework numbers match what you are assigned!

Some students have found this useful, but it is OPTIONAL (NOT required):

INTRODUCTORY CHEMISTRY-SELECT.SOLN.MAN.
Author: TRO
ISBN: 9780134564067

2. CALCULATOR FOR USE ON QUIZZES AND EXAMS: You should borrow or purchase an inexpensive nonprogrammable ***scientific*** calculator to use for doing your homework and in-class practice problems. You will use this for your next chemistry class as well as this one. You can find a scientific calculator for less than $9 at each of the local discount chain stores. Look for a basic calculator model that features an EE or EXP or x 10^x key option ***DIRECTLY ON THE KEYBOARD***. For future chemistry classes, the functions log x, 10^x, ln x, e^x, y^x may also be useful. Please ask your instructor or TA for advice about choosing a calculator if you need it. The Texas Instruments model students find easiest to use is TI-30Xa.

If you are unsure about whether your calculator is acceptable, please ask your instructor or your teaching assistant.

During Chem 50, no *programmable* calculators will be needed (or allowed) on quizzes, hour exams, or the final exam. You may not use your cell phone as a calculator at any time during quizzes, hour exams, or the final exam.

3. RESPECT YOUR CLASSMATES: Please respect your classmates. When you interact, please do so politely. Often your seat mates will be able to answer questions that arise during class. Working together to find the solution to a problem helps you to know how do complete homework assignments as well as how to understand chemistry concepts.

4. WHAT TO BRING TO CLASS EACH DAY:

a. Yourself!
b. Paper and something to use to write.
c. Your calculator.
d. A willingness to learn together and enjoy daily experiments!

You do ***not*** need to carry your textbook to lecture or recitation. It's heavy. When/if either Emily or I refer to it during class, we will show you the reference.

PREREQUISITE SKILLS: For Chem 50, you should have had a basic arithmetic and algebra course in preparation for the mathematics in this curriculum. This is to help you be less stressed and frustrated as you work problems during the course. Although there will be mathematics review as we progress through the course, you should have had some exposure to and have a comfort level with basic mathematics prior to beginning this course. You will be doing calculations involving fractions, percent, exponents, scientific notation, writing and solving algebraic equations, and general algebraic problem-solving techniques. If you need extra help with mathematics, please ask your instructor or your TA.

CELL PHONE/TEXTING COURTESY: Please have your smart phone ready in case we need to use it during class. But please do not use it while we are working together unless we need it. It can be distracting. If you have an emergency for which you need your phone, please just step out into the hallway so that we do not disturb your call.

q50: If you have a question about general mechanics of the course, please check the syllabus first. On Canvas, we also have a list of FAQs where we have summarized questions have arisen in the past. If neither the syllabus nor the FAQs address your question, please send it to "q50@iastate.edu". The "q50" address contacts the head TA and me at the same time. Whomever receives your message first will answer your question.

In the email subject line, please always include Chemistry 50 and your recitation section number. Your section number is important so that we can give you the most complete answer possible.

COURSE INFORMATION:

CHEM 50 WEB SITE: This departmental web site is where you can find the course syllabus online. You will also find the syllabus posted on the Canvas site for Chemistry 50, along with other important course information and study aids.

http://courses.chem.iastate.edu/courses/2022/fall/chem-50

CANVAS: We will post up-to-date information about announcements, assignments, quizzes, review sheets, and examinations on the Canvas site. You can check this web site for grade information as it becomes available. You can also link to lecture capture videos there (Echo360).

IMPORTANT COURSE POLICY: Save ALL of the graded work that your TA returns to you until ***after*** the semester is completed. It is your responsibility to check grades on Canvas. If you discover an error in a grade on Canvas, please show the graded work to your teaching assistant ***within ONE week*** of receiving the returned graded work to have the grade corrected.

RECITATION: During your Wednesday recitation, Emily, your teaching assistant (TA), under the guidance of your course instructor, facilitates a 50-minutes session during which she will often review concepts from the lecture, expand on those concepts as needed, and carry on a discussion with you. You will have the opportunity to ask questions about chemistry concepts along with homework problems. You will take weekly quizzes during the recitation. (There is more about recitation quizzes below.)

On the first page of this course syllabus, you will find a listing of each recitation section, along with the time and location it meets.

You should attend the recitation in which you are enrolled. If, on some given Wednesday, there is a reason that you cannot attend your regular recitation session, you can ask Emily whether there is a seat available in another recitation section so that you could attend that alternate section and would not have to miss class. This can happen ***only*** if there is room in the section that you want to temporarily attend.

You can earn 3 points maximum for each recitation you attend. You will be graded on the best 13 of 15 recitation attendance scores.

NO TA OR LATE TA: If for some reason your TA Emily does not show up for your recitation section after five minutes, please DO NOT LEAVE. Please send one student to the General Chemistry office in 1608 Gilman or call 515-294-6352 to alert staff and to request a substitute teaching assistant. The department will immediately find a substitute.

If your TA Emily routinely shows up LATE for recitation, please e-mail me or tell me in person so that I can correct the situation. This should not happen and is unacceptable. Your name will not be used when I talk to your TA about this.

EXAMINATIONS/QUIZZES:

EXAMS: There will be four examinations (100 points each) and a comprehensive final exam (100 points) given on the dates listed below. You will take these exams during class, in your regular classroom, 1352 Gilman. *Please note the day and time of the **final exam** is already scheduled (it **cannot** be changed) and make your end-of-semester travel plans accordingly.* Exams 1-4 will be returned at the next class session after they are graded.

Exam 1: Friday, September 16
Exam 2: Friday, October 7
Exam 3: Friday, October 28
Exam 4: Friday, November 18

Final Exam: Wednesday. Dec. 14, 7:30-9:30 a.m. **(This is the only time this exam will be given.)**

The four one-hour exams (100 points) will be given at 9:55 a.m. in 1352 Gilman on the dates listed. A class meets in the room prior to our class and directly following our class. ***Please be prompt. We have only 50 minutes for the exam!***

The hour exams will be a combination of the following question types: multiple choice, fill in the blank, matching, "explain your idea", and "show your work". Although each exam is worth 100 points, the number and type of questions varies with each exam. This type of format has been chosen in order to award some portion of full credit (called partial credit) for partially correct responses.

THERE WILL BE NO MAKE-UP EXAMS. Unfortunately, we do not have the means of offering a make-up examination. Any absence from an exam results in a score of zero. However, if you will miss an exam due to emergency or illness, you will be able to make up the missing points by ***substituting the percent score that you earn on the final exam for the missing exam score***. You do not have the option to replace any additional missing exam score.

