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Chemistry 101

Winter Quarter 2006

Schedule of Assignments

TR 8:30 - 9:48 AM

1000 McPherson Lab

Home Page - <http://www.chemistry.ohio-state.edu/~king>

WebCT Site: <https://webct.mps.ohio-state.edu/webct/public/home.pl>

Textbook:	Introduction to General, Organic, & Biological Chemistry", (FOURTH EDITION), by Robert J. Ouellette
Lab Manual:	"Experiments in General, Organic, & Biological Chemistry", (FOURTH EDITION), by Robert J. Ouellette and Jason H. Manchester
Study Guide:	"Study Guide & Solutions Manual", (FOURTH EDITION), by Mary H. Bailey (text supplement)
Calculator:	For quizzes & examinations, the use of calculators is restricted to <b>ANY</b> TI-30, Sharp EL-509, Sharp EL-531 OR Casio FX-250. <b>NO OTHER CALCULATORS ARE PERMITTED.</b>

Week of	Lecture Topic	Chapter	Quiz		Lab Experiment**	
			Mon	Fri	Mon	Fri
Jan. 2 *	Chemistry	1	x	---	x	CKIN, 1AB, SFU**
Jan. 9	Measurements, Atomic Structure	2, 3	I	I	CKIN, 1AB, SFU**, 2	2
Jan. 16 *	Atomic Structure, Periodic Table	3	x	II	x	3
Jan. 23	Ionic Compounds, Covalent Bonds	4, 5	II	III	3	23
Jan. 30	Molecular Geometry, Chemical Equations	5, 6	III	---	23	7
<b>FIRST MIDTERM EXAMINATION - Wednesday, February 1, 6:30 PM - 7:48 PM (Evening)</b>						
Feb. 6	Chemical Reactions, Composition	6, 7	IV	IV	7	8
Feb. 13	Composition & Stoichiometry, Gases	7, 8	V	V	21	21
Feb. 20	Liquids, Solids, Solutions	8, 9	---	---	16	16
<b>SECOND MIDTERM EXAMINATION - Wednesday, February 22, 6:30 PM - 7:48 PM (Evening)</b>						
Feb. 27	Reactions Rates & Equilibrium	9, 10	VI	VI	18	18
Mar. 6	Acids & Bases	11	VII	VII	20,FCO	20,FCO
<b>FINAL EXAMINATION - Tuesday, March 14, 7:30 AM - 9:18 AM (Morning)</b>						

\* Monday, Jan. 2 and 16 are University holidays. No classes will be held and OSU offices will be closed.

\*\* CKIN = Check-in. SFU = Significant Figures & Units (pg 33). FCO = Finish, Check-Out. x = lab closed, no rec.

**Lab Reports for 1, 2, 3, 23 and 7 are due no later than Friday, Feb. 24.** (See reverse for more info about due dates.)

**All Lab Reports are due no later than 4:30 PM on Fri., March 10.** (See reverse side for info about weekly due dates.)

**MEDICAL INSURANCE COVERAGE:** Due to the potentially dangerous nature of laboratory work, you are reminded to maintain medical insurance coverage through OSU health service or a private agency when enrolling in chemistry laboratory courses.

**ACADEMIC MISCONDUCT:** Any material submitted in General Chemistry must represent your own work. Apparent violations of this standard will be referred to the University Committee of Academic Misconduct (COAM) as required by Faculty Rules. *Please read the attached statement on Standards of Academic Conduct carefully.*

**STUDENT RESPONSIBILITY:** Each student receives this information about Chemistry 101 in the first lecture section. It is your responsibility to read this material and be familiar with course content, course procedures, and grading. You are also responsible for any announcements concerning course procedures which are made in class, whether you are present or not! (If you are absent, you are expected to get notes, announcements, etc. from another student in the class.)

**IF YOU FAIL TO ATTEND THE FIRST LAB SESSION - CHECK IN AT 100 CE WITHOUT DELAY**

**GRADING:** Your performance in the course will be evaluated on the basis of total points earned. The distribution of points is as follows:

Quizzes	180 pts.
Laboratory	160 ▶ <b>A minimum of 50% of the total lab points is required to pass the course.</b>
Midquarter I	180
Midquarter II	180
Final	<u>300</u>
Total	1000 pts.

**QUIZZES:** will be given in recitation in the weeks indicated on the front of the syllabus. There are **NO** make-up quizzes but you are allowed to miss one quiz without receiving a penalty or needing permission from your instructor. If you take all of the quizzes, your lowest quiz score will be dropped. **ALWAYS SHOW YOUR WORK ON QUIZZES** to receive full credit. Bring your **approved calculator** to quizzes and exams.

