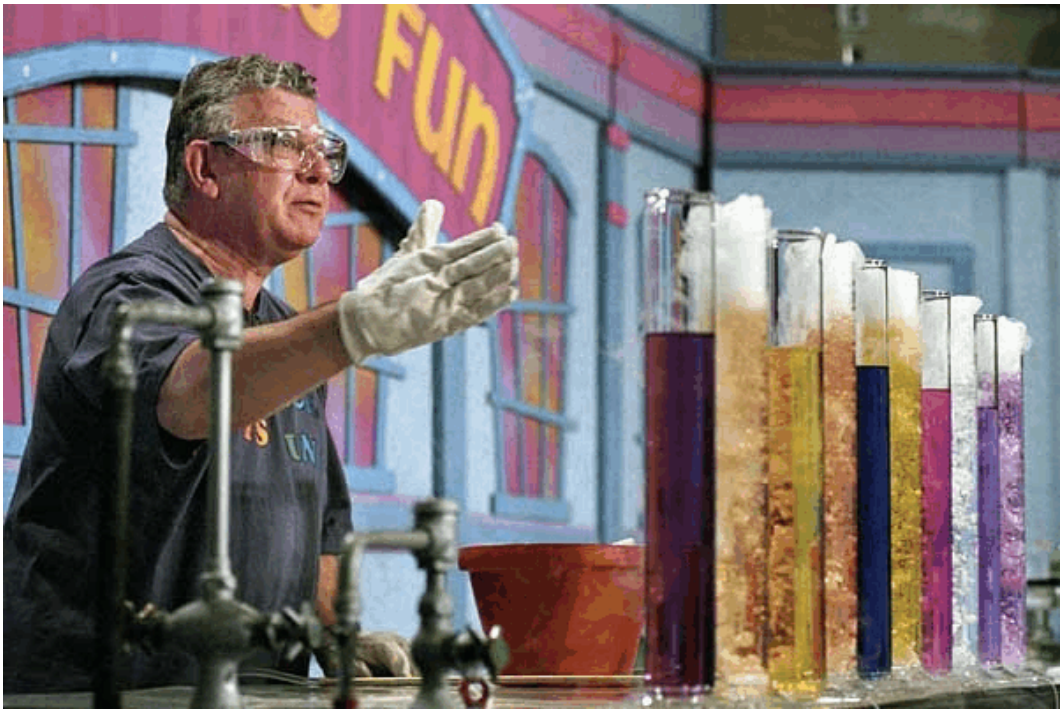
September-December 2007

CHEMISTRY 103

Lecture Section 1
MWF 11:00 A.M. Room 1351 Chemistry
www.scifun.org

37
1970-2007

General Chemistry:	4 credit hours
Lecturer:	Professor Bassam Z. Shakhashiri
Office:	9355 Chemistry
Telephone:	262-0538
E-Mail:	bassam@chem.wisc.edu (Please include your lab section number and your T.A.'s name in your messages to me. You must use your *wisc.edu* mailbox; otherwise I will not respond.)
Office Hours:	Mondays 12:05 – 1:15 p.m. Also, by appointment. Students are encouraged to see me immediately after class near the lecture table.



ALWAYS BRING THIS SYLLABUS TO CLASS

You should obtain a copy of each handout when it is distributed in lecture or from your T.A. Copies of handouts are also available in the General Chemistry Computer Room (1375).

CONTENTS

INTRODUCTION

Chemistry 103 is the first semester course in a two semester General Chemistry sequence. The second semester course is Chemistry 104. Chemistry 103 and 104 are a unit, and students who take Chemistry 103 should plan to take Chemistry 104 also. Chemistry 103 and 104 provide a general background concerning the principles and factual basis of chemistry. The 103-104 sequence serves as a prerequisite for more advanced courses such as Organic Chemistry (341 or 343) and Analytical Chemistry (327 or 329).

The prerequisites for this course are Math 101 or placement at or above Math 112. Concurrent registration in Math 112 or above and one year of high school chemistry are recommended. Students who have not taken a high school chemistry course should expect to commit some extra time to this course, particularly in the early weeks of the session. If you have not had chemistry before, you should seek advice from your instructor immediately.

These General Chemistry courses explore chemical phenomena and principles with emphasis on developing an understanding of chemistry and an appreciation of what chemists do. You must commit yourself to learning the basic vocabulary of chemistry. You will acquire skills in dealing with chemical phenomena and principles and in manipulating mathematical expressions that describe chemical behavior.

I am especially interested in having you develop an informed and sensible attitude toward chemistry in particular and science in general. In addition, I would like you to develop good study habits and skills so that you can fulfill your intellectual and emotional capabilities. Your T.A. and I need to be informed about what is good, bad, and indifferent about what we do.

