

## GENERAL CHEMISTRY FOR ENGINEERS (01:160:159)

### GENERAL INFORMATION, FALL 2016

Welcome to Chemistry 159, the first semester of General Chemistry for Engineers.

This handout provides information concerning course policies and procedures.

You are responsible for all the information in this handout. A syllabus may be attached or provided separately.

*The material for this course is copyrighted and may not be used / posted on any other web site at or outside of Rutgers without permission. Any violation of this policy will be treated as an academic integrity violation and will be referred to the Office of Student Conduct and appropriate channels for action.*

#### LEARNING GOALS FOR STUDENTS

1. Understand and Apply Basic Principles and Concepts in Chemistry as Applied to Engineering Topics

Specifically<sup>1</sup>:

- Nomenclature
- Stoichiometry
- Reactivity
- Gases
- Thermochemistry
- Our Current Model of Atom
- Quantum Mechanics and Atomic Orbitals
- Molecular Orbital Theory/Application to Metals
- Molecular Shape and VSEPR Theory
- Chemical Bonding

2. Explain and be Able to Assess the Relationship Among Assumptions, Method, Evidence, Arguments, and Theory in the Analysis of Chemistry and Chemical Systems as demonstrated by the following<sup>2</sup>:

- Interpretation of Graphical and Tabular Data
- Expression of Physical, Chemical or Engineering Processes in a Mathematical Form
- Solving Equations to Determine the Value of Physical, Chemical, and Engineering Variables
- Development of the Ability to Relate the Concepts Learned in the First Goal to Each Other in Ways that Were Not Directly Explained in Class
- Development of Critical Thinking Skills for the Application of Knowledge to Engineering Processes
- Understanding of the Basics of the Scientific Method by Applying a Relevant Body of Knowledge to the Evaluation of Existing Scientific Studies and the Design of Studies to Test Specific Hypotheses

#### Assessment of Students

An integrated approach to assessing the achievement of the learning goals 1 and 2 will be used. This includes the use of a mixture of written quizzes, multiple choice exam questions, among others aimed specifically at each of these learning goals.

<sup>1</sup>Core Curriculum Goal e

<sup>2</sup>Core Curriculum Goal f

## LECTURER AND COORDINATOR/ADMINISTRATOR

Dr. Emmanuel Hove  
ehove12@rci.rutgers.edu

**OFFICE HOURS:** Will be posted on Sakai. You are welcome to attend any of the office hours that fit your schedule regardless of your recitation section or instructor. All instructors work as a team.

**REQUIRED MATERIALS** (same as will be used in Chemistry 160 next semester)

*Please note we are not using online homework or Connect +. You do not need to purchase the interactive component Connect +.*

1. *"Principles of General Chemistry"*, Second Edition, by Martin S. Silberberg. Lecture material and homework problems originate in this textbook.
2. *"Student Solutions Manual"*, by Patricia Amateis and Martin S. Silberberg, for use with the above textbook. This manual contains detailed solutions to all Follow-Up Problems and to End-of-Chapter Problems with colored (blue) numbers. (Short answers to these same problems are given in the textbook.)
3. Scientific calculator (logarithms, exponentials, powers, roots, etc.). This does not have to be an expensive calculator. **Expensive, programmable calculators (graphing calculators) are not allowed in this course and are considered a violation of academic integrity if used.**

**The books are available online. Also:**

Items 1 and 2 above are available as a special package (Edition 2<sup>ND</sup>), Publisher: MCG CUSTOM, at the main Rutgers University Bookstore Barnes & Noble, 1 Penn Plaza, New Brunswick, at the Livingston and Douglass Bookstores, and at New Jersey Books. The same books were used in the 2013-2014 academic year. Bookstores also sell scientific calculators. This is the second edition; note the covers of the textbook may be different colors.

### LABORATORY REQUIREMENT

Introduction to Experimentation (01:160:171) is a one-semester, one-credit laboratory requirement. It may be taken in either the fall, winter, or the spring semester (or in the summer). Chem. 171 is a prerequisite or a co-requisite for Chem. 160, the second semester of General Chemistry for Engineers. Chem. 171 begins with the first day of classes, and the first meeting is more than a check-in period. Chem. 159 or equivalent is a prerequisite or a co-requisite for Chem. 171.

### ALTERNATIVE COURSES

Course coordinators and college advisors will be glad to assist you in making decisions on alternative courses. Here are some basic guidelines, but you should always check with your Dean and Department to take an alternative course since your department sets the course requirements:

1. If your problem-solving and quantitative reasoning skills at the level of high school algebra are very weak, you may want to drop Chem. 159 immediately and enroll in the one-semester, three-credit course "Introduction to Chemistry", Chemistry 134. This is NOT a substitute for Chem. 159. You may then take Chem. 159 next fall; or you may take Chem. 161/101 next spring, summer, or fall. Chem. 161/101- Chem 162/102 is the "non-engineers" version of Chem. 159-160, but is acceptable and suitable for engineers. A different textbook may be used, and each semester of Chem. 161/101 – Chem 162/102 (lecture and required recitation) is a total of a four-credit course: more lecture time is scheduled. Chem. 162/102 is also offered in the spring, summer, and fall semesters. Engineering programs will accept Chem. 161/101-162/102.

