

CHEMISTRY 141

Dr. Parker

Fall 2001

Oxford College and Liberal Arts. Oxford College is dedicated to a liberal arts education, and science, including chemistry, is an integral part of the liberal arts. In this course, you will have an opportunity to master these liberal arts skills (see the class LearnLink conference for more information):

- Reasoning:

1. Problem-Solving
2. Critical Thinking
3. Logic
4. Calculation/Computation
5. Empiricism
6. Analysis
7. Use of Evidence
8. Measurement

- Language

1. Listening
2. Reading
3. Writing
4. Dealing with narratives

- Aesthetics

1. Observing closely
2. Seeing relationships among form, pattern, harmony, and shape

- Imagination

1. Synthesis
2. Remembering
3. Forecasting (planning)
4. Playing with differences
5. Developing scientific insight (hypotheses)

Learning Goals. The primary learning goals for this class are for you to:

- Utilize critical thought and reasoning to understand chemical behavior at the microscopic and macroscopic levels.
- From your knowledge of chemistry and chemical systems, be able to develop solutions to problems which you have not encountered before.

Content goals. You will be expected to master these areas of chemistry (for a more detailed list of the content, see the class LearnLink conference):

- The scientific method
- Conversion between different measuring systems
- Significant figures
- The structure of the atom
- Nomenclature
- Molecular mass and moles
- Stoichiometry
- Reactions in aqueous solution
- Molarity
- Gases
- Thermochemistry
- Quantum theory and electromagnetic radiation
- Electron configurations
- The periodic table
- Bonding
- Molecular geometry and hybridization
- Intermolecular forces
- Phases of matter

Text. "Chemistry," 6th ed., by Chang.

Optional: Study guide, student solutions manual.

Laboratory manual: sold by the Chemistry Department.

Carbon-copy lab notebook.

Safety glasses for lab.

You must have all three materials for lab before your first lab meeting.

Attendance. All students are expected to attend all lecture and laboratory sessions. However, it is recognized that emergencies may arise which may necessitate absences from class. You should

notify me if an absence is due to illness or other emergency. You are responsible for all material covered in lecture if absent.

You are allowed 3 absences in lecture and NO ABSENCES in lab.

If you exceed the 3 absence limit in lecture for whatever reason, you will lose 1 point for the next absence (number 4), 2 points for the next absence (number 5), and 3 points for each additional absence (numbers 6 and up). These points will be deducted from the final course average.

Make-up exams are not given, regardless of the reason an exam was missed. If you miss an exam and present me with an acceptable excuse, the grade on the final exam will count in place of the missed exam grade. You must notify me by the day and time of the exam that you will not be present and you must give me the reason for the absence. If the excuse is not considered acceptable, the exam grade will be a zero. It is up to me as the instructor to make the determination as to whether an excuse is acceptable. In general, illness or an emergency situation are the only acceptable excuses for missing an exam. Missing an exam also counts as an absence in the course.

Being late to class is rude and distracting. Therefore, 3 tardies will be considered equal to 1 absence. If you come in more than 15 minutes tardy, you will be counted absent. If you come in late, it is your responsibility to see me immediately after class to ensure that you are marked tardy and not absent. No adjustments will be made at a later time. If you are continuously tardy, you may be excluded from further classroom attendance. When you are in class, you must be attentive and not disturb others. Leaving a class early counts as an absence, as does sleeping through a class or being generally inattentive.

Cell phones and pagers are not allowed in class or lab. Food and drink are not allowed in class or lab; however, beverages in spill-proof containers may be brought into class.

Problems. At the end of each chapter, there are problems which you should work to help you in understanding the material. These problems are for your benefit only; they will not be taken up or graded. Since general chemistry is a problem-oriented course, and the tests will consist mainly of problems, it is essential that you become proficient in working problems such as those found at the end of the chapters. You should work problems as you encounter the material. You should also attempt each problem before seeking help from the book, your notes, or the answer. It is not sufficient to be able to follow how a problem is worked; on a test, you will have to work a problem all the way through, and the only way you will be able to do this is if you have worked numerous practice problems.

Tests. There will be 4 exams, given approximately every 3-4 weeks. These will be given in class. Each exam will last 55 minutes. For an exam, you may bring only a calculator and pencils; any other material will be given out with the exam. Make sure your calculator is working and that

you know how to use it. Calculators will not be loaned. You must take the exam during your regular class time. If you come in late, you will not be given extra time to finish the exam. The honor code applies to all exams.