**MIDQUARTER EXAMS:** These exams are given only at the times shown on the Schedule of Assignments. Make-up exams will be given **only** in the last week of regularly scheduled classes for medical reasons (documented) or a preapproved university conflict. Exams are a scheduled part of this course and attendance is required (exam location is based on lab section). Students with **University** conflicts should consult the lecturer. Computer answer sheets from exams will not be returned. Answers will be posted.

**NO HATS ARE TO BE WORN DURING EXAMS OR QUIZZES!!!** (If you wear a hat or other head covering for religious reasons, please see Dr. King before the exam.)

**FINAL EXAM:** The final exam must be taken at the University scheduled time. OSU ID cards will be collected at the final exam. Final exams will not be returned.

**LABORATORY:** consists of one 3-hour session per week, and **a minimum of 50% of the total lab points is necessary for a passing grade for the course.** Your lowest lab score will not be counted. **YOU MAY WORK IN THE LAB ONLY DURING YOUR SCHEDULED LAB PERIOD!** Any time remaining in a lab period may be used to complete a previous experiment - *discuss this with your TA first*. Read the experiment before you come to lab so that you come **prepared** to work efficiently and carefully. Your **lab data sheets must be initialed** by your lab instructor **before leaving the lab** or your report will **not be graded**.

**LABORATORY REPORTS:** are normally due at the **beginning** of the lab session **ONE** week after the **completion** of the experiment. Late reports (even if on the same day) will be penalized 2 points per day. You must notify your TA by email within one day after submission of a late report. **NO** credit will be given after 2 weeks or past the due dates shown on the first page. *Photocopies of reports are not permitted - it is illegal to photocopy the lab manual.* The final report will not be graded until you are properly checked out of lab. **If you do not check out, you will receive a zero for the last 2 labs.** The lab score will be prorated to 160 points.

**LABORATORY SAFETY REQUIREMENTS:** Students are required to read, understand, and implement the safety precautions indicated in the laboratory manual and laboratory handouts. The precautions are summarized on a safety form which must be signed by all students during their first laboratory period. The following are selected instructions from the safety form:

1. You must wear Department-authorized ANSI code goggles in the laboratory. Goggles will be issued during check-in - if they are misplaced, goggles may be borrowed from 231/331 CE. Not wearing goggles will result in the loss of 10% of the grade for the experiment. For any subsequent violation, an additional loss of 10% of the grade will result. Continued violations may result in dismissal from the course. The wearing of contact lenses is **NOT** recommended.
2. Each student must wear shoes (not sandals) and adequate clothing to reduce the possibility of injury from chemicals or broken glass.
3. Familiarize yourself with the location of the fire blanket, fire extinguisher, and eye wash in the laboratory.
4. Promptly report all accidents, no matter how small, to your lab instructor.
5. Your work area should be cleaned before you leave lab. After putting your equipment away, wipe down your work area with a wet sponge or towel. This ensures that you and other students who use the space will not be harmed by chemicals left on the desktop. Also clean up spills in the balance room by brushing chemicals into a weighing dish.
6. No unauthorized experiments are allowed. No chemicals may be removed from the lab.

**HOMEWORK:** Assignments are attached to this syllabus and posted on the King Home Page. Homework will not be graded; however, doing assigned problems is often the best way to determine how well you understand the material. Answers to homework assignments will be posted in the homework case, Celeste Lab 2<sup>nd</sup> floor. Answers to odd-numbered questions can be found in the back of the textbook. All homework solutions also can be found in the Study Guide.

**OFFICE HOURS:** Dr. King will be available in her office, 0109 Newman Wolfrom, on Mondays, Wednesdays, & Fridays from 3-4 PM and Tuesdays & Thursdays from 10-11 AM - no appointment is necessary at those times.

### ADDITIONAL ASSISTANCE

1. Lab Supervisor - Dr. Tatz (rjtatz@chemistry.ohio-state.edu, 280D CE, 292-8096) will help with lab problems.
2. Extra copies of course handouts are available in the General Chemistry Office, 100 Celeste Lab.
3. You are strongly encouraged to make use of the Learning Resource Center (160 CE) frequently.
4. All students with documented disabilities, who need accommodations, should see the instructor privately to schedule an appointment as early as possible. If your disability requires materials in alternative formats, please contact the Office for Disability Services at 292-3307, Room 150 Pomerene Hall.
5. Undergraduate chemistry web site: <http://www.chemunder.chemistry.ohio-state.edu>

### LEARNING RESOURCE CENTER (TA Aid Room) - 160 CE

The Center is open Monday through Friday during posted hours. Computers that have instructional programs for the General Chemistry classes are available on a first come, first served basis. These programs involve only single-concept problems that must be understood in order to deal with the more difficult multi-concept questions on examinations.