2. There is another alternative. If you discover after several weeks that, despite adequate study, you are not prepared for Chem. 159, you may want to take the one-semester, two-credit course "Preparation for General Chemistry", Chemistry 133. This starts in mid-October and is the same as Chem. 134 from mid-October through December. You will not be at a disadvantage because you start this course in October, but you should continue with Chem. 159 until Chem. 133 begins. The special procedure and deadline for switching into Chem. 133 will be announced in October. Chem. 134/133 is offered only in the fall semester.

3. The chemistry department offers also a special version of Chem. 161/101-162/102 in the fall and spring semesters, respectively. This version is called General Chemistry Special Sections and covers the same material as regular Chem. 161/101-Chem 162/102 but has more lecture time than regular Chem. 161-162, two recitations per week, more quizzes, more exams, and smaller classes.

4. If you are interested in taking a more advanced course in place of Chem. 159-160, you should consider "Honors General Chemistry", Chemistry 163-164. Chem. 163 is offered only in the fall, and Chem. 164 is offered only in the spring. High school chemistry is a prerequisite, and Calculus I and II are co-requisites for Chem. 163 and Chem. 164, respectively. Switching into Chem. 163 should be done as soon as possible. For further information, you can contact the Chemistry Department.

5. If you are a life sciences or pharmacy major or plan to attend pharmacy school, you may want to take Chem. 161/101-Chem 162/102, or Chem. 163-164, not Chem. 159-160. If you plan to attend medical or dental school, you may want to take Chem. 161/101-Chem 162/102, or Chem. 163-164, not Chem. 159-160. Chem. 159-160 is shorter and two credits less. Chem. 159-160, although designed for engineering students, is also acceptable for these majors.

### CLASSROOM MANAGEMENT SYSTEM (SAKAI)

We will be using sakai this fall (URL: <http://sakai.rutgers.edu/>) as a classroom management system. You should check this site regularly. However, this site is not a substitution for you not attending lectures or recitation. If you check it now, you may find a number of documents posted. If you are registered and a Rutgers Student, you will automatically be a "member" of the online class. You will need your NetID to login. You should read the documents, especially the Syllabus, Grading Policies, the Announcements and other material very carefully. During the course many additional documents will be posted on the web site including practice exams, and useful information or explanations about important topics. There is a discussion board and a chat room. Sakai is where the scores will be posted. If you are having trouble accessing sakai, see me after class.

## LECTURES

You are scheduled for two lectures per week, each 55 minutes in length on Tuesdays 10:35 to 11:30 AM and Thursdays 8:55–9:50 AM or on Tuesdays and Thursdays (3:35–4:30 PM) depending on your recitation section. Attendance is of utmost importance since the lecturers will be emphasizing and clarifying important and difficult concepts. You are responsible for what transpires in lecture, including any announcements and changes to the syllabus, and for picking up a copy of all lecture handouts. You are also responsible for all the assigned readings and problems, whether or not they are explicitly discussed in class. The material must be read before as well as after any given lecture. The syllabus is an approximation. The actual pace of the class will have to be determined by the abilities of the class itself. Some days, we will be ahead of the syllabus; some days we may be behind.

Any changes in the course format and/or information about exams and quizzes will be announced in lecture. Take notes! Do not rely on Sakai only and attend classes in a timely manner.

## RECITATIONS AND QUIZZES (Scientific Calculators Only)

You are scheduled for one 55-minute recitation per week. Memorize your recitation section number and the name of your recitation instructor. The correct schedule of all recitation sections is given in the on-line Schedule of Classes (subject to change). Schedule changes can be made during the first few days of classes. After that time, section changes are not possible.

Recitation is a problem-solving and help session. Seriously attempt all of the assigned homework problems before recitation. Select a few which you would like to see worked out in class, and try to have specific questions about the homework problems and about any material that is not clear in the textbook or the lectures. Be prepared, and do not hesitate, to ask questions in order to use recitation time effectively. Recitation is an important part of this course.

Quizzes will be given during the semester usually in recitation. All quizzes will count; none will be dropped. Each quiz is expected to be roughly 10 to 20 minutes long. Always bring your non-graphing calculator and official photo ID; calculators may not be shared during quizzes. **You cannot use your cell phone as a calculator.** Quizzes will consist of questions and/or problems testing your ability to relate the learned concepts in ways that were not directly explained in class. Make sure you understand the assigned homework problems and the worked examples in the text. Quizzes will include long answer problems for which work must be shown and partial credit may be possible. Quizzes will be given at the end of the recitation period so that you will have an opportunity to ask questions before the quiz. Quizzes will be graded by your recitation instructor. Any questions about how your quizzes are graded must be made promptly to your instructor. You have one week to ask for a regrade after receiving your graded quiz.