Each exam will also include an essay; this must be typed or word-processed and double-spaced, using 12-point type and black ink. The essay must be printed – electronic submission is not acceptable. If more than one page, the pages must be stapled. The topic will be posted 4-7 days in advance on the class LearnLink conference. The essay must be turned in when you come to take the exam. Part of your grade on the essay will be based on your writing -- grammar, spelling, and punctuation. You should run a spell checker and proof-read. Essays that are hand written, essays not double-spaced, and essays electronically submitted are not acceptable. For the essay, you may use your book and notes, but giving or receiving assistance from any person is an Honor Code violation.

Oxford College has adopted as part of its Mission Statement that its curriculum is designed to teach students to "embrace responsible citizenship." In addition, as part of its Purpose Statement, the College lists "to augment the student's ... intellectual awareness of the world". To encourage you to become aware of the world around you, most exams will have a bonus question on "current events."

Honor Code. It is assumed that all Oxford College students will adhere to the highest standards of academic honesty and will uphold the Oxford College Honor Code. Accordingly, I do not proctor exams.

On exams, you may not use any material not distributed with the exam itself except for a calculator and pencils/pens. Any other material you bring into the room must be left at the front of the room. During an examination, you may not give or receive assistance. On assignments for outside class (essays, lab reports), the work is to be your work alone – you may not give or receive any assistance, and you may use only materials authorized. Since absences and tardies can affect your grade, giving false information regarding absences or tardies is a violation of the Honor Code. Note also that the Oxford College Honor Code expects students to report any violations of the Code they know of.

Exam schedule.

Exam I Friday, Sept. 21
Exam II Wednesday, Oct. 10
Exam III Friday, Nov. 9
Exam IV Friday, Dec. 7

Exams may be moved back to the next class meeting if necessary to cover the material.

Final Exam. There will be a final exam, covering the semester's material. This will be given during the regularly scheduled final exam period.

Schedule.

Ch. 1	
Ch. 2	Ch. 7
Ch. 3, sections 1-3, 5-7	Ch. 8
**EXAM I	Ch. 9
	**EXAM III
Ch. 3, sections 8-10	
Ch. 4, sections 1-5, 7	
Ch. 5	Ch. 10, sections 1-5, 8
Ch. 6, sections 1-2, 4, 3, 5-7	Ch. 11
**EXAM II	**EXAM IV

Note that this schedule is subject to change. The sections covered for each exam will be announced in class. We may cover additional material after chapter 11.

Preparation for class. Refer to the “Student Survivor’s Guide” for information.

Review sessions. A review session will be held before each exam; the date and time will be announced in class. If held outside of class, these sessions are optional and voluntary; no new material will be covered. If held in class, attendance will count as it would for a regular class session, since the review normally will not take the entire class period.

Laboratory. Your laboratory instructor will explain the lab procedures to you. The lecture and laboratory are designed to coordinate so that you will have covered material in class before being required to use that material in lab. As you will note under Grading, there are penalties assessed for a low lab average and for low individual lab grades.

Office Hours. My office is Pierce 217. I am usually in my office and available from 9-5 every day. Exceptions are around lunch time (11:30-1:00) and during class and labs.

Grading. The final will count as two exam grades, giving a total of 6 (4 exams + final counting twice). The lowest of these 6 grades will be dropped. This average will constitute the lecture portion of your course grade.

Your lab grade will count in one of two ways, whichever results in a higher grade in the course for you:

(1) Your course grade will be computed by adjusting your grade on the lecture portion using your lab average as shown below. This method normally benefits students whose exam average is a high B or an A.

93 and up	+2	73 - 75	-4
90 - 92	+1	70 - 72	-5
85 - 89	no adjustment	67 - 69	-6
82 - 84	-1	64 - 66	-7
79 - 81	-2	61 - 63	-8
76 - 78	-3	58 - 60	-9
		57 and below	-10

OR

(2) Your course grade will be computed by taking 80% of your lecture grade and 20% of your lab grade. This method usually benefits students whose exam average is a B or lower. You must pass both the lecture AND the lab portions of the course or you will receive an F.