CONNECTIONS

In this chemistry course we will encounter and use a robust vocabulary. Several of the words begin with the letter "C" and one of the most significant is: CONNECTIONS. It is important that you strive to make connections among all aspects of the course material: facts, principles, theories, explanations, etc. in order to increase your

knowledge and to deepen your understanding of the simple and complex relationships that make chemistry *the* central science and the science of the familiar.

Often the connections are easy to make, especially, if you seek to make them and if you seek help in making them. Mental connections are not always obvious and making them is greatly enhanced by one's eagerness, patience, determination, perseverance, and general emotional readiness to learn. The great joy of making discoveries comes from being focused and from being willing to learn from mistakes without succumbing to frustration.

It is important that you try to make connections, as appropriate, with other course material that you may have had or with what you are learning this semester in your other courses.

In addition, it is very important that you make connections with people and places. Personal connections with fellow students, teachers, experts, advisors, and others in our community will greatly enhance your academic progress and personal maturity. Furthermore, your emotional growth and development will greatly benefit from pursuing the rich offerings available in our community.

TEXTBOOKS AND OTHER MATERIAL

1. *Chemistry and Chemical Reactivity*, 6th ed., John C. Kotz and Paul Treichel, Jr., and Gabriela C. Weaver, Thomson Brooks/Cole (2006).
2. *Chemistry 103/104 Lab Manual, Fall 2007*, Department of Chemistry, University of Wisconsin-Madison. (Available in the lobby outside room 1351 during the first two weeks of class, then from the General Chemistry Office – ***cash only***.)
3. *Workbook for General Chemistry, Third Edition*, Bassam Z. Shakhashiri and Rodney Schreiner, Stipes Publishing Company (2004).
4. Carbonless laboratory notepad (100 pgs), available at local bookstores and in lobby of Chemistry building.
5. Safety goggles. Industrial quality eye protection is *required* in all chemistry laboratories. Safety goggles that fit over regular glasses can be purchased from local bookstores and drugstores.
6. An inexpensive calculator is required. It should have capabilities for square roots, logarithms and inverse logarithms, and exponential (scientific) notation operations. The calculator will be used on exams, quizzes, study assignments and in the laboratory.

COURSE FORMAT

LECTURES. During **Monday/Wednesday** lectures we will discuss principles, outline goals, and present illustrations and demonstrations.

- To prepare for lecture, you should read the suggested readings in the Course Outline starting on page 10 of this syllabus.
- During lecture, take your own thorough notes. Be sure to take effective notes about the demonstrations; the Guidelines for Demonstration Notes on page 9 should help you do this.
- After lecture you should review your notes and study the appropriate readings and work the suggested exercises. (The answers to many of the exercises are provided in the book.)
- See page 7 for Helpful Study Hints.
- In addition, I will suggest exercises in lecture.

DISCUSSION (QUIZ) SECTION. A group of 22 or fewer students constitutes a discussion and laboratory section supervised by one Teaching Assistant. Discussion sections are for review and problem solving relevant to the recent lecture material. The sessions include short quizzes to help evaluate your progress. You should be prepared when you come to the discussion class. Ask specific questions of your T.A. Make sure you understand the questions and the answers given by your T.A. and fellow students.

LABORATORY. In laboratory you will have the opportunity to experience directly some of the relationships discussed in lectures and in the textbook and to apply experimental techniques to solving chemical problems. Laboratory work is, by nature, slow compared with text reading. You will succeed only with adequate preparation. You must read the experiment and complete the pre-lab assignment **prior** to coming to lab. We encourage you to discuss your work with your fellow students and with your T.A. while doing the experiment.

DISCUSSION AND LABORATORY TIMETABLE

601	3:30 MW	2307 Chem	7:45-10:45 T	2325 Chem	Rose Ruther	601
602	4:35 MW	2307Chem	7:45-10:45 R	2325 Chem	Danielle Stacy	602
603	1:20 MW	2307 Chem	7:45-10:45 T	2325 Chem	Danielle Stacy	603
604	2:25 MW	2307 Chem	7:45-10:45 R	2325 Chem	Rose Ruther	604
605	1:20 MW	2373 Chem	11:00-2:00 T	2325 Chem	Lisa Johnson	605
606	2:25 MW	2373 Chem	11:00-2:00 R	2325 Chem	Lisa Johnson	606
607	7:45 TR	2373 Chem	11:00-2:00 T	2325 Chem	Brian Esselman	607
608	8:50 TR	B21 Chad	11:00-2:00 R	2325 Chem	Weifeng Cao	608
609	8:50 TR	10 Ogg Hall	2:25-5:25 T	2325 Chem	William Welch	609
610	9:55 TR	49 Sellery	2:25-5:25 R	2325 Chem	William Welch	610
611	1:20 MW	2385 Chem	2:25-5:25 T	2325 Chem	Joan Widin	611
612	2:25 MW	138 Witte	2:25-5:25 R	2325 Chem	Joan Widin	612
613	2:25 TR	2307 Chem	7:45-10:45 W	2325 Chem	Weifeng Cao	613
614	3:30 TR	2307 Chem	7:45-10:45 F	2325 Chem	Aaron Crapster	614
615	11:00 TR	2385 Chem	7:45-10:45 W	2325 Chem	George Timmer	615
616	12:05 TR	2385 Chem	7:45-10:45 F	2325 Chem	George Timmer	616

