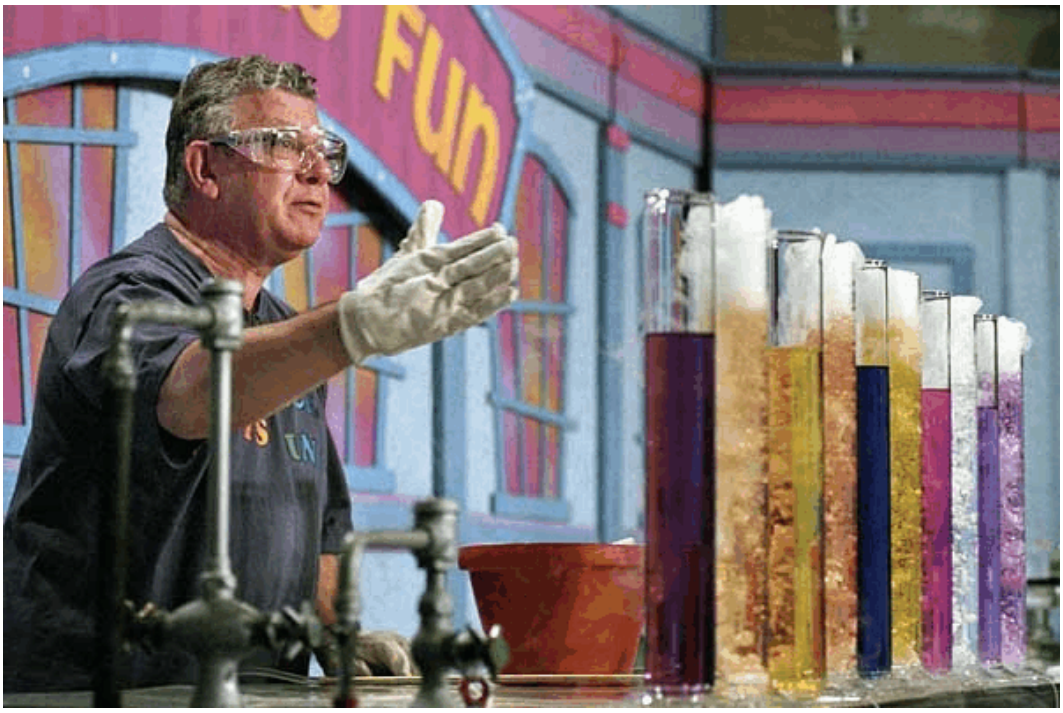
CHEMISTRY 103

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

34
1970-2003

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)
Office Hours:	Mondays 1:30 - 3:00 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 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.

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,* John C. Kotz and Paul Treichel, Jr., 5th ed., Saunders College Publishing (2003).
2. *Chemistry 103/104 Laboratory Manual*, Fall 2003, Department of Chemistry, University of Wisconsin-Madison.
3. *Workbook for General Chemistry, 2nd Edition*, Bassam Z. Shakhashiri and Rodney Schreiner, Stipes Publishing Company (1999).
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, homework assignments and in the laboratory.

COURSE FORMAT

LECTURES. During 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. (In addition, a set of lecture notes will be available in the General Chemistry Computer Room, Room 1375, where they may be duplicated.) 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.) 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 T.A. while doing the experiment.

DISCUSSION AND LABORATORY TIMETABLE

601	3:30 MW	2307 Chem	7:45-10:45 T	2325 Chem	Hilary Domush	601
602	4:35 MW	2307Chem	7:45-10:45 R	2325 Chem	Hilary Domush	602
603	1:20 MW	2307 Chem	7:45-10:45 T	2325 Chem	Sarah Jewell	603
604	2:25 MW	2307 Chem	7:45-10:45 R	2325 Chem	Sarah Jewell	604
605	1:20 MW	2373 Chem	11:00-2:00 T	2325 Chem	Erik Hadley	605
606	2:25 MW	2373 Chem	11:00-2:00 R	2325 Chem	Erik Hadley	606
607	7:45 TR	B351 Chem	11:00-2:00 T	2325 Chem	Jane Coughlin	607
608	8:50 TR	B351 Chem	11:00-2:00 R	2325 Chem	Jane Coughlin	608
609	8:50 TR	B357 Chem	2:25-5:25 T	2325 Chem	Caroline Pharr	609
610	9:55 TR	B357 Chem	2:25-5:25 R	2325 Chem	Caroline Pharr	610
611	1:20 MW	2377 Chem	2:25-5:25 T	2325 Chem	Ruomu Jiang	611
612	2:25 MW	2377 Chem	2:25-5:25 R	2325 Chem	Ruomo Jiang	612
613	2:25 TR	2307 Chem	7:45-10:45 W	2325 Chem	Andrew Razgulin	613
614	3:30 TR	2307 Chem	7:45-10:45 F	2325 Chem	Andrew Razgulin	614
615	11:00 TR	2311 Chem	7:45-10:45 W	2325 Chem	Chris Painter	615
616	12:05 TR	2311 Chem	7:45-10:45 F	2325 Chem	Chris Painter	616