EXAM REPLACEMENT: We can all have a bad day taking an exam. ***If*** you have taken ***all four*** one-hour exams, you have the option of replacing your ***lowest*** exam score with the ***percent*** grade you received on the final examination, *if it is higher than the lowest hour exam score*. If you miss one of the hour exams, you do not have this option—the zero for the missing exam ***is*** your lowest score and your final exam percent score will automatically replace that zero score.

EXAM WRAPS: Each exam we take helps us to learn something, both as we prepare, and as we look at our results. From our graded exam paper, we can use a strategy called an exam wrap to explore where we did not earn full points and learn from that what we should have learned preparing for the exam. Each time we do this, we learn more, about course material and about how we can improve our exam-taking strategies. You will be given a template (model) for how to prepare an exam wrap.

ONLINE POST-LECTURE QUIZZES: After each lecture, you will complete a brief lecture quiz. You will find the quiz posted on Canvas at the "Quizzes" tab. It will be open from 11:59 a.m. to 11:59 p.m. on the day of the lecture. If you have to miss the lecture, you will be able to watch the lecture capture video posted at the Echo360 link on Canvas. For each lecture quiz you take, you can earn a maximum of 5 points. You will be graded on the best 20 of 25 of these lecture quizzes. There will not be a lecture quiz on an exam day.

RECITATION QUIZZES: There will be a quiz *EACH* recitation day (Wednesday). Quizzes will be representative of material discussed during lecture with problems similar to homework assignments. Each quiz will cover all material specifically since the last quiz or exam, but is considered to be cumulative in nature. This means that you are responsible for all material in the course from the first day. The ***THIRTEEN BEST*** of fifteen recitation quizzes will be counted towards your grade. ***There are NO make-up recitation quizzes.***

FINAL EXAM: The final exam will be a 100-point ***COMPREHENSIVE*** multiple-choice examination covering ALL of the material we have studied during the course. **THE *COMPREHENSIVE* FINAL EXAM WILL BE GIVEN on Wednesday December 14 at *at 7:30-9:30 a.m.* The Registrar sets this time and date.** There will be no possibility to take the final exam early. Only those with conflicting final exam sessions or three or more final exams in one day can negotiate any change in the final exam day or time. This is university policy. Please make your holiday break travel plans accordingly.

Requests to change final exam day/time: The student wishing to change the day of the final exam (because of having three or more final exams on the same day) must make their request to the instructor ***no later than the last scheduled class day before the beginning of preparation week***.

******If you miss the final examination, you will fail the course.******

COURSE PROTOCOL:

GRADES: Your Chem 50 course grade will be based on a total possible 100% as outlined below

4 one-hour exams at 100 points each	50 %	Weekly homework set scores	7.5 %
Comprehensive final exam at 100 points	10 %	Pre-exam problem sets (PEPS)	7.5 %
Question(s) of the Day: lecture (3 pts per day, count best 20 of 29)	3.00 %	Exam wrappers	2.5 %
Daily lecture quiz: (max. 5 pts per day, count best 20 of 25)	3.25 %	Weekly recitation quiz scores (best 13/15)	10.0 %
Attendance: recitation (max. 3 pts per day, count best 13 of 15)	6.25 %		

GRADING SCALE FOR THE COURSE:

≥94 – 100	A	≥87 – <90	B+	≥76 – <80	C+	≥60 – <65	D+	<50	F
≥90 – <94	A-	≥83 – <87	B	≥69 – <76	C	≥55 – <60	D		
		≥80 – <83	B-	≥65 – <69	C-	≥50 – <55	D-		

Calculating your grade at any time: The Canvas gradebook maintains a constant calculation of your current course grade. Please alert us of any missing or incorrect scores as the semester progresses. Please do this within ONE week of having an assignment returned to you. ***Please be sure to keep all of your papers until you receive your end of semester course grade!***

Academic integrity: Academic integrity is expected of you during this course. If you demonstrate Academic Misconduct in any form, you are in violation of ISU *Student Disciplinary Regulations*. This includes, but is not limited to: copying or sharing answers on tests or assignments, plagiarism, and having someone else do your academic work. Please do not engage in academic misconduct! It is considered a serious offense. As an instructor, I am obligated to inform the Dean of Students of your action(s). Then, the Dean will meet with you to discuss sanctions. Depending on the act, you could receive an F grade on the test/assignment, F grade for the course, and/or could be suspended or expelled from the University. Neither you nor I want to see this happen. (Please see (http://www.studentconduct.dso.iastate.edu/academic-misconduct) for more details and a full explanation of the Academic Misconduct policies.)

ATTENDANCE AT LECTURE AND RECITATION: Let's all respect one another. Although we will have our smart phones ready in case we need them, please have the ringer turned off. So that the background noise of class does not bother you, if you need to use your phone during class, please step out into the hallway.

You will be most successful if you attend each lecture and recitation. When you are there, you can ask me questions, you can discuss concepts with those seated around you, you can ask Emily questions. Besides, it's not the same without you there.

Question of the day: Each lecture, you will complete a "Question of the Day" (QOD) sheet to review the last lecture and integrate new ideas into what you already know. If you miss lecture, you will miss those points. You can earn a maximum of 3 points for completing the "QOD" paper. Your grade will include points for the best 20 out of 29 lectures (question of the day).

Most of us will quickly get into a rhythm in the course. That said, life happens… When it happens to you, please let us know so that we can help you through what might be a stressful or challenging time in your life.

If you don't feel well, please stay home and rest so that your symptoms do not get worse. You will be able to watch the Echo360 video of the class to see what we discussed. You and Emily /I can work together to help you to catch up. Please email us within two days of missing class so that we can work with you as soon as possible.

Past student have had crises during the semester. They have lost family members, gone through relationship rifts, had medical episodes or diagnoses, struggled with food or housing insecurity, and substance abuse issues. Even joyous events like a friend's or family member's wedding or the birth of a child, can disrupt your life for awhile.

When such issues arise, we can work with you personally to listen, suggest campus resources of which you might not be aware, and help you catch back up. But, we can only help you if you let us know.

LEARNING OBJECTIVES FOR CHEMISTRY 50:

The following list includes our fundamental overall learning objectives for Chemistry 50. A much more detailed list of learning objectives is provided for each chapter at the end of this document. After successfully completing this course, you should be able to:

1. Explain the basic structures of atoms, ions, and molecules, and ways to quantitatively and qualitatively describe the properties of atoms and molecules in the various phases of pure matter and in mixtures.
2. Explain the reactivity of atoms, ions, and molecules, and various qualitative and quantitative methods for describing, depicting, and balancing chemical reactions.
3. Correlate the electronic configurations of atoms and the structures of molecules with their chemical properties.
4. Correctly use the language of chemistry (nomenclature, terminology, and symbolic representations).
5. Use the periodic table, chemical facts, concepts, and models, as a foundation to organize further chemical knowledge and to understand the physical world.
6. Visualize the structure of matter and its reactions at the atomic and molecular level.
7. Master qualitative problem solving skills and monitor your own thinking processes as you proceed.
8. Solve quantitative problems using basic mathematical skills (the "gfu" approach).
9. Move beyond memorizing to integrating overarching concepts.