Desk numbers and E-mail addresses for T.A.s:

Desk 2	Weifeng Cao	*wcao2@wisc.edu*
Desk 4	Aaron Crapster	*crapster@wisc.edu*
Deck 4	Brian Esselman	*esselman@wisc.edu*
Desk 2	Lisa Johnson	*ljohnson9@wisc.edu*
Desk 1	Rose Ruther	*ruther@wisc.edu*
Desk 1	Danielle Stacy	*dstacy@wisc.edu*
Desk 5	George Timmer	*timmer@wisc.edu*
Desk 3	William Welch	*wwelch@wisc.edu*
Desk 3	Joan Widin	*widin@wisc.edu*

ACADEMIC PERFORMANCE, PROGRESS, AND ACCOMPLISHMENT

In this large course, the students have diverse backgrounds and different expectations. My expectations include individual accomplishment on the part of every student, so that all of you not only fulfill your capabilities, but also expand your capacity and enrich your life. Of great importance to me are the knowledge you acquire, the skills you cultivate, and the attitude you develop. I expect that by the end of the semester each of you will have enough accomplishment to be at least at the ACCEPTABLE level (see page 5). Everything the instructional staff does is aimed toward helping you achieve this goal.

To help you gauge your academic performance and progress I am offering you a collection of learning aids. For example, you should take advantage of the self-paced WORKBOOK FOR GENERAL CHEMISTRY (see page 6). The self-paced approach helps you ascertain your own knowledge and level of understanding of chemistry.

Although grades are not the ultimate measure of your knowledge, abilities, or potential, they are useful guides to you and to others. Your level of accomplishment will be recognized at the end of the semester by the letter grade you receive for the course. Individual accomplishment is measured against course standards and not necessarily against the performance of other students. The course standards and levels of accomplishment are:

Points	Accomplishment Level	Letter Grade
90 - 100	Superior	A
88 - 89	Excellent	AB
80 - 87	Proficient	B
78 - 79	Good	BC
70 - 77	Acceptable	C
60 - 69	Mediocre	D
below 60	Unacceptable	F

ACADEMIC MISCONDUCT AND CHEATING. In this course you are encouraged to study and prepare for quizzes and examinations with other students. However, when taking quizzes and examinations, and when writing laboratory reports, you are to work alone. The University regulations are very explicit about academic misconduct and cheating, and these regulations will be fully enforced. During examinations, we will apply a code of honor, under which you are to work alone and neither give nor receive help from any sources. Also, you are expected to help enforce this code.

GRADES. Your grades will be based on a maximum of 1000 points distributed as follows:

3 examinations	36%
TA quizzes	16%
Laboratory	12%
Final examination	36%

EXAMINATIONS. There will be three mid-term exams of approximately 50 minutes each, given on select Fridays during the scheduled lecture period. At the end of the semester, there will be a 2-hour final examination. Please check the Lecture and Laboratory Schedule (page 14) for the examination dates. The location of each exam will be announced later. If you have a documented disability and a VISA from the McBurney Center regarding exams please notify your TA and myself as early in the semester as possible. **Make-up exams will not be given, nor will it be possible to give any exam outside of its scheduled time.**

QUIZZES. Your T.A. will give a quiz during the second of the two weekly discussion sessions. Your T.A. will provide detailed information about this and the conduct of the discussion/laboratory sessions.

LABORATORY. The laboratory work is important to understanding and appreciating chemistry. **You must successfully complete the laboratory assignments in order to receive a passing grade in the course.** Exams may include questions based on the laboratory material.

Quiz and lab grades will be normalized to a common scale at the end of the semester to minimize differences in grading practices among the discussion/lab sections. Cumulative course grades will be scaled at the end of the semester, guided by the scale shown above and by class accomplishment.