E MAIL ADDRESSES FOR TAs

Hilary Domush	domush@chem.wisc.edu
Sarah Jewell	jewell@chem.wisc.edu
Erik Hadley	ebhadley@wisc.edu
Jane Coughlin	coughlin@chem.wisc.edu
Caroline Pharr	pharr@chem.wisc.edu
Ruomu Jiang	rjiang@chem.wisc.edu
Andrew Razgulin	razgulin@chem.wisc.edu
Chris Painter	painter@chem.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 below). 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, CHEM TIPS (see page 6) will enable you to discover in a timely manner those segments of the course that require more study on your part. Also, information from CHEM TIPS will help me and your Teaching Assistant in planning lecture and discussion sessions. Another learning aid you should take advantage of are 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	330 points
quizzes	180 points
laboratory	160 points
final examination	330 points

Quiz and lab grades will be normalized to a common scale at the end of the semester to minimize differences in grading practices in 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.

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.

Your T.A. will give quizzes approximately weekly in discussion section. These may be announced or unannounced. Your T.A. will provide detailed information about this and the conduct of the discussion/laboratory sessions.

EXAMINATIONS. All examinations will be worth 100 points each. There will be three exams of approximately 50 minutes each and a two-hour final examination. Please check the Lecture and Laboratory Schedule (page 15) for the examination dates. The location of each exam will be announced later. **Make-up exams will not be given.**

POST EXAM OPTION. My expectation is that every student will perform at a threshold level or higher. The threshold level corresponds to a grade of 75 on an examination. Please note that this is near the middle of the **Acceptable** level of accomplishment described earlier.

Retake Exam. Students who receive a grade below 75 on Exam I have an option of taking another exam on the same material. The **retake exam** will be offered from 11:00 to 11:50 a.m. on the Friday following the regular exam and is worth 100 points. You are eligible to take this special exam only if you scored below 75 on the regular exam. (The retake exam is **not** a late exam; you must take Exam 1 to be eligible for the retake exam.) The official score recorded for the exam will be the higher score of the two up to a maximum of 75.

For example, if your score on regular Exam I is 64, you have the option of taking the Retake Exam I. Should your score be 72 on the retake exam, then that will be your official score for Exam I. Should your score be 83 on the retake exam, then your official score on Exam I will be entered as 75, the maximum level you can achieve on the retake exam. If you score 60 on the retake exam, then your official score on Exam I will be recorded as 64.

This option will be available for only the first of the three scheduled exams. **It will not be available for Exam II, Exam III, or for the final exam.**

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 12; 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. Many departments on Campus especially in physical sciences areas have begun to collaborate extensively to promote learning across courses. This Chemistry 103 course is part of a collaborative effort with the other courses. The Learning Community sections are 605, 608, 609, 610, and 612. We are interested in the progress and potential success of such efforts and we welcome your input. Students not involved in such efforts should seek to learn about them and communicate their opinions to Professor Shakhashiri regarding possible expansion in future semesters.

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., fact sheets about one or two key chemicals will be distributed on a weekly basis. You will be tested on the content of each fact sheet on each hour exam as well as on the final exam.

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, if not all, of the answers will be provided with the questions.)

HOMEWORK EXERCISES. Homework assignments are given in the Course Outline starting on page 10. You are not required to turn in the assignment; consequently homework 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 homework assignment, you should seek help from your T.A. in quiz 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 p.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.

I strongly encourage you to study on a weekly basis with others in your Cooperative Learning Group (see page 6). 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. Make *good* connections!

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.

STUDY SKILLS. Study skills groups include discussions corresponding to the expressed needs and desires in a particular group. Possible topics include: problem solving, self-assessment, time-scheduling, note taking, exam preparation/taking, reading efficiency, memory, concentration, and avoiding procrastination. Students wishing to improve their performance on academic tasks are encouraged to participate in a group. Study skills groups usually meet for four 90-minute sessions. PREREGISTRATION IS REQUIRED.