Grading scale. Grades are normally assigned as follows, with no rounding:

93 - 100 A	77 - 79 C+
90 - 92 A-	73 - 76 C
87 - 89 B+	70 - 72 C-
83 - 86 B	67 - 69 D+
80 - 82 B-	60 - 66 D
	below 60 F

*If I have seen farther, it is by
standing on the shoulders of giants.*

■ Sir Isaac Newton

Dr. Marshall Gregory, Harry Ice Professor of English, Liberal Education and Pedagogy, Butler University, gave a presentation here in May 2001 on the Liberal Arts. This is his characterization:

HUMAN CAPACITIES (not all are unique to human beings, but all are fundamental to human beings)

Reason

Language

Morality/Ethics

Aesthetics

Imagination

Introspection (self-awareness)

Physicality

LIBERAL ARTS SKILLS (the skills that human capacities turn into as they become developed)

Reason

- Problem-Solving
- Critical Thinking
- Logic/Argumentation
- Calculation/Computation
- Empiricism
- Analysis
- Use of Evidence
- Measurement

Language

- Listening
- Speaking
- Using metaphor
- Writing
- Dealing with narratives, either written or oral

Morality/Ethics

- Distinguishing among intellectual, social, and moral virtues
- Moral deliberation
- Recognizing moral issues

Acting on principle

Using such moral principles as justice, fairness, and kindness as guides to conduct

Aesthetics

Observing closely

Seeing relationships among form, pattern, harmony, and shape

Pleasure in beauty

Imagination

Synthesis

Creative thinking

Invention

Alternative thinking

Remembering (history)

Forecasting (planning)

Playing with differences

Reflecting on religion

Gaining cross-cultural awareness/sympathies

Developing scientific insight (hypotheses)

Introspection (self-awareness)

Escaping ego

Gaining self-respect

Seeing differences/commonalities

Becoming thoughtful

Enhancing self-honesty

Acquiring humility

Physicality

Refining the use of senses, empirically as well as aesthetically

Maintaining health, strength, alertness, and stamina

Understanding the relations between psyche and soma

Understanding others' experiences through bodily sameness

Managing body-based emotions

Learning how to control and when to celebrate bodily impulses

LIBERAL ARTS CURRICULUM (the courses that develop the skills: the means, not the end, of Liberal Education)

Literature

Philosophy

Languages

Fine Arts

History

Social Sciences

Physical Sciences

Mathematics

Physical training

You are responsible for:

- Ch. 1 Components of the scientific method
Physical vs chemical properties and changes
Intensive vs extensive properties
Elements vs compounds
Names and symbols of the common elements
Names of regions of the periodic table
States of matter
Conversions -- you are responsible for the metric system prefixes and
temperature
Significant figures
Scientific notation
Accuracy vs precision
- Ch. 2 Structure of the atom
How protons, electrons, and neutrons compare in mass and charge
Accomplishments of scientists
Complete atomic symbols
Naming of ionic compounds (salts), hydrates, acids, and molecular
compounds
- Ch. 3 Average atomic mass and isotopes
Moles, converting between mass and moles and between moles and number
of atoms or molecules
How elements exist naturally
Percent composition
Empirical and molecular formulas from percent composition
Stoichiometry, including limiting reagents and percent yield
- Ch. 4 Electrolytes
Net ionic equations, when both sides given and when only left side given
Acids, bases, what they do in water, their reactions
Oxidation-reduction, oxidation numbers, oxidizing agent
Classes of reactions
Using activity series to predict if a displacement reaction occurs

Molarity

How to prepare a solution from a solid to be a certain molarity

Dilution

How to prepare a solution by dilution to be a certain molarity

Acid-base titration

Ch. 5

Converting between mm Hg, torr, and atmospheres

Combined gas law

Assumptions for an ideal gas

Ideal gas law

STP

How density of a gas varies with molecular weight and pressure

Dalton's law when dealing with mixture of gases, using mole fraction

Collecting a gas over water

Graham's Law (qualitative only)

How a real gas differs from an ideal gas in pressure and volume, and why

(van der Waals)

Under what conditions of T and P a real gas behaves most like (or most

unlike) an ideal gas

Ch. 6

mole basis)

Constant volume and constant pressure calorimetry (and put answer on a per

First Law of Thermodynamics

ΔH from ΔH of formation (and put answer on a per mole basis)

ΔE from q and w

What a state function is

Predict if ΔH will be equal to ΔE

Ch. 7

wavelength

Regions of the electromagnetic spectrum, in order of frequency, energy, or

Colors of the visible spectrum, in order of frequency, energy, or wavelength

Convert between frequency, wavelength, and energy

Accomplishments of scientists

Bohr's model of the hydrogen atom -- what was correct, what was incorrect

Heisenberg Uncertainty Principle -- what it says, when it applies

Shapes of s and p orbitals

Electron configurations, complete and noble gas core

Quantum numbers -- is a set allowed? If so, what orbital? If not, why?

Set of quantum numbers for a group of electrons

Paramagnetic vs diamagnetic

Ch. 8

Electron configuration of ions

Trend in size, ionization energy

How sizes of ions compare to size of atom

Ch. 9

Lewis symbols from formula

How single, double, and triple bonds compare in length, strength

Resonance -- what is it? Drawing resonance forms