LEARNING AIDS

COOPERATIVE LEARNING GROUPS. Students are asked to form groups of 4-5 students. Groups should sit together in the lecture hall and discussion sessions. Group discussions and assignments may occur during lecture. *Each group may find it helpful to study together outside of class.* Group membership is to be established and identified by September 14; see your T.A. for details. **One of the hallmarks of excellence of UW-Madison**

is the quality of its students. Share your talents with others and take advantage of the rich talent surrounding you.

LEARNING COMMUNITIES. Several sections in this lecture have been set aside for specific residence hall students. Section 431/731, Chadbourne Residential; section 432/732, Sellery residents; section 435/735, Ogg residents; and section 436/736, Witte residents. Chadbourne, Sellery, Ogg and Witte discussion sections will meet in their respective residence halls. All lab sections meet in the Chemistry building.

WORKBOOK FOR GENERAL CHEMISTRY. The WORKBOOK lessons provide a type of self-tutorial for each topic. These lessons provide you with written instructional materials as well as drill exercises. The format allows you to learn at your own pace by following the illustrations and examples in the Workbook.

CHEMICAL OF THE WEEK. To increase your knowledge about chemicals, their properties, production, cost, uses, etc., you will be directed weekly to fact sheets about one or two key chemicals. The information is at *www.scifun.org*. You will be tested on the content of each fact sheet on each exam as well as on the final exam. The schedule of the Chemical of the Week is listed on page 14.

CHEM TIPS. *Chem*istry *T*eaching *I*nformation *P*rocessing *S*ystem. The objective of CHEM TIPS is to provide information about course progress to both students and instructors. In CHEM TIPS, you are given weekly surveys composed of a set of multiple choice questions. The surveys deal primarily with the subject matter of the preceding two lectures. Within hours (usually 4) after the survey is completed, an instructional message based on your responses to the survey questions will be sent to you through electronic mail. This message identifies the correct answers to the survey questions, suggests materials for further study of areas in which your answers were incorrect, and provides additional information to help you master the course material. Your T.A. and professor will receive summary reports to let them know how the class is doing and to help them identify topics that may be causing trouble.

The surveys will be given during the last 10 minutes of **Monday** lectures. The responses to CHEM TIPS surveys will be scanned optically and processed by computer. Therefore, **please bring a #2 pencil with you on Mondays to mark the optical scanner sheet**.

Participation in the CHEM TIPS program is optional. The results are *not* used in preparing course grades. In the past, nearly all students participated in CHEM TIPS, and student reactions and evaluations were highly favorable. It is very important for you to stay up-to-date in your studies, and CHEM TIPS will help you do this in Chemistry 103.

TIPS was developed by Professor Allen C. Kelley, Department of Economics, Duke University. CHEM TIPS was adapted and implemented beginning in 1973 by Professor Bassam Z. Shakhashiri, Department of Chemistry, University of Wisconsin-Madison.

EXAM STUDY QUESTIONS. About one week prior to each examination, a list of questions taken from old exams will be distributed. You should answer the questions as part of your review and study for the exam. Compare your solutions and answers with those of fellow students. If your solutions do not agree with those of others, then you should tackle the questions together. (Most, but not all, of the answers will be provided with the questions.)

WEEKLY STUDY QUESTIONS. Study assignments are given in the Course Outline starting on page 10. You are not required to turn in the assignment; consequently study problems are not graded. You should work out the assigned problems because they are typical of the kinds of problems you are expected to master and handle with ease. If you have questions about the study assignment, you should seek help from your T.A. in discussion section.

ADDITIONAL ACTIVITIES

BULL SESSIONS. These informal sessions are held 1-3 times during the semester. Their aim is to enable the professor to meet students in small groups. The sessions are held in the evening and are open to all those registered in this lecture section and their friends. Topics of discussion are not necessarily related to course materials. Refreshments will be served. The date of each session will be announced one week in advance.

KEEPING IN TOUCH WITH YOUR INSTRUCTORS. You should take full advantage of the availability of your lecture professor and your T.A. outside the classroom for face-to-face meetings and e-mail contact. My e-mail address is on page 1 of this syllabus. I usually check my e-mail box once a day and attempt to answer my mail promptly. The T.A. e-mail addresses are on page 4.

HELPFUL STUDY HINTS

Read the assignment prior to lecture. Take *good* notes during the lecture (see page 9 of this syllabus for examples). Reread and study the appropriate pages in the textbook. Do the sample exercises in the book. Try the suggested exercises in the book. Also learn the key words and concepts listed on the left-hand side of this syllabus under each unit number. Use the Workbook which accompanies them.

Come to the discussion section prepared. Ask specific questions of your T.A. Make sure you understand the questions of your fellow students and the answers which your T.A. and others give.