TEST ANXIETY. The purpose of a Test Anxiety Group is to help students reduce anxious responses to test-taking situations and to acquire more relaxed attitudes. Procedures encompass exercises to promote relaxation and coping strategies for exam-taking panic. Students who believe their study skills and habits are adequate but who are not performing well on tests because of anxiety are encouraged to participate in a group. The groups usually meet for four 90-minute session. PREREGISTRATION IS REQUIRED. For dates, times and more information, call 262-1744 or go to 905 University Avenue, Room 401, Monday, Tuesday, Thursday, and Friday, 8:00 a.m.–5:00 p.m., and Wednesday, 9:00 a.m.–5:00 p.m.

CHEMISTRY LEARNING CENTER

The Chemistry Learning Center is for students who wish to improve their ability to learn chemistry. Participation is voluntary and there is no fee. Students meet in small groups with staff to work out effective strategies for mastering the chemical content. The Chemistry Learning Center is located in Room B311 of the Chemistry Building. Fall hours are from 9:00 a.m. to 5:00 p.m, Monday through Friday. Contact Scott Mellon at 265-5497 (srmellon@wisc.edu).

WRITING CENTER

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 out 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.

To schedule an appointment, contact the Writing Lab in 6171 Helen C. White Hall, tel. 263-1992. The hours are Monday through Thursday, 9:00 a.m.–8:00 p.m., and Friday, 9:00 a.m.–3:00 p.m. For more information, check their Web site at *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 drop-in centers at the Steenbock Library, College Library, and Gordon Commons, study group tutoring, individual tutoring, study skills counseling, and exam files. For more information, visit or call the GUTS Tutoring Office, 303 Union South, 263-5666, Monday through Thursday, 1:00-5:00 p.m.

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

October 18 - 24 has been proclaimed as National Chemistry Week for 2003. 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.

GUIDELINES FOR DEMONSTRATION NOTES

These Guidelines should help you take effective notes about the demonstrations Professor Shakhashiri presents 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 Professor Shakhashiri may provide about the equipment and materials.
2. Describe what Professor Shakhashiri does with the equipment and materials.
3. Describe what happens as a result of what Professor Shakhashiri 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 Professor Shakhashiri 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 covered with fog. 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 Professor Shakhashiri does with the equipment and materials.

   Professor Shakhashiri 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 is brought into lecture hall. 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

INTRODUCTION – Sept 3
- Macroscopic Properties
- Particulate Structure
- Atoms and Molecules

MEMORIZE THE NAMES & SYMBOLS OF THE FIRST 36 ELEMENTS IN THE PERIODIC TABLE.
TEXT 1.1–1.2
QUESTIONS
TEXT Ch.1: 3
WKBK: Lesson 35

ELEMENTS AND ATOMS – Sept 8
- Classifying matter
- Mixtures and pure substances
- Elements and compounds
- Quantitative properties
- Significant figures

TEXT 1.3–1.8
QUESTIONS
TEXT
Ch.1: 7,12,14,20,28,32,42,44,56,58,62, 64,74

ATOMS AND THE MOLE – Sept 10
- Atomic structure
- Isotopes
- Atomic mass
- The mole
- Molar mass
- The periodic table

TEXT 2.1 – 2.8
QUESTIONS
TEXT
Ch. 2: 6,10,14,20,22,24,30,36,38,46,48, 52,54,56

CHEMICAL COMPOUNDS – Sept 15
- 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: 3,12,18,20,22,24,30,32,34,36,40, 42,90
WKBK: pp 1–9

COMPOUNDS AND MOLES – Sept 17
- Molar mass of a compound
- Percent composition
- Empirical formulas
- Molecular formulas

TEXT 3.5–3.7
QUESTIONS
TEXT
Ch. 3: 1,44,48,52,54,60,64,68,74,78,86
WKBK: pp 9–17

CHEMICAL EQUATIONS – Sept 22
- Chemical reactions and equations
- Balancing chemical equations
- Mass relationships in chemical reactions
- Stoichiometry

TEXT 4.1–4.3
QUESTIONS
TEXT
Ch. 4: 2,8,10,12,14,18,44,46
WKBK: Lessons 2 & 3

CHEMICAL ANALYSIS – Sept 24
- Limiting reactant
- Percent yield
- Determining the formula of a compound

TEXT 4.4–4.6
QUESTIONS
TEXT
Ch. 4: 6,20,22,24,26,28,36,56
WKBK: Lesson 4

Exam 1 — Friday, September 26 — 11:00–11:50 a.m.