INSTRUCTOR HELP SESSIONS, HS:

There will be scheduled student hours/optional study sessions/optional help sessions.

There will be scheduled optional study/help sessions at 5:30 p.m. in Room 1810 Gilman on the Wednesday evening prior to each Friday hour exam. These dates include:

Exam 1 HS: Wednesday, September 14	Exam 3 HS: Wednesday, October 26
Exam 2 HS: Wednesday, October 5	Exam 4 HS: Wednesday, November 16
Final Exam: TBA	**(This session is if students are interested in scheduling it.)**

Based on student request, a help session will be scheduled for the final exam based on the schedules and availability of class members. Please take advantage of these help sessions or instructor/TA student hours, if you have any difficulties understanding materials studied in class.

COURSE WORK:

ASSIGNMENTS: It is best to keep caught up with the reading and homework in any chemistry course! Getting behind is the number one mistake any of us can make! Concepts in chemistry are like building blocks. From the beginning of the course, you learn one topic at a time to build up to larger concepts. If you are not confident of a topic early in the course, your whole foundation is unsteady. To avoid this, try to keep caught up every day. It is TOO easy to get behind. Doing small amounts of work each day will save you from becoming discouraged later when it is time to complete a major problem assignment or to study for an examination.

The homework assignments for which you are responsible will be provided chapter by chapter. The homework problems assigned are listed in the order that they will be covered during lecture. These assignments will be outlined during pre-class announcements and via weekly Canvas announcements. You can find the homework problems at the end of each chapter.

For every one full hour of time that you spend in the classroom, please plan to spend at least an hour and a half to two hours or more studying outside of class. This means that you will spend up to eight hours or more per week actively participating in class and studying for this course. Staying caught up with your assignments will help you to learn the material. If you feel that you are getting behind, please talk with your instructor or your TA as soon as you can in order to arrange to get help.

To be most successful, before coming to class each day, skim the assignments in the textbook and attempt to work the assigned problems. During each formal "lecture" session, you will be told which problems in the text should be solved for the next class period. Because the homework problems reflect a major portion of the course content, it is important that you become good at solving these problems. Any questions you have regarding these homework problems and assigned reading material should be directed to me during the formal "lecture" session or to Emily during your recitation. These problems will be similar to those problems you will be asked to solve on the PEPS, hour examinations, or quizzes.

During Chemistry 50, we want you to learn to work problems effectively. We will ask you to please ***show ALL of your work completely for full credit***. If you do not show your work completely (for example, you show only a number for your answer), we cannot award full credit.

Each Wednesday ***during your recitation class period***, Emily will collect and grade selected homework problems. The graded problems will be returned to you the next recitation class period. Problem sets will be graded on the following basis:

0 points = no paper handed in
1 point = no work shown, only answers
2 points = less than 50% complete
3 points = 50% complete, showing only minimal work or without demonstrating clear understanding
4 points = 75% complete, showing only minimal work or without demonstrating clear understanding
5 points = complete with all work shown

******PLEASE NOTE:*** There WILL be both a HW assignment and a quiz during Preparation Week.***

OTHER USEFUL INFORMATION:

Academic success center (ASC): The Academic Success Center, Room 1076 of the Student Services Building, 515-294-6624, provides services and programs to assist students including disability resources, presentations, workshops for study skills. Visit their web site, http://www.dso.iastate.edu/asc/

Accessibility statement:
Iowa State University is committed to advancing equity, access, and inclusion for students with disabilities. Promoting these values entails providing reasonable accommodations where barriers exist to students' full participation in higher education. Students in need of accommodations or who experience accessibility-related barriers to learning should work with Student Accessibility Services (SAS) to identify resources and support available to them. Staff at SAS collaborate with students and campus partners to coordinate accommodations and to further the academic excellence of students with disabilities. Information about SAS is available online at www.sas.dso.iastate.edu, by email at accessibility@iastate.edu, or by phone at 515-294-7220.

Special academic needs:
Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

If you require accommodations, please contact me as soon as you can (***preferably during the first week*** you are enrolled in the course) so that you and I can talk about how we can make appropriate arrangements to meet your needs as soon as possible. **For us to be able to help you for exam or quiz accommodation, our staff has asked that requests be made a minimum of four business days prior.**

Harassment and Discrimination. Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. If you have concerns about such behavior, please contact me, Student Assistance (http://www.studentassistance.dso.iastate.edu/) at 515-294-1020, or email dso-sas@iastate.edu, or the Office of Equal Opportunity and Compliance (http://www.eoc.iastate.edu/) at 515-294-7612.

Religious Accommodation. Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request reasonable accommodation for religious practices. ***In all cases, please put your request in writing***. The instructor will review the situation in an effort to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the Dean of Students Office at 515-294-1020 or the Office of Equal Opportunity at 515-294-7612.

Free Expression: Iowa State University supports and upholds the First Amendment protection of freedom of speech (https://bit.ly/isu-freedomspeech) and the principle of academic freedom (https://bit.ly/regents-academicfreedom) in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

Preparation Week: This class follows the Iowa State University Preparation Week policy as noted in section 10.6.4 of the Faculty Handbook: http://www.provost.iastate.edu/resources/faculty-handbook. As previously noted, there WILL be both a HW assignment and a quiz during Dead Week.

Contact Information: If you are experiencing, or have experienced, a problem with any of the above issues, please talk with me. You can also email academicissues@iastate.edu.

Important Dates: The ***last day for change from credit to audit:*** Friday, August 26, 2022. The audit does not count towards full-time student status.

The ***last day to drop the course:*** Friday, October 28, 2022.

Please see ***me (****not Emily)* to negotiate any changes in your status in the course (i.e., section changes, drops, etc.). I will direct you to the person who keeps those computer records for Chem 50.

HOMEWORK: A list of homework problems is provided on the next page. These are to be worked for your benefit and understanding. The more problems you work, the more prepared you will be for your exams and quizzes.

1. Wednesdays, at the beginning of recitation class, you will hand in selected homework problems for grading. The homework should be written out on paper and handed in to your TA, Emily, at the beginning of recitation on the date that they are due. Those problems that you will be asked to hand in for grading will be indicated in the pre-class notes during lecture and/or via a Canvas announcement from Emily. You should make every effort to work these assigned problems. They are found *at the end of each chapter* in your textbook. The assigned problems reflect the concepts you are expected to understand for the hour exams and quizzes. If you have difficulty with any of them, check your textbook to find where the author of the textbook has provided similar example problems. If you continue to have difficulty after studying example problems, you should spend time with your TA during recitation, your TA during her student hours in the Chemistry Help Center, any TA in the Chemistry Help Center, or your instructor.