Read the experiment. Complete the pre-lab assignment. While in lab, discuss your work with your fellow students and T.A. and complete the laboratory report before leaving unless instructed otherwise by your T.A.

UNIVERSITY COUNSELING SERVICE

Please take advantage of these services as soon as the need arises. Come and see me as soon as possible regarding the type of help suitable for your needs.

Individual counseling is available at University Counseling and Consultation Services. For more information call 265-5600 or go to 115 N. Orchard Street, Monday, Tuesday, Thursday and Friday, 8:30 - 5:00 p.m., and Wednesday, 9:00 to 5:00 p.m. or visit their web page at *http://www.uhs.wisc.edu*

STUDY SKILLS. Help with self-assessment, test anxiety, problem solving, time scheduling, note taking, exam preparation/taking, reading, efficiency, memory, concentration and procrastination is available through an one-credit course titled “Education Effectiveness” in the School of Education, Department of Counseling Psychology. Interested students should contact the department at 262-0461 to speak with an instructor.

WRITING LAB

As you work on your lab reports I'd encourage you to take advantage of the instruction offered by the University's Writing Lab. Writing lab instructors can help you make your writing the best that it can be. They'll meet with you individually or with your entire group to discuss drafts of your work. They can help you get started as you're generating and organizing ideas. They can give you a critical reaction to a draft—asking questions where ideas aren't clear, pointing out problems in organization and style, and offering advice for revision. For more information see their web page at *http://www.wisc.edu/writing*.

GREATER UNIVERSITY TUTORING SERVICE (GUTS)

GUTS offers free assistance to all enrolled UW-Madison students through a variety of programs. These include study group tutoring, individual tutoring, study skills counseling, exam files and drop-in centers. For more information, consult *http://guts.studentorg.wisc.edu/*

ALCOHOL AND DRUG ABUSE

Serious impediments to learning, personal growth and development, and responsible behavior can be caused by alcohol and substance abuse. The notorious national reputation of this Campus in this regard is shameful. Please follow the guidance provided by the Office of the Dean of Students and other officials to help achieve a drug-free environment and to exercise responsible and lawful use of alcoholic beverages.

NATIONAL CHEMISTRY WEEK

The week of October 21 has been proclaimed as National Chemistry Week for 2007. This year's theme is "The Many Faces of Chemistry." Be on the lookout for a variety of items and activities which will be brought to your attention by me and by your T.A. Also, check the University Bookstore calendar for the dates and locations of the **SCIENCE IS FUN** activity during the academic year.

THE CHRISTMAS LECTURE

Every year for the past 37 years, Professor Shakhashiri, has presented the annual Christmas lecture, titled "Once Upon a Christmas Cheery, In the Lab of Shakhashiri ." This science-oriented entertainment has played to packed houses at such varied locations as the University of Wisconsin-Madison, the National Academy of Sciences and the Smithsonian's National Air and Space Museum in Washington, and Boston's Museum of Science, and it has been televised by stations across the country. This year's presentations in Madison are on Saturday, December 1st, and Sunday, December 2nd, at 1:00 p.m. and 4:00 p.m. each day. Mark your calendars, and bring your friends and family!

GUIDELINES FOR DEMONSTRATION NOTES

These Guidelines should help you take effective notes about the demonstrations presented during lecture. The demonstrations display phenomena and illustrate principles discussed in the lecture. They are intended to enhance your understanding of the lecture material. Therefore, it is essential that you take accurate and complete notes about the demonstrations.

Three steps are involved in taking good notes about the demonstrations.

1. Describe the equipment and materials at the start of the demonstration. Be sure to include any information the lecturer may provide about the equipment and materials.
2. Describe what the lecturer does with the equipment and materials.
3. Describe what happens as a result of what the lecturer does. Describe the changes that occur during the process, as well as the final condition of the materials.
4. Review your notes and rewrite them when necessary to ensure clarity.

As examples, notes for some lecture demonstrations are included below; they show how a student writes out in fuller comprehensible form the abbreviated notes written down during lecture.

A. "Bubbles and Fog" Demonstration (Part 1)

1. Describe the equipment and materials at the start of the demonstration. Be sure to include any information the lecturer may provide about the equipment and materials.

   4 glass cylinders, each with volume of about 1 liter. One pair of cylinders contains about 800 mL of pink liquid in each cylinder. The other pair contains about 800 mL of purple liquid in each. A bucket of white solid chunks. The white solid is dry ice (solid carbon dioxide). Dry ice has a temperature of –78°C. It sublimes, that is, changes directly from solid to gas.

2. Describe what the lecturer does with the equipment and materials.

   The lecturer puts on cloth gloves and drops chunks of dry ice into one of the cylinders of pink liquid and one of the cylinders of purple liquid.