REACTIONS IN SOLUTION 1 – Sept 29

- Electrolytes
- Solubility of ionic compounds
- Precipitation reactions
- Net ionic equations
- Acids and bases
- Acid-base reactions

TEXT 5.1–5.4
QUESTIONS
TEXT
Ch. 5: 1,3,5,7,22,24,26,28,30,40,42
WKBK: Lesson 5

REACTIONS IN SOLUTION 2 – Oct 1

- Classification of reactions
- Reaction-driving forces
- Oxidation numbers
- Oxidation-reduction reactions

TEXT 5.5–5.7
STUDY QUESTIONS
TEXT
Ch. 5: 9,44,46,52,54,56,96,106,118
WKBK: pp 145–151

CONCENTRATIONS OF SOLUTIONS – Oct 6

- Molarity
- Preparing solutions
- pH
- Solution stoichiometry

TEXT 5.8–5.10
QUESTIONS
TEXT
Ch. 5: 13,58,62,64,68,72,74,78,84,94,100
WKBK: Lesson 6

HEAT AND ENERGY – Oct 8

- Temperature
- Energy
- Heat capacity
- Heat transfer
- Heat energy
- Enthalpy
- Enthalpy of fusion and vaporization

TEXT 6.1–6.5
QUESTIONS
TEXT
Ch. 6: 2,16,18,22,26,70,
WKBK: pp 79–81

HEAT AND CHEMICAL REACTIONS – Oct 13

- Calorimetry
- Enthalpy of reaction
- Hess's law
- Enthalpy of formation
- Fuels

TEXT 6.6–6.10
QUESTIONS
TEXT
Ch. 6: 34,36,40,50,52,56,58,78,82
WKBK: pp 82–96

THE BOHR MODEL OF THE ATOM – Oct 15

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

TEXT 7.1–7.3
QUESTIONS
TEXT
Ch. 7: 20,22,24,28,34,36,38,70

MODERN ATOMIC THEORY – Oct 20

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

TEXT 7.4–8.2
QUESTIONS
TEXT
Ch. 7: 44,56,74
Ch.8: 3,8,10,20,22,24
WKBK: Lesson 10

PERIODIC PROPERTIES – Oct 22

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

TEXT 8.3–8.7
QUESTIONS
TEXT
Ch. 8: 34,36,38,40,52,54,58,60,70,76
WKBK: Lesson 11

Exam 2 — Friday, October 24 — 11:00–11:50 a.m.

BONDING & LEWIS STRUCTURES – Oct 27

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

TEXT 9.1–9.5
QUESTIONS
TEXT
Ch. 9: 4,28,30,36,38,42,86,90,
WKBK: pp 130–141

BOND PROPERTIES – Oct 29

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

TEXT 9.6–9.8
QUESTIONS
TEXT
Ch. 9: 10,18,46,50,54,56,62,64,66,68, 70,96,106
WKBK: pp 141–144 & 152–155

SHAPES OF MOLECULES – Nov 3

- Describing molecular shapes
- VSEPR
- Molecular polarity

TEXT 9.9–9.11
QUESTIONS
TEXT
Ch. 9: 24,72,74,78,82,84,88,98,108
WKBK: Lesson 14

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: 2,4,18,20,24,26,42,52,74
WKBK: Lesson 15

MOLECULAR ORBITAL THEORY – Nov 10

- Molecular orbitals
- Combinations of atomic orbitals
- Diatomic molecules
- Band theory
- Semiconductors

TEXT 10.3–10.4
QUESTIONS
TEXT
Ch. 10: 34,36,40,60,64,68,70

MOLECULAR SPECTROSCOPY – Nov 12

- Absorption of electromagnetic radiation
- UV-visible spectroscopy
- IR spectroscopy
- H-nmr spectroscopy

Handout
QUESTIONS
Handout

IDEAL GAS LAW – Nov 17

- Pressure
- Boyle's law
- Charles's law
- Avogadro's law
- Dalton's law
- Ideal gas
- Molar mass determination

TEXT 12.1–12.5
QUESTIONS
TEXT
Ch. 12: 10,12,14,18,22,26,28,30,36,46,74
WKBK: Lesson 9

KINETIC MOLECULAR THEORY – Nov 19

- Postulates
- Molecular speed and kinetic energy
- Diffusion and effusion
- Deviations from ideal gas behavior

TEXT 12.6–12.9
QUESTIONS
TEXT
Ch. 12: 50,52,54,58,66,90

Exam 3 — Monday, November 24 — 11:00–11:50 a.m.