2. Pre-exam problem sets (PEPS). ***At the beginning of the Wednesday recitation before each exam***, you will hand in a problem set including problems that will help you to review for the exam. This problem set will be posted on Canvas on Wednesday of the previous week, i.e., a week before it is due. You should print out the problem set and work each problem directly on the printed paper. A PEPS answer key will be posted ***AFTER*** you hand in your PEPS assignment. Scores on PEPS assignments will be normalized to 10 points each.

Unless otherwise noted in the homework assignment section or during lecture, you are responsible for ALL materials in the chapters discussed during class (formal "lecture" or recitation). This is summarized by the objectives listed for each chapter.

For *any* homework assignment, you should show *all* work that you do to solve a problem, including *units*. In general, just a numerical answer will not receive full points. The *more* work that you show, the more points you will receive. Your recitation instructor will explain to you what this means along with showing you *how* to show all of your work, including *units*.

3. Exam wrapper. This is your personal self-assessment of your preparation for and performance on each exam. It is a learning opportunity! It is due one week after you receive your graded exam.

PUBLIC HEALTH. If you are not feeling well, you should stay home and focus on your health. Should you miss class due to illness, it is your responsibility to work with your instructor to arrange for accommodations and to make up coursework, as consistent with the instructor's attendance policy.

You may choose to wear a face mask and/or receive the COVID-19 vaccine and boosters, as well as other vaccines such as influenza, but those options are not required. Thielen Student Health Center will continue to provide COVID-19 vaccinations free-of-charge to students. The university will continue to offer free masks and COVID-19 test kits during the fall 2022 semester. Other wellbeing resources for students are available at: https://www.cyclonehealth.iastate.edu/wellbeing-resources/

Public health information for the campus community continues to be available on Iowa State's public health website. All public health questions should be directed to publichealthteam@iastate.edu.

Tentative Schedulefor the Semester

Week	LECTURE Chapter	Topic	Pages to Read	RECITATION Chapter	Topic	Pages to Read
wk1 8-22	ch3	Matter and Energy	3: 60-90	8-24 ch2 qz1	2.2 Scientific Notation	2:15-17
wk2 8-29	ch3 ch4	Atoms and Elements	4: 99-123	8-31 ch2 qz2	2.5 Basic Units of Measure 2.6 Converting Units	2:26-33
wk3 9-5	ch4 ch9	Electrons in Atoms and the Periodic Table	9: 285-316	9-7 ch2 qz3	2.3 Significant Figures (SF) 2.4 SF and calculations	2: 17-25
wk4 9-12	ch9			9-14 ch2 qz4	2.10 Problem Solving	2: 33-36; 43-44
	EXAM 1	**Friday, September 16**	**9:55 -**	**10:45 a.m.**	**1352 Gilman Hall**	
wk5 9-19	ch9 ch5	Molecules and Compounds	5: 133-158	9-21 ch of wk qz5		
wk6 9-26	ch5			9-28 ch of wk qz6		
wk7 10-3	ch5 ch6	Chemical Composition	6: 169-197	10-5 ch of wk qz7		
	EXAM 2	**Friday, October 7**	**9:55 -**	**10:45 a.m.**	**1352 Gilman Hall**	
wk8 10-10	ch6			10-12 ch of wk qz8		
wk9 10-17	ch6 ch7	Chemical Reactions	7: 207-240	10-19 ch of wk qz9		
wk10 10-24	ch7			10-26 ch of wk qz10		
	EXAM 3	**Friday, October 28**	**9:55 -**	**10:45 a.m.**	**1352 Gilman Hall**	
Week	**LECTURE Chapter**	**Topic**	**Pages to Read**	**RECITATION Chapter**	**Topic**	**Pages to Read**
wk11 10-31	ch7 ch8	Quantities in Chemical Reactions	8: 249-273	11-2 ch of wk qz11		
wk12 11-7	ch8			11-9 ch of wk qz12		
wk13 11-14	ch8 ch13	Solutions (sections13.2-13.3, 13.6, 13.8)	13: 446-450; 455-458; 460-463	11-16 ch of wk qz13		
	EXAM 4	**Friday, November 18**	**9:55 -**	**10:45 a.m.**	**1352 Gilman Hall**	
11-21	fall break!					
wk14 11-28	ch13 ch10	Chemical Bonding	10: 325-349	11-30 ch of wk qz14		
wk15 12-5	ch13 ch10	Chemical Bonding	10: 325-349	12-7 ch of wk qz14		
wk16 12-12	**FINAL EXAM DAYS**					
	FINAL EXAM	Wednesday, December 14	**7:30 -**	**9:30 a.m.**	**1352 Gilman Hall**	

*****Chem 50af22 *TENTATIVE* Schedule for Lecture—we will adjust as needed as we go. Exam and quiz dates will not change.**

Aug					
	M	T	W	R	F
wk1	22 Aug ch3	23	24 **rec1—qz1** **ch2.2**	25	26 ch3 ch4
wk2	29 Aug ch3 ch4	30	31 **rec2— qz2** **ch2.5, 2.6**	1 September	2 ch4 ch9
Sep					
	M	T	W	R	F
wk3	5 Sep university holiday no classes	6 Sep	7 **rec3— qz3** **PEPS1 posted** **ch2.3, 2.4**	8	9 ch4 ch9
*wk4	12 Sept ch9	13	14 **rec4— qz4** ***PEPS1 due*** **ch2.10** xm1 review	15	16 **exam 1—everything since first day**
wk5	19 Sept ch9 ch5	20	21 **rec5—qz5** **exam 1 (e1) returned** **e1 wrapper assigned**	22	23 ch5
wk6	26 Sept ch5	27	**28** **rec6—qz6** PEPS2 posted ***e1 wrapper due***	29	30 **ch5**
Oct					
	M	T	W	R	F
wk7	3 October ch5 ch6	4	5 **rec7—qz7** ***PEPS2 due*** xm2 review	6	7 **xm2—everything since first day**
wk8	10 Oct ch5 ch6	111	12 **rec8—qz8** **e2 returned** **e2 wrapper assigned**	13	14 ch6
wk9	17 Oct ch6	18	19 **rec9—qz9** **PEPS3 posted** ***e2 wrapper due***	20	21 **ch6** **ch7**
wk10	24 Oct ch7	25	26 **rec10—qz10** ***PEPS3 due*** xm3 review	27	28 **xm3—everything since first day**
wk11	31 Oct ch7 ch8				