3. Describe what happens.

   The chunks of dry ice sink to the bottom of the liquids. Bubbles form on the dry ice and rise to the top of the liquids. Fog forms at the tops of the cylinders containing dry ice. The fog spills over the tops of the cylinders and sinks down their sides. The colors of the liquids gradually change: the pink liquid fades to colorless, the purple liquid changes to green and then to yellow. The color changes take about 30 seconds.

B. "Bubbles and Fog" Demonstration (Part 2)

1. Describe the equipment and materials at the start of the demonstration.

   5-liter flask of hot water. Red plastic dish pan. Chunks of dry ice.

2. Describe what is done with the equipment and materials.

   The hot water is poured into the dish pan. Then, dry ice is poured into the hot water.

3. Describe what happens.

   Cloud of fog rises to about 2 meters above the pan. Then, the cloud sinks and fog pours over the edge of the pan and onto the floor. The production of fog gradually diminishes and stops after about 3 minutes.

COURSE OUTLINE

TEXT = Chemistry & Chemical Reactivity, WKBK = Workbook for General Chemistry

ATOMS & ELEMENTS – Sept 7
- Heterogeneous and homogeneous substances
- Atoms and molecules
- Elements and compounds
- Atomic structure
- The mole and molar mass
- The periodic table

MEMORIZE THE NAMES & SYMBOLS OF THE FIRST 36 ELEMENTS IN THE PERIODIC TABLE.
TEXT 1.1–2.8
QUESTIONS
TEXT Ch.1: 1,3,19,23,27,39,73,77,87
Ch.2: 1,5,9,17,19,23,27,29,31,39,45,47,57
WKBK: Lesson 37, pp 1 – 7

CHEMICAL COMPOUNDS – Sept 10
- Ionic compounds
- Naming ionic compounds
- Properties of ionic compounds
- Molecular compounds
- Naming molecular compounds
- Properties of molecular compounds

TEXT 3.1-3.4
QUESTIONS
TEXT Ch.3: 7,9,11,13,15,19,21,23,63,65,71,85,89
WKBK: pp 7 – 9

CHEMICAL COMPOSITION – Sept 12
- Molar mass of a compound
- Percent composition
- Empirical formulas
- Molecular formulas

TEXT 3.5–3.7
QUESTIONS
TEXT Ch. 3: 1,27,29,31,35,39,41,45,47,49,51,55, 61,87,95
WKBK: pp 9 – 17

CHEMICAL REACTIONS – Sept 17
- Chemical reactions and equations
- Balancing chemical equations
- Stoichiometry
- Limiting reactant
- Percent yield

TEXT 4.1–4.6
QUESTIONS
TEXT Ch. 4: 1,3,5,7,9,15,17,21,23,25,27,29,45,47, 71,73
WKBK: Lessons 2, 3, & 4

REACTIONS IN SOLUTION – Sept 19
- Electrolytes
- Solubility of ionic compounds
- Concentration of solutions (molarity)
- Precipitation reactions
- Net ionic equations

TEXT 5.1–5.2, 5.8
QUESTIONS
TEXT Ch. 5: 3,5,9,11,23,25,41,43,45,47,51,77, 101,123
WKBK: Lessons 5 & pp 56 – 64

ACIDS AND BASES – Sept 24
- Properties of acids and bases
- Acidic and basic oxides
- Acid-base reactions
- Gas-forming reactions

TEXT 5.3–5.6, 5.8
QUESTIONS
TEXT Ch. 5: 13,17,19,21,27,39,31,33,81

OXIDATION AND REDUCTION – Sept 26
- Oxidation numbers
- Oxidation-reduction reactions
- Solution stoichiometry

TEXT 5.7, 5.10
STUDY QUESTIONS
TEXT Ch. 5: 35,37,39,61,67,83
WKBK: pp 64 – 69, 144 – 151

Exam 1 — Friday, September 28 — 11:00–11:50 a.m.