Teaching assistants spend two hours a week in the Center to provide contact time with their students and to answer specific questions about their course as well as general questions in any course. A schedule is posted outside the door which lists the time each T.A. is available as well as their course assignment. Teaching assistants wear a name tag which indicates the course for which they are responsible. There are also two side rooms, 160A and 160C where T.A.'s may be present. The Center has limited space and is not designed as a library or study hall but as a place where students can come for individual instruction and help.

### LABORATORY VIDEO INSTRUCTION

Laboratory videotapes are shown at the start of the laboratory. Students must view the entire tape prior to starting the experiment. Students who are late for laboratory will have to view the tape at Classroom Services in Room 11 Lord Hall. (A student I.D. is required to obtain a copy of the tape. Classroom Services opens at 7:00 A.M.). **OBTAIN A CHEMISTRY VIDEO MAKEUP FORM FROM 231 OR 331 CELESTE PRIOR TO GOING TO LORD HALL.**

The videotapes are designed to supplement the instructions in the laboratory manual. Students will be better prepared to assimilate the taped instructions if they have read the laboratory manual prior to the laboratory. The videotapes are short and there is insufficient time to take detailed notes if you are not already familiar with the experiment. The list of videotapes for this course and run times are as follows:

<i>Expt. #</i>	<i>Title of Videotape for Chemistry 101</i>	<i>Time</i>
CKIN	Safety in the Laboratory	06:08
1	Use of the Balance	05:41
2	Density	14:44
3	Specific Heat of a Metal	06:13
23	Qualitative Analysis of Cations and Anions	09:27
7	Chemical Reactions	06:06
8	Determination of the Formula of an Oxide of Tin	10:58
21	Oxidation-Reduction Reactions of the Halogens	12:13
16	1st - Volumetric Analysis	11:26
	2nd - Determination of Zinc Ion by Titration	05:26
18	Equilibrium	13:56
20	Acids and Bases	16:38

Chem 101 is a Physical Science course in the Natural Science category of the GEC, which has these goals and objectives:

**Goals/Rationale:** Courses in natural sciences foster an understanding of the principles, theories and methods of modern science, the relationship between science and technology, and the effects of science and technology on the environment.

#### **Learning Objectives:**

1. Students understand the basic facts, principles, theories and methods of modern science.
2. Students learn key events in the history of science.
3. Students provide examples of the inter-dependence of scientific and technological developments.
4. Students discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

## STANDARDS OF ACADEMIC CONDUCT IN GENERAL CHEMISTRY

**Any material submitted in General Chemistry must represent your own work. Violations of this standard will be referred to the University Committee of Academic Misconduct (COAM) as required by Faculty Rules.**

If you need assistance, check with the staff of the Department of Chemistry. Group efforts by students, use of another student's pre-laboratory or laboratory material, or assistance from individuals who already have taken the course may place you in jeopardy of violation of the standards of General Chemistry. Possession of another student's lab report(s) will raise immediate concerns about academic misconduct. Plagiarism or the submission of work based on old material is considered to be academic misconduct no matter how small the infraction. Identical answers indicate copying or unacceptable group efforts - always answer questions in your own unique words. Individuals retaking the course must redo all work for the course and may not submit any parts of earlier experiments for grading.

Pre-laboratory exercises are designed to make you prepare for the laboratory. Copying answers from other individuals or from old copies of the exercises does not prepare you properly for the laboratory. Evidence of copying or "working together" will be submitted to COAM. The minimum penalty recommended by the Department of Chemistry will be a zero for the pre-laboratory exercise and the accompanying experiment.

Laboratory work is the essence of the science of Chemistry; therefore laboratory work in General Chemistry is to be an individual effort. You will have your own locker/work space and you are expected to perform all parts of the experiments with your own equipment, chemicals and unknowns. The accumulation of data, calculations derived from that data and any conclusions or answers to questions associated with that experiment are to be your own work. Laboratory data may not be altered or "made up". All laboratory work must be done in your assigned laboratory room during your scheduled time period and be supervised by your assigned teaching assistant. You are required to have the data sheet/notebook signed by your teaching assistant during lab. Some courses require the submission of carbon copies of the lab notebook every lab period. Violations will be prosecuted with the minimum recommended penalty of a zero for the entire laboratory portion of the course. If a minimum grade in laboratory is required as stated on the syllabus of the course, the zero can result in an E for the entire course.