Nov					
	M	T	W	R	F
wk11		1 Nov	2 **rec11—qz11** **e3 returned** **e3 wrapper assigned**	3	4 ch8
wk12	7 Nov ch8	8	9 **rec12—qz12** **PEPS4 posted** ***e3 wrapper due***	10	**11** **ch8**
wk13	14 Nov ch8 ch13	15	**16** **rec13—qz13** ***PEPS4 due*** xm4 review	17	18 **xm4—everything since first day**
fall break	21 Nov fall break	22 fall break	**23** fall break	24 fall break	25 fall break
wk14	28 Nov ch13	29	**30** **rec14—qz14** **e4 returned** **e4 wrapper assigned**		
Dec					
	M	T	W	R	F
wk14				1 Dec	2 ch13
wk15	5 Dec ch13	6	**7** **rec15—qz15** ***e4 wrapper due***	8	9 ch13
wk16	12 Dec **fx week**	13	**14** ***final exam!*** **comprehensive, multiple choice—everything since first day** ***7:30-9:30 am***	15	17

Objectives and Suggested Homework
Listed by Chapter (Ch) and Section (Sec)
Useful to Prepare for an Exam

Ch	Sec	Topics	Objectives	HW with answers	HW without answers
2	2	Scientific notation	2.2.1 Given a number less than one, write that number in proper scientific notation. 2.2.2 Given a number greater than one, write that number in proper scientific notation. 2.2.3 Convert numbers between decimal notation and scientific notation. 2.2.4 Add, subtract, multiply and divide using scientific notation.	31,33,37,39	32,34,38,40
	3	Significant figures	2.3.1 Distinguish between measured numbers and exact numbers. 2.3.2 Explain the rationale for the use of significant figures. 2.3.3 Given a measured number, state the number of significant figures.	41,43,45, 47	42,44,46, 48
	4	Calculations using significant figures	2.4.1 Use significant figures properly in addition, subtraction, multiplication, and division. 2.4.2 Divide and/or multiply a series of numbers and write the answer to the correct number of significant figures. 2.4.3 Learn and apply rules for rounding.	49,51,53,57, 59	50,52,54,58, 60
	5	Metric units	2.5.1 Learn and apply metric base units: gram, liter, meter. 2.5.2 Recognize the difference between mass and weight. 2.5.3 Learn and apply metric prefixes, their symbols, and numerical meanings: Tera-, giga-, mega-, kilo-, centi-, milli-, micro-, nano-, and pico-.	Memorize: Pico-, nano-, micro-, milli-, centi-, kilo-, mega-, giga-, tera-	
	6	Interconversions of metric units	2.6.1 Convert between metric units using dimensional analysis.	69	70
	7	Interconversions of units metric to English	2.7.1 Convert between metric units and English units using dimensional analysis.	71bcd,73,77, 81,125	72,74,78,82, 126
	9	Density	2.9.1 Recognize and use density as a conversion factor. 2.9.2 Calculate mass from density and volume. 2.9.3 Calculate volume from density and mass.	103,115,121	104,116,122
	10	Problem-solving strategies (“gfu”)	2.10.1 Perform multi-step conversions using dimensional analysis.	83	84

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
3	2	Matter	3.2.1 Distinguish among elements, compounds, and mixtures in terms of their atomic make-up. 3.2.2 Distinguish between homogeneous and heterogeneous matter.	1,13	2,12
	3	Classifying states matter	3.3.1 Classify matter by physical state. 3.3.2 State the shape and volume characteristics of the three physical states of matter. 3.3.3 Classify common samples of matter according to physical state. 3.3.4 Identify the SIX processes by which matter changes physical state (i.e., melting, freezing; evaporating, condensing; subliming, depositing etc.). Describe particle motion associated with each change.	3	4
	4	Elements, compounds, mixtures	3.4.1 Given the names, write the symbols and/or given the symbols write the names of the elements having atomic numbers 1 through 36, in addition to Ag, Sn, I, Xe, Cs, Ba, Pt, Au, Hg, Pb, Rn, U. There are 48 of these.	31,33bc, 35bc,113bd	32,34ab, 36ac,114bc
	5	Physical/chemical properties	3.5.1 Differentiate between physical properties and chemical properties.	39	40
	6	Physical/chemical change	3.6.1 Differentiate between physical change and chemical change.	43,115	44,116
	7	Conservation matter/mass	3.7.1 State the Law of Conservation of Matter. 3.7.2 Apply the Law of Conservation of Matter	47b,49	48b,50
	8	Units of energy	3.8.1 Define energy. 3.8.2 Differentiate between kinetic and potential energy. 3.8.3 Explain the Law of Conservation of Energy. 3.8.4 Discuss energy transformation between chemical, mechanical, electrical. 3.8.5 Convert units of energy: calorie, Calorie, and Joule	17,19,21,55 lines 1,2,4 (not kWh), 59 (if you like math)	18,20, 56 lines 1,2,3 (not kWh), 60 (if you like math)
	9	Energy endothermic, exothermic	3.9.1 Differentiate between endothermic and exothermic processes in terms of heat and in terms of particle motion.	23,61 (no energy diagram),63	22,62 (no energy diagram),64
	10	Temperature	3.10.1 Distinguish between heat and temperature. 3.10.2 Convert temperatures between Celsius and Kelvin. 3.10.3 Memorize the equation for converting between the two scales.	25,65c,67,73 (line 3, not °F)	30,66d,68, 74 (line 3, not °F)
	11	Heat capacity	3.11.1 Distinguish between heat and specific heat.	27	
	12	Energy and heat calculations	3.12.1 Define each term in $q=mc\Delta T$. 3.12.2 Use specific heat, temperature and mass to calculate heat. 3.12.3 Given appropriate experimental data, calculate the specific heat or the mass or the change in temperature of a substance.	75,77,79,85, 105 (if you like math)	76,78,80,86, 106 (if you like math)