INTERMOLECULAR FORCES – Dec 1

Dipole interactions
Polar molecules
Non-polar molecules
Hydrogen bonding
Properties of liquids

TEXT 13.1–13.5
QUESTIONS
TEXT
Ch. 13: 16,18,20,22,50,54,30,32,56,58,68

PROPERTIES OF SOLIDS – Dec 3

Molecular solids
Network solids
Amorphous solids

TEXT 13.8–13.9
QUESTIONS
TEXT
Ch.13: 88 Handout

PROPERTIES OF LIQUIDS – Dec 8

Miscible and Immiscible Liquids
Heat of Solution
Henry's Law
LeChatelier's Principle

TEXT 14.2 - 14.3
QUESTIONS
TEXT
Ch.13: 28, 32, 36, 38

CHEMISTRY OF THE HALOGENS – Dec 10

Special Handout

Final Exam — Wednesday, December 17 — 12:25 – 2:25 p.m.

34th Annual Presentation of
"Once Upon a Christmas Cheery, In the Lab of Shakhashiri"
Saturday and Sunday, December 6 and 7

Chemistry 103 – Lecture Section 1 – Fall 2003
Lecture and Laboratory Schedule

DATE	LECTURE TOPIC	LABORATORY
Sept 3 (W)	Introduction	No Lab
Sept 5 (F)	Reinforcement & Enrichment	
Sept 8 (M)	Elements & Atoms	Lake Study (outside)
Sept 10 (W)	Atoms and the Mole	
Sept 12 (F)	Reinforcement & Enrichment	
Sept 15 (M)	Chemical Compounds	Solutions, Density & Graphing (in lab)
Sept 17 (W)	Compounds & Moles	
Sept 19 (F)	Reinforcement & Enrichment	
Sept 22 (M)	Chemical Equations	No Lab
Sept 24 (W)	Chemical Analysis	
Sept 26 (F)	**EXAM I 11:00-11:50 a.m.**	
Sept 29 (M)	Reactions in Solution 1	Reaction of Zinc & Iodine; Check-in
Oct 1 (W)	Reactions in Solution 2	
Oct 3 (F)	*Retake* **EXAM I**	
Oct 6 (M)	Concentrations of Solutions	Reaction Types & Chemical Logic (outside)
Oct 8 (W)	Heat & Energy	
Oct 10 (F)	Reinforcement & Enrichment	
Oct 13 (M)	Heat & Chemical Reactions	Synthesis of an Alum (in lab)
Oct 15 (W)	The Bohr Model of the Atom	
Oct 17 (F)	Reinforcement & Enrichment	
Oct 20 (M)	Modern Atomic Theory	No Lab
Oct 22 (W)	Periodic Properties	
Oct 24 (F)	**EXAM II 11:00-11:50 a.m.**	
Oct 27 (M)	Bonding & Lewis Structures	Solution Calorimetry (in lab)
Oct 29 (W)	Bond Properties	
Oct 31 (F)	Reinforcement & Enrichment	
Nov 3 (M)	Shapes of Molecules	Periodic Table Live! (outside)
Nov 5 (W)	Valence Bond Theory	
Nov 7 (F)	Reinforcement & Enrichment	
Nov 10 (M)	Molecular Orbital Theory	Alcohol in Wine (in lab)
Nov 12 (W)	Molecular Spectroscopy	
Nov 14 (F)	Reinforcement & Enrichment	
Nov 17 (M)	Ideal Gas Law	Project Lab (1)
Nov 19 (W)	Kinetic Molecular Theory	
Nov 21 (F)	Reinforcement & Enrichment	

Nov 24 (M)	**EXAM III 11:00 - 11:50 a.m.**	No lab
Nov 26 (W)	No Lecture	
Nov 30 (F)	Thanksgiving Recess	
Dec 1 (M)	Intermolecular Forces	No Lab
Dec 3 (W)	Properties of Solids	
Dec 5 (F)	Reinforcement & Enrichment	
Dec 8 (M)	Properties of Liquids	Project Lab (2), Check-out
Dec 10 (W)	Chemistry of the Halogens	
Dec 14 (F)	No Lecture	
Dec 17 (W)	**FINAL EXAM 12:25 – 2:25 p.m.**	

34th Annual

Once Upon a Christmas Cheery in the Lab of Shakhashiri

Saturday and Sunday, December 6 and 7

DUE To Your T.A. Friday, September 12

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.