Copying, use of "crib" material or use of stored constants and formulas in calculators on quizzes, midterm examinations or the final exam, no matter how small the violation, is regarded as a severe violation of academic standards. The Department of Chemistry will recommend as the minimum penalty a grade of E for the course for any such violations. The use of improper calculators (those NOT listed on the syllabus as approved) may constitute academic misconduct. The staff will inspect calculators used in exams. During exams, students are seated with their lab section to facilitate proctoring of the exam.

Students supplying materials for others to "look at" may be charged with academic misconduct. Never allow another student access to your pre-laboratory exercises or lab reports even after completion of the course. You should not assist others in violations of academic standards. "I didn't know that the person was going to copy my work" is not an acceptable excuse.

## HOMEWORK

Before your first lab session, read "Safety in the Laboratory" and "Laboratory Techniques" in your lab manual pg 1-32.

Before your first recitation session, read "Significant Figures and Units" in your lab manual pg 33-38.

The following Homework Exercises are in your text book at the end of each chapter:

Chapter 1: No. 1, 3, 5-7, 9, 11, 13, 16, 18, 19, 24, 28, 31-33, 35, 37-39 [The solution to homework problem 1.33 in the text book is incorrect. Benzene is a solid (not a gas) at 0oC.]

Chapter 2: No. 2, 3, 6, 7, 10, 11, 15, 16, 18, 26, 27, 31, 34, 35, 38, 39, 47, 48, 51, 54 [Corrections: 2.16 correct answer is 1.26 s; 2.39 correct answer is  $5.0 \times 10^2$  or 0.50 L]

Chapter 3: No. 1-9, 14-21, 24, 25, 28, 29, 32, 36, 37, 40, 41, 45, 47, 50, 51, 54, 55, 58, 59, 62, 63

Chapter 4: No. 6, 7, 9, 11, 13, 15-17, 23-27, 29, 30

Chapter 5: No. 2, 3, 5, 7, 10, 12, 13, 15, 17, 19, 21-27, 29

Chapter 6: No. 2, 3, 6, 7, 9, 11, 14-16, 20, 21, 23, 24, 27, 31-36

Chapter 7: No. 2, 3, 7, 10, 18, 19, 21, 26, 27, 30, 31, 36-38, 40, 41, 44-46, 51, 56, 57, 62, 63, 66-68

Chapter 8: No. 1-3, 8-10, 13-15, 18-20, 23, 26, 27, 29, 32, 33, 35, 39, 41, 42, 44, 45, 50-52, 57-60, 62

Chapter 9: No. 1, 3, 6, 7, 12, 13, 16, 17, 24, 25, 27-29, 31-33, 35-43, 47-50

Chapter 10: No. 1-6, 8-12, 14-16, 21, 24, 26, 28, 29, 32, 38, 39, 41, 44, 45

Chapter 11: No. 1-3, 5-8, 15-17, 20, 21, 23, 25, 28, 29, 32, 33, 41-43, 45, 49-51, 54, 55, 56, 57, 59, 60

Homework Solution will be posted in the Homework Case, 2nd floor Celeste Lab. Solutions to all exercises are given in the Study Guide for this course, and solutions to odd-numbered exercises are given in the textbook.

## CALCULATOR SKILLS

BRING AN ALLOWED CALCULATOR WITH ITS OPERATING INSTRUCTIONS AND YOUR LABORATORY MANUAL TO THE FIRST RECITATION SESSION!!!

The following problems are designed to give you practice using your calculator in operations with scientific notation. Report your answers in proper scientific notation and with the appropriate significant figures. During your first recitation session, your TA will help you work through some of these problems, so bring this sheet with you. Please work the rest of these problems before you take your first quiz..