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
4	3	Nuclear atom	4.3.1 Draw a model of the atom, indicating where the nucleus is located.	3,31	4,32
	4	Subatomic particles	4.4.1 State the names, symbols, charges, relative masses, and locations in the atom for the three subatomic particles (proton, electron, and neutron).		
	5	Z= atomic number= #protons	4.5.1 Define the term atomic number. 4.5.2 Define the term atomic mass. 4.5.3 Define the term mass number. 4.5.4 Use the Periodic Table to identify the atomic number, atomic mass, and mass number for a neutral atom of any element. 4.5.5 From the atomic number of an atom, use the periodic table to identify what that element is. 4.5.6 Distinguish between atomic mass and mass number. 4.5.7 Given the atomic number and mass number, determine the number of protons, electrons, and neutrons in a neutral atom. 4.5.8 Given the number of protons, electrons, and neutrons in a neutral atom, determine the atomic number, the mass number, and what the identity is of the element. 4.5.9 Be able to represent a neutral atom of any element with the notation ${}^{A}_{Z}X$, e.g., ${}^{34}_{16}S$. 4.5.10 Be able to represent a neutral atom of any element with the notation X-A, e.g., S-34. 4.5.11 From either representation (${}^{A}_{Z}X$ or X-A), determine the number of protons, electrons, and neutrons in a neutral atom.	9,13,45,47, 51	8,12,24,26, 46,48,52
	6	Periodic law and periodic table	4.6.1 Using the Periodic Table, identify the following: representative elements, transition metal elements, lanthanides, actinides, metals, nonmetals, metalloids, groups, periods, alkali metals, alkaline earth metals, halogens, noble gases, inert gases.	53,55,57,59, 61, 63,67,69,71, 73c,17	54,56,58,60, 62,64,68,70, 74c, 16,18
	7	Ions	4.7.1 Explain how anions and cations are formed. 4.7.2 Predict the likely charges and formulas for the monatomic ions formed by representative elements. 4.7.3 Using the Periodic Table, determine the number of electrons a metal atom will lose to become a cation. 4.7.4 Using the Periodic Table, determine the number of electrons a nonmetal atom will gain to become an anion. 4.7.5 Using the Periodic Table, predict the charge on an ion formed from any representative element. 4.7.6 Given the number of protons and electrons in an ion, determine the charge on the ion. 4.7.7 Given the symbol for an ion, including the mass number, charge and atomic number, calculate the number of protons, electrons, and neutrons in the ion. 4.7.8 Given the number of protons, electrons, and neutrons in an ion, write the correct symbol for the ion, including the mass number, atomic number and charge.	19,21,75,79, 81,83,85, 109	20,76,80, 82,84,86, 110
	8	Isotopes	4.8.1 Given the number of protons and neutrons in two atoms, indicate whether the atoms are isotopes.	25,89,93	22,90,94

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
5	2	Compounds constant composition	5.2.1 State the Law of Constant Composition (Definite Proportions). 5.2.2 Apply the Law of Constant Composition (Definite Proportions) to a calculation.	3,25,29	4,26,30
	3	Chemical formulas	5.3.1 Given the chemical formula for one molecule of a chemical compound, provide an "inventory" of the number of atoms of each type in the compound. 5.3.2 From an "inventory" of the number of atoms of each type in a chemical compound, provide the chemical formula for one molecule of the chemical compound.	5,31,33,37, 39,91	6,32,34,38, 40,92
	4	Molecular view elements, compounds (molecular, ionic)	5.4.1 List the elements that exist as diatomic (or polyatomic) molecules. 5.4.2 Distinguish between empirical and molecular formulas.	7,9,41,43,45,47,49,51	8,42,44,46, 48,50,52
	5	Formula writing ionic	5.5.1 Use the Periodic Table to give the names and formulas for common monatomic ions, both metal and nonmetal (ch4 review topic). 5.5.2 Distinguish between metal ions that have only one possible charge and metal ions that can have more than one possible charge. 5.5.3 Learn the names and the charges for metal ions that can have more than one charge. 5.5.4 Distinguish between monatomic ions and polyatomic ions. 5.5.5 Name monatomic anions. 5.5.6 Learn the formulas (including charges) for the following polyatomic ions: ammonium, cyanide, hydrogen carbonate, hydroxide, nitrate, carbonate, sulfate, and phosphate.	53	10,54
	6,7	Naming compounds—ionic	5.7.1 Given a formula involving a metal (that has only one possible charge) and a nonmetal or polyatomic ion, use the ionic compound rules to name the compound. 5.7.2 Given the name of a compound involving a metal (that has only one charge) and a nonmetal or polyatomic ion, use the ionic compound rules to give the formula. 5.7.3 Given a formula involving a metal (that has more than one possible charge) and a nonmetal or polyatomic ion, use the ionic compound rules to name the compound. 5.7.4 Given the name of a compound involving a metal (that has more than one possible charge) and a nonmetal or polyatomic ion, use the ionic compound rules to give the formula. 5.7.5 Given a formula involving the ammonium ion and a nonmetal or polyatomic ion, use the ionic compound rules to name the compound. 5.7.6 Given the name of a compound involving the ammonium ion and a nonmetal or polyatomic ion, use the ionic compound rules to give the formula.	11,15,17,55,57,59,61cd, 65abc, 69abcdf	12,16,18,56,58,60,62bcd, 66abdf,70de
	8	Naming compounds—covalent	5.8.1 Write (spelling correctly) the prefix associated with one=mono, two=di, three=tri, four=tetra, five=penta, six=hexa, seven=hepta, eight=octa, nine=nona, and ten=deca atoms of an element in a chemical name. 5.8.2 Given the name, write the formula and given the formula, use the covalent compound rules to write the name for covalent compounds.	19,69a-d, 71a-d,73	20,70de,72, 74
	9	Naming compounds—acid	5.9.1 Recognize binary acids and learn the system for naming binary acids. 5.9.2 Recognize oxyacids and learn the system for naming oxyacids.	21, 77bcd, 81ab	22,78,82a
	11	Mass of molecules	5.11.1 Calculate the molecular mass of a covalent compound; calculate the formula mass for an ionic compound. 5.11.2 Recognize molecular mass and formula mass as they relate to molar masses in ch6.	83ad,99abd	24,84bc, 100ab

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
6	3	Moles of element <—>atoms of element; Moles of element <—>grams of element	6.3.1 Using the Periodic Table, be able to determine the mass of one mole (molar mass) of any element and or compound. 6.3.2 Use an understanding of molar mass of an element to convert grams of an element to moles of an element and reverse. 6.3.3 Recognize that equal numbers of atoms are present in any two samples of elements if they contain an equal number of moles of the element.	21,23,31,37, 43	22,24,32,38, 44
	4	Moles of compound<—> molecules compound; Moles of compound <—> grams compound	6.4.1 Use Avogadro's Number to convert between moles and number of molecules, formula units, ions, or atoms. 6.4.2 Construct conversion factors for grams per mole using the Periodic Table. 6.4.3 Construct conversion factors for units per mole using Avogadro's Number (units= molecules, formula units, ions, or atoms).	3,5,45,47, 49 lines 1&3,51, 53cd	2,4,6,46,48, 50 lines 2&3,52,54ac
	5	Chemical formulas as conversion factors Mass or molecules compound <—> moles compound <—> moles elements <—> atoms element	6.5.1 From the chemical formula of a compound, provide an inventory of the number of moles of each element present. 6.5.2 From mass of a sample of a compound, calculate the number of atoms of each element in the compound. 6.5.3 From the mass of each element in a sample of a compound, find the number of molecules of the compound.	7,9,57,59, 63,65,67, 115	6,8,10,58, 60,64,66,68, 116
	6,7	Mass percent from chemical formula	6.7.1 Calculate percent by mass composition for each element of a compound	11,71,79ad, 85	12,72,80bd, 86
	8	Empirical formula from mass percent	6.8.1 Given a molecular formula, determine the empirical formula 6.8.2 Given the per cent composition of a compound, determine the empirical formula	13,87,89c,93	88,90c,94
	9	True formula from empirical formula	6.9.1 Given the empirical formula and the molar mass, determine the molecular formula of a compound	15,99 (now, look again at #13,#15)	16,100