HEAT AND ENERGY – Oct 1

- Temperature
- Energy
- Heat capacity
- Heat transfer
- Changes of state

TEXT 6.1–6.3
QUESTIONS
TEXT Ch. 6: 9,13,15,17,19,33,61,71,73
WKBK: pp 79 – 81

HEAT AND CHEMICAL REACTIONS – Oct 3

- Enthalpy
- Enthalpy of reaction
- Calorimetry

TEXT 6.4–6.6
QUESTIONS
TEXT Ch. 6: 27, 29,31,35,37,79
WKBK: pp 82 – 90

CHEMICAL ENERGY – Oct 8

- Hess's law
- Enthalpy of formation
- Fuels

TEXT 6.7–6.9, pp 282-293
QUESTIONS
TEXT Ch. 6: 43,45,47,49,51,53,57,87,93
p.293: 5,11,13,17
WKBK: pp 90 – 96

LIGHT AND ATOMS – Oct 10

- Wave properties
- Electromagnetic radiation
- Atomic emission
- Bohr's model of the atom

TEXT 7.1–7.3
QUESTIONS
TEXT Ch. 7: 1,3,5,9,15,17,19,21,53,63

MODERN ATOMIC THEORY – Oct 15

- Schrödinger wave equation
- Orbitals
- Electron spin
- Magnetism
- Electron configuration

TEXT 7.4–8.2
QUESTIONS
TEXT Ch. 7: 25,29,31,35,59,60,65
Ch. 8: 1,5,7,11,13,19,37,55
WKBK: Lesson 10

PERIODIC PROPERTIES – Oct 17

- Atomic size
- Ionization energies
- Electron affinities
- Ion sizes

TEXT 8.3–8.7
QUESTIONS
TEXT
Ch. 8: 25,27,29,31,45,51,57,61
WKBK: Lesson 11

CHEMICAL BONDS – Oct 22

- Valence electrons
- Lewis structures
- Ionic bonding
- Covalent bonding
- Octet rule
- Resonance

TEXT 9.1–9.4
QUESTIONS
TEXT Ch. 9: 1,3,11,13,15,17,59,61,73
WKBK: pp 130 – 138

BOND PROPERTIES – Oct 24

- Exceptions to octet rule
- Formal charge
- Bond polarity
- Bond length
- Bond energy

TEXT 9.5–9.6, 9.10
QUESTIONS
TEXT Ch. 9: 29,31,33,37,39,49,53,65,83
WKBK: pp 138 – 144, 152 – 155

SHAPES OF MOLECULES – Oct 29
- Describing molecular shapes
- VSEPR
- Molecular polarity

TEXT 9.7–9.9
QUESTIONS
- TEXT Ch. 9: 19,21,23,25,43,45,47,77
- WKBK: Lesson 14

MOLECULAR ORBITALS – Oct 31
- Molecular orbitals
- Combinations of atomic orbitals
- Diatomic molecules

TEXT 10.3
QUESTIONS
- TEXT Ch. 10: 15,17,19,41,45

Exam 2 — Friday, November 2 — 11:00 – 11:50 a.m.

VALENCE BOND THEORY – Nov 5
- Overlap of atomic orbitals
- Hybrid atomic orbitals
- Sigma and pi bonds

TEXT 10.1–10.2
QUESTIONS
- TEXT Ch. 10: 1,3,5,7,11,23,25,29,39
- WKBK: Lesson 15

MOLECULAR SPECTROSCOPY 1 – Nov 7
- Absorption of electromagnetic radiation
- UV-visible spectroscopy
- IR spectroscopy

HANDOUT
QUESTIONS
- HANDOUT

MOLECULAR SPECTROSCOPY 2 – Nov 12
- Nuclear magnetic resonance
- ^{13}C-nmr spectroscopy
- Determining molecular structures

HANDOUT
QUESTIONS
- HANDOUT

IDEAL GAS LAW – Nov 14
- Pressure
- Boyle's law
- Charles's law
- Avogadro's law
- Ideal gas law

TEXT 12.1–12.5
QUESTIONS
- TEXT Ch. 12: 1,3,5,7,9,11,17,19,25,27,37,77
- WKBK: Lesson 9

KINETIC MOLECULAR THEORY – Nov 21
- Postulates
- Molecular speed and kinetic energy
- Diffusion and effusion
- Deviations from ideal gas behavior

TEXT 12.6–12.9
QUESTIONS
- TEXT Ch. 12: 41,43,45,47,49,51,97,105

INTERMOLECULAR FORCES – Nov 26
- Dipole interactions
- Polar molecules
- Non-polar molecules
- Hydrogen bonding

TEXT 13.1–13.4
QUESTIONS
- TEXT Ch. 13: 1,3,5,7,39,75,87

PROPERTIES OF LIQUIDS – Nov 28
- Boiling & freezing points
- Vaporization
- Vapor pressure
- Viscosity

TEXT 13.5
QUESTIONS
- TEXT Ch.13: 17,19,47,53,65,67,69

PROPERTIES OF SOLIDS 1 – Dec 3

Crystalline solids
Properties of solids
X-ray diffraction
Amorphous solids
Ionic solids
Molecular solids
Network solids

TEXT 13.6–13.7
QUESTIONS
TEXT Ch.13: 23,25,27,29,51,71
HANDOUT

PROPERTIES OF SOLIDS 2 – Dec 5

Molecular solids
Network solids
Amorphous solids
Phase diagrams

TEXT 13.8–13.10
QUESTIONS
TEXT Ch.13: 33,37
HANDOUT

Exam 3 — Friday, December 7 — 11:00–11:50 a.m.