### 1. Multiply:

a. $(6.1 \times 10^{13}) \times (4.532 \times 10^7)$	= $2.8 \times 10^{21}$
b. $(9.876 \times 10^{-9}) \times (1.13874 \times 10^{-8})$	= $1.125 \times 10^{-16}$
c. $(8.71 \times 10^{-15}) \times (4.65 \times 10^8)$	= $4.05 \times 10^{-6}$
d. $(-5.39 \times 10^8) \times (2.157823 \times 10^{-5})$	= $-1.16 \times 10^4$
e. $(0.00013805) \times (3.77461 \times 10^{12})$	= $5.2108 \times 10^8$

### 2. Divide:

a. $(1.987052 \times 10^3) / (3.678991 \times 10^6)$	= $5.401079 \times 10^{-4}$
b. $(3.753 \times 10^{-7}) / (2.39 \times 10^{-14})$	= $1.57 \times 10^7$
c. $(8.94523 \times 10^5) / (6.2439 \times 10^{-9})$	= $1.4326 \times 10^{14}$
d. $(5.679 \times 10^{-12}) / (2.997104 \times 10^5)$	= $1.895 \times 10^{-17}$
e. $(-6.029 \times 10^{-6}) / (1.03 \times 10^{-7})$	= $-5.85 \times 10^1$

### 3. Add:

a. $(1.23 \times 10^4) + (9.876 \times 10^3)$	= $2.22 \times 10^4$
b. $(1.23 \times 10^2) + (9.876 \times 10^{-1})$	= $1.24 \times 10^2$
c. $(4.9921 \times 10^{-2}) + (7.06182 \times 10^2)$	= $7.06232 \times 10^2$
d. $(1.03724 \times 10^{-9}) + (9.913 \times 10^{-11})$	= $1.13637 \times 10^{-9}$
e. $(1.97236 \times 10^{-23}) + (8.7110 \times 10^{-23})$	= $1.06834 \times 10^{-22}$

### 4. Subtract:

a. $(1.2317 \times 10^4) - (9.876 \times 10^3)$	= $2.441 \times 10^3$
b. $(4.8639 \times 10^2) - (6.115 \times 10^{-1})$	= $4.8578 \times 10^2$
c. $(7.10550 \times 10^{-3}) - (1.625 \times 10^2)$	= $-1.625 \times 10^2$
d. $(1.025611 \times 10^{-17}) - (9.9813 \times 10^{-18})$	= $2.748 \times 10^{-19}$
e. $(6.3925 \times 10^{-10}) - (2.38 \times 10^{-14})$	= $6.3923 \times 10^{-10}$

### 5. Mixed Mode:

a. $(5.159 + 8.23 \times 10^1) \times (2.4 \times 10^{-2} + 3.00)$	= 264
b. $(456 \times 8.271 \times 10^{-3}) + 7.416$	= 11.19
c. $\frac{(49.82 + 75.97) \times (3.8462 \times 10^3)}{(9.211 \times 10^{-2})}$	= $5.253 \times 10^6$

NOTE: The number of significant figures in addition and subtraction is governed by the decimal place and not the lowest number of significant figures present in a problem. Therefore, the number of significant figures may at times increase or decrease from those shown in a given problem/calculation. This is demonstrated by the following three examples:

$$3 \text{ c. } (4.9921 \times 10^{-2}) + (7.06182 \times 10^2) = 7.06232 \times 10^2$$

Although  $4.9921 \times 10^{-2}$  has only 4 significant figures after the decimal place, the answer is reported with 5. The reason for that is best seen if the numbers are used with the same exponential terms:

$$\begin{array}{r} \mathbf{7.06182} \quad \times 10^2 \quad \text{Keep the \# with the greater exponential term.} \\ + \mathbf{0.00049921} \times 10^2 \quad \text{Converted from } 10^{-2} \text{ to } 10^2. \\ \hline \mathbf{7.06231921} \times 10^2 \quad \text{5 places after the decimal place are significant and the number is} \\ \text{rounded to: } \mathbf{7.06232} \times 10^2 \end{array}$$

$$4 \text{ d. } (1.025611 \times 10^{-17}) - (9.9813 \times 10^{-18}) = 2.748 \times 10^{-19}$$

This problem is treated just as 3c above:

$$\begin{array}{r} \mathbf{1.025611} \quad \times 10^{-17} \\ - \mathbf{0.99813} \quad \times 10^{-17} \\ \hline \mathbf{0.027481} \quad \times 10^{-17} \end{array} \quad \text{only 5 positions after the decimal place are in common and the} \\ \text{answer is rounded to } \mathbf{2.748} \times 10^{-19}$$

$$5 \text{ a. } (5.159 + 8.23 \times 10^1) \times (2.4 \times 10^{-2} + 3.00) = 264$$

$$\begin{array}{r} \mathbf{5.159} \qquad \qquad \mathbf{3.00} \\ + \mathbf{82.3} \qquad \qquad + \mathbf{0.024} \\ \hline \mathbf{87.459} \qquad \qquad \mathbf{3.024} \end{array}$$

Both of these sums are good to 3 significant figures which lets you report the product to 3 significant figures = **264**