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
7	2	Evidence of a chemical reaction	7.2.1 List five ways that you know that a chemical reaction has occurred.	1,3,29	2,30
	3	Equations	7.3.1 Represent reactants and products with appropriate chemical formulas and states of matter. 7.3.2 Use appropriate symbols to represent that heat is required for a chemical reaction, that a catalyst is required for a chemical reaction, or that a reaction is reversible.	5	4
	4	Balancing equations	7.4.1 Balance simple equations given the formulas of the reactants and products so that there are equal numbers of atoms of each element on each side of the equation	7,39,41,43, 45,49,51,55	6,40,42,44, 46,50,52,56, 58,62
	5	Solubilities, solubility rules	7.5.1 Using the solubility rules, predict whether a compound is soluble or insoluble. 7.5.2 Define and recognize strong electrolytes.	9,11,13,59, 63	8,10,12,60, 64
	6	Precipitation reactions	7.6.1 Practice balancing multiple double replacement reactions and recognize the significance of the insolubility of some products as a driving force for the reaction. 7.6.2 Write molecular equations, ionic equations, and net ionic equations. Identify spectator ions.	15, 65,71, 75bc,103, 105	14,66,72, 76bc,104, 116
	7	Molecular, ionic, net ionic equations	7.7.1 Write molecular equations, ionic equations, and net ionic equations. 7.7.2 Identify spectator ions.	71ad	16,72bc
	8	(a) Acid-base and (b) gas evolution reactions	7.8.1 (a) Define the term neutralization. 7.8.2 Recognize: "acid + base —>"salt" + water" 7.8.3 Write and balance the molecular, ionic and net ionic equation for an acid-base neutralization reaction. 7.8.4 Identify spectator ions (i.e., the "salt"). (b) Recognize types of compounds that undergo gas evolution reactions. 7.8.5 Identify and write equations for gas evolution reactions.	19,79ab,81a	18,80ab,82a
	9	Oxidation-reduction reactions	7.9.1 Identify oxidation-reduction (redox) reactions. 7.9.2 Identify and write equations for combustion reactions. 7.9.3 Understand the activity series how to use it to predict the outcome of single replacement reactions. 7.9.4 Define the terms oxidation and reduction. 7.9.5 Define the terms oxidizing agent and reducing agent. 7.9.6 Write and balance the net ionic equation for an oxidation-reduction reaction given the major reactants and products.	21,83,85ac, 87bc	20,84,86bc, 88bc
	10	Classifying chemical reactions by type	7.10.1 Classify a chemical reaction type by inspection.	23,89,91	22,24,90,92

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
8	3	Recipes and chemical reactions: "converting" moles of what you are given to moles of what you are trying to find	8.3.1 Interpret a balanced equation to represent the mole ratio of reactants and products along with the amount of heat energy either absorbed or released. 8.3.2 From a balanced chemical equation, construct conversion factors based on the mole ratio(s). 8.3.3 Use mole ratio conversion factors as "recipes" to predict: Quantities (in moles) of any reactant or product from a known quantity (in moles) of one specific reactant or product.	1,3,5, 15cd, 17ad,19cd, 25,27,29,99	2,4,16acd, 18cd,20ad, 26,28,30, 100
	4	Recipes: converting mass of what you are given <—> moles of what you are given <—> moles of what you want to find <—> mass of what you want to find	8.4.1 Use mole ratio conversion factors as "recipes" to predict: Quantities (in grams) of any reactant or product from a known quantity (in grams) of one specific reactant or product.	31,37(lines 1-4),79	32,38(lines 1-4),80
	5,6	Limiting reactant, theoretical yield, percent yield	8.6.1 Given quantities of two reactants (moles or mass), determine which one is the limiting reactant and which one is the reactant in excess. 8.6.2 Use the limiting reactant to predict the quantity of product.	7,9,11bd, 43ad,45cd, 47bd,49bc, 51,57ac,61	6,8,10,12cd, 44cd,46, 48ad,50bc, 52,58ac,62
	7	Enthalpy: Measure of heat evolved or absorbed in a chemical reaction	8.7.1 Differentiate between endothermic and exothermic reactions. 8.7.2 Construct conversion factors for heat in kJ per mole of a given reactant or product 8.7.3 Use heat per mole conversion factors to calculate the quantity of heat as a function of mass or moles of material reacting or forming.	13,69,71,73, 75	14,70,72,74, 76

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
9	4	Electrons in orbits	9.4.1 Relate an element's position on Periodic Table to energy levels in which all electrons in a neutral atom of that element can be found.	13,45	46
	5,6	Orbitals, electron configuration	9.6.1 State the relationship among orbitals, sublevels, and main energy levels. 9.6.2 State the spin relationship between electrons in the same orbital. 9.6.3 List the order in which atomic orbitals are filled (referring to the Periodic Table as a "map").	15,19,21	16,18,20 (through 4p not 5s), 22
	7	Electron configuration, the periodic table, valence electrons	9.7.1 Write the electron configuration for any A group element (#1-#36): a. Using boxes and arrows or slots and arrows. b. Using $1s^2\ 2s^2\ 2p_x^2\ 2p_y^2\ 2p_z^1$ c. Using $1s^2\ 2s^2\ 2p^5$ 9.7.2 State and apply Hund's Rule for writing electron configurations and determining the number of unpaired electrons in an atom. 9.7.3 Explain the relationship between electron arrangement and the Periodic Table.	23,25,49bcd, 51, 53ab, 55abd,57abc, 59abc,61,63, 65ab, 67c,71, 73,75abc,95	24,50,52, 54b,56abd, 58bcd,60ad, 62,64,66b, 68a,72,74, 76a,94,96
	8,9	Trends in size of atoms size of ions, tendency to hold tightly to valence electrons, ionization energy, metallic-ness, reactivity of metals	9.9.1 Describe the trends in *size of atoms* within a group and a period. 9.9.2 Describe the trends in *size of ions* within a group and a period. 9.9.3 Describe the trends in *tendency to hold tightly to valence electrons* of atoms within a group and a period. 9.9.4 Describe the trends in *ionization energy* of atoms within a group and a period. 9.9.5 Describe the trends in *reactivity of metals* within a group and a period. 9.9.6 Compare reactivity of alkali metals to alkaline earth metals in the same period. 9.9.7 Describe the trend of nonmetallic or metallic character among elements within a group and a period. 9.9.8 Observe flame tests on several metallic ions and relate to excited state vs. ground state. 9.9.9 Recognize the transition metals on the Periodic Table and indicate the distinguishing electronic characteristic.	27,81ad,83, 77ad,79, 85ad,87,93	28,82ad,84, 78ac,80, 86abd,88,94