MODERN MATERIALS – Dec 10

Metals
Semiconductors
Band Theory
Ceramics

TEXT pp 642-655
QUESTIONS
TEXT p.655: 1,3

PROPERTIES OF HALOGENS – Dec 12

Periodic properties
Oxidation states
Nomenclature
Compounds
Molecular shapes

HANDOUT
QUESTIONS
HANDOUT

SUMMARY – Dec 14

Final Exam — Wednesday, December 21 — 2:45 – 4:45 p.m.

38th Annual Presentation of
"Once Upon a Christmas Cheery, In the Lab of Shakhashiri"
Saturday and Sunday, December 1 and 2

Chemistry 103 – Lecture Section 1 – Fall 2007

Lecture and Laboratory Schedule

DATE	LECTURE TOPIC	COW	LABORATORY
Sept 5 (W)	Introduction	Lake Lore	No Lab
Sept 7 (F)	Atoms & Elements		
Sept 10 (M)	Chemical Compounds	Ethanol	Lake Study (outside)
Sept 12 (W)	Chemical Composition		
Sept 14 (F)	Special Guest Lecture: Prof. Kevin Strang		
Sept 17 (M)	Chemical Reactions	Methane	Reaction of Zinc & Iodine; Check-in (in lab)
Sept 19 (W)	Reactions in Solution		
Sept 24 (M)	Acids and Bases	Sulfuric Acid	No lab
Sept 26 (W)	Oxidation-Reduction		
Sept 28 (F)	**EXAM I 11:00-11:50 a.m.**		
Oct 1 (M)	Heat & Energy	Lime	Synthesis of an Alum (in lab)
Oct 3 (W)	Heat & Chemical Reactions		
Oct 8 (M)	Chemical Energy	Hydrogen	Reaction Types & Chemical Logic (outside)
Oct 10 (W)	Light & Atoms		
Oct 15 (M)	Modern Atomic Theory	Gases that Emit Light	Solution Calorimetry (in lab)
Oct 17 (W)	Periodic Properties		
Oct 22 (M)	Chemical Bonds	Autumn Colors	No lab
Oct 24 (W)	Bond Properties		
Oct 29 (M)	Shapes of Molecules	Agricultural Fertilizers	No lab
Oct 31 (W)	Molecular Orbitals		
Nov 2 (F)	**EXAM II 11:00-11:50 a.m.**		
Nov 5 (M)	Valence Bond Theory	Ozone	No lab
Nov 7 (W)	Molecular Spectroscopy 1		
Nov 12 (M)	Molecular Spectroscopy 2	Fireworks!	Project Lab, Part 1 (in lab)
Nov 14 (W)	Ideal Gas Law		
Nov 19 (M)	Kinetic Molecular Theory	Gases of the Air	No lab
Nov 21 (W)	No Lecture		
Nov 26 (M)	Intermolecular Forces	Chemoreception	Project Lab, Part 2 (in lab); Check-out
Nov 28 (W)	Properties of Liquids		
Dec 3 (M)	Properties of Solids 1	Liquid Crystals	Window on the Solid State (outside)
Dec 5 (W)	Properties of Solids 2		
Dec 7 (F)	**EXAM III 11:00 - 11:50 a.m.**		
Dec 10 (M)	Properties of Modern Materials	Bucky Balls	No lab
Dec 12 (W)	Properties of Halogens		
Dec 14 (F)	Summary		
Dec 21 (F)	**FINAL EXAM 2:45 – 4:45 p.m.**		

DUE To Your T.A. Friday, September 14

CHEMISTRY 103 Lecture Section 1
Professor Bassam Z. Shakhashiri

INFORMATION SHEET
Please PRINT

Name_____,_____
(last) (first)

Lab Section_____

T.A._____

Telephone_____ attach photograph here

e-mail_____

Classification_____

Major_____

I have completed the Math prerequisite for this course (see page 2 of the syllabus): Yes No

If you are currently enrolled in a Math course, indicate its number: _____

Number of high school chemistry years completed: 0 1 2 3 AP

Indicate year of last high school chemistry course:_____

Name and location of high school: _____

Circle number of college chemistry courses taken: 0 1 2 3

Give the number of credit hours you are taking this semester: _____

Give number of hours per week you are working (paid or volunteer) this semester:_____

I plan to take another chemistry course beyond this: Yes No Don't Know

Please tell me a couple of interesting things about yourself.