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
10	2	Valence electrons and dot structures for atoms	10.2.1 Define outer energy level (valence) electrons. 10.2.2 Give the number of outer energy level (valence) electrons in an atom of a representative element given the group number. 10.2.3 Use the Periodic Table to write the electron dot symbol for any representative element. State the octet rule.	3,23,25,29, 31, 35	2,24,26,30, 32,36
	3	Lewis structures for ionic compounds	10.3.1 Describe the formation of an ionic bond. 10.3.2 Recognize that the number of electrons lost by metal atoms must equal the number of electrons gained by nonmetal atoms in the formation of an ionic compound. 10.3.3 Write formulas for ionic compounds given the charges on the ions or using the Periodic Table to determine the charges on the ions. 10.3.4 Write Lewis electron dot structures for ionic compounds.	5,39,41	4,40,42
	4	Lewis structures for covalent compounds	10.4.1 Distinguish among single, double and triple covalent bonds and relationship to bond length and bond strength. 10.4.2 Write the Lewis electron dot structures for covalent compounds. 10.4.3 Write the Lewis electron dot structures for polyatomic ions.	7,9,11,45, 51,53	6,8,10,46, 52,54
	6	Resonance	10.6.1 Explain what resonance-contributing structures are. 10.6.2 Draw appropriate resonance contributing structures for covalent compounds or polyatomic ions.	57ab,59ab	12,58ac, 60ab
	7	Shapes	10.7.1 Determine geometric shapes and bond angles for covalent compounds or polyatomic ions.	13,15,61,63, 65,67,69	14,16,62,64, 66,68,70
	8	Electronegativity, polarity	10.8.1 Describe the trends in electronegativity across a period and down a group. 10.8.2 Differentiate among ionic, polar and nonpolar bonds based on electronegativity. 10.8.3 Predict whether a bond will be ionic, polar or nonpolar based on the elements' placements on the Periodic Table and their electronegativity values. 10.8.4 Use the crossed arrow to label the dipole in a polar covalent bond. 10.8.5 Use partial charge symbolism to label the dipoles in a polar covalent bond.	77ac,79,83, 85,87,91,99	78abc,80,84, 86,88,92, 100

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
11	2	Kinetic Molecular Theory, KMT	11.2.1 Explain the applications of Kinetic Molecular Theory to gases 11.2.2 Recognize the relationship of the Kinetic Molecular Theory to Boyle's Law, Charles' Law, and Dalton's Law of Partial Pressures	3	4
	3	Pressure	11.3.1 Convert among pressures expressed in units of atmospheres, torr, or mm Hg.	1,5,23ad, 25ab, 29ab, 31abc	2,6,24a,26a, 30ad,32ab
	4	Boyle's law: P and V	11.4.1 Observe the relationship between volume and pressure for a gas. 11.4.2 State Boyle's Law and express it mathematically. 11.4.3 Given a change of pressure, calculate the change of volume and the reverse.	7,9,35,37	8,12,36,38
	5	Charles' law: V and T	11.5.1 Observe the relationship between temperature and volume for a gas. 11.5.2 State Charles' Law and express it mathematically. 11.5.3 Given a change of temperature, calculate the change of volume and the reverse. Be certain to use Kelvin temperatures in the calculations.	11,43,127	10,44
	6	Combined gas law: P, V, & T	11.6.1 Combine application of Boyle's Law and Charles' Law; use the Combined Gas Law.	53,57	12,54,58
	7	Avogadro's law: V and n	11.7.1 Recognize Avogadro's Law and understand that at any given temperature and pressure, there are an equal number of moles (molecules) of two different gases in an equal volume of those two gases.	13,47,49	48,50
	8	Ideal gas law: p, v, T, and n	11.8.1 Use the Ideal Gas Law to solve for pressure, volume, number of moles, or temperature (in Kelvin or Celsius). 11.8.2 Define standard (STP) conditions. 11.8.3 Define the molar volume @STP. 11.8.4 Use the density relationship to calculate molar mass (grams per mole) using the Ideal Gas Law. 11.8.5 Use molar mass and the Ideal Gas Law to calculate density of a gas at a given temperature and pressure.	15,63,65,71	14,22,64,66, 72
	9	Mixture of gases	11.9.1 Recognize the significance of the partial pressure of water vapor in measuring the pressure of a gas collected by displacement of water.	17,21,75,77	16,20,76,78
	10	Gases in chemical reactions	11.10.1 Given a balanced chemical equation, the mass of one non-gaseous reactant or product, and the T and P of a gaseous reactant or product, calculate the volume of the gaseous reactant or product. 11.10.2 Given a balanced chemical equation, the volume of a gaseous reactant or product and a given T and P, calculate the mass of another non-gaseous reactant or product.	85cd,87ab, 93,97,125	86cd,88c,94, 98

Ch	Sec	Topics	Objectives	Homework with answers	Homework without answers
13	2	Solutions: homogeneous mixtures	13.2.1 Define solute, solvent and solution.	1,3	2
	6	Solution concentration, molarity	13.6.1 For a given molarity solution, calculate the mass of solute required per liter of solution. 13.6.2 For a given molarity and volume, calculate the number of moles of solute. 13.6.3 Calculate the volume of a solution with a specified molarity to deliver a given amount of solute (in moles or grams).	59ac,61ac, 67,69,77,79	60ac,62ac, 68,70,78,80
	7	Solution dilution	13.7.1 Given the molarity and volume of a concentrated solution, calculate the volume required to prepare a dilute solution of a specified molarity.	81,87	82,88
	8	Solution stoichiometry	13.8.1 Given the molarity and volume of a titrant, calculate the volume or molarity of a solution being titrated. 13.8.2 Using the molarity and volume of a solution being titrated, calculate the molarity or volume of a titrant.	89c,91,95	90c,92,96

Chemistry 50 Listing of *Chapter Questions* You Should Be Able to Answer for an Exam

Chapter		Questions
2		1,2,3,5,6,7,10,11,13,14,17,19,20,21
3		2,3,9,10,12,13,14,15,16,18,20,22,23,25,27,28,30
4		5,8,9,12,13,16,17,18,19,20,21,22,24,25,26
5		3,4,5,6,7,8,9,10,11,15,17,19,20,21,22,24
6		2,3,4,5,6,7,8,9,10,12,13,15,16
7		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17, 18,19,20,21
8		2,3,5,6,7,8,9,10,11,12,13,14
9		13,15,16,18,19,20 (4p not 5s),21,22,23,24,25,26,27,28
10		2,3,4,5,6,7,8,9,10,11,1w2,13,14,15,16,17,18,19,20,21,22
11		1,3,4,5,6,7,10,11,12,13,14,15,116,17,19,20,22
13		1,2,3,15 (molarity only)