If you go to the wrong section, you will not get credit for attendance or for any quizzes or other work that are performed.

The quizzes are intended to help you to keep up with the course. Superficial understanding of the material is not enough: you need to learn to do the homework with the textbook closed, and practice really helps. Avoid inappropriate use of the solutions manual.

You can have quizzes or activities and unannounced quizzes in both lecture and recitation. Attendance will be taken.

## EXAMS (Scientific Calculators Only)

There will be two 80-minute exams plus a 180-minute final exam.

You must take the exam at your assigned location. Locations for all exams will generally be announced in Lecture. You need to attend lecture and take notes to receive any changes to the syllabus. Exams are usually multiple choice. A periodic table will be provided. You are expected to know the formulas, solubility tables and the physical constants.

## EXAM (AND QUIZ) RULES AND REQUEST FOR CONFLICT EXAM (Provide documentation by the end of the second week of the course)

1. For all examinations, be at your assigned location 15 minutes before the starting time. Bring #2 pencils, erasers, and a non-graphing, non-programmable, calculator (no memory) with spare batteries and official photo ID. Some students bring an extra scientific calculator as a back-up. Calculators may not be shared, and covers must be removed from all calculators. Earphones and headphones may not be used, and hats should not be worn. Cell phones cannot be used as calculators and will be considered as a violation of the academic integrity.
2. Cell phones, ipods, and other electronic devices are not permitted, not even for use as a calculator or a watch. If you need to know the time, you can wear a watch.
3. You should not bring books, notes, backpacks, cell phones, ipods, ipads, pagers, electronic devices, laptops or any other unnecessary items into the exam room. If you do, they must be placed out of sight during the exam: at the front, back, or sides of the exam room. We are not responsible for lost or stolen items. **When you leave the room, check that you have not forgotten anything**, such as a photo ID card, textbook, electronic device or notebook.
4. You may NOT use scratch paper; all work will be done in the question booklet. There is plenty of room, especially if you use both sides of the paper.
5. Please fill out the entire Op-scan form carefully. **Be absolutely certain that you code your student identification number correctly on the form.** Include your recitation section number. You may lose points if the Op-scan is not properly filled.
6. All answers must be transferred to the Op-scan form before time is called. Failing to do so may result in the loss of many points or a zero on the exam. You will not be permitted to write on your answer sheet once the time is called. If you have to write your name or section number etc. on the answer sheet after the time is called, points will be deducted.

NOTE: If you record your answers in the exam booklet during the exam, then you will be able to find out how many wrong answers you have as soon as the answers are made available. When the computer grading is finally done, you are responsible for finding any errors in your grade and must contact your recitation instructor within one week. Scores can go up or down with regrades. We will not consider any late requests.

Exams take precedence over most university events; however, situations that may constitute an official exam conflict follow: 1. Student is registered for another course that meets at the same time as the scheduled exam. 2. Another exam is scheduled for the student at the same time. 3. Athletic practice is required by a coach. 4. Religious observance. 5. Verifiable medical reasons.

Note that you will not usually be excused from a class or a lab because you have an exam scheduled when that class or lab meets. If you have a class that precludes you from starting a common hour exam on time at 9:40PM, you need to apply for a conflict exam. If you think that you have a conflict with the final exam, be sure to read carefully about this matter in the schedule of classes.

To request permission to take any conflict exam, please e mail both your course coordinator/administrator at [Marvastis@aol.com](mailto:Marvastis@aol.com) and your recitation instructor by the end of the second week of the course. Be sure to include the following documentation: 1. A copy of your course schedule as sent to you by the university. 2. Supporting documents to verify that a conflict exists: a note signed by a course professor or by a coach; for religious observances, attach a note verified by your Dean. All documents have to be on original letterhead with original signatures and contact telephone number for verification purposes.

A list of students approved for each conflict exam may be posted on Sakai prior to each exam; or students may be notified individually by e-mail. A conflict exam may be given in the same evening as a regularly scheduled common hour exam at a time and location to be announced. The date, time, and location of the conflict/make-up final exam will be announced.

If you miss an exam for unforeseen and verifiable medical reasons, you must notify the course coordinator and your recitation instructor (by e-mail) immediately when you are capable with an explanation. Later, you must provide the coordinator/recitation instructor with a written explanation and supporting documents. We reserve the right to verify all documentation. Make sure the documentation contains the proper letterhead and contact information. There are no make-up exams for the common hour exams. For students who are excused from Exam I or from Exam II, the total points will be adjusted in a way to account for the missing exam.

#### ACADEMIC INTEGRITY

All University polices on academic integrity will be strictly enforced. Any involvement with cheating, the fabrication or invention of information used in an academic exercise, or facilitating academic dishonesty of others will result in serious consequences ranging from reprimand to expulsion. Bringing information into an exam, whether stored electronically or on paper, shall be considered cheating. Having a cell phone or pager at hand during a test shall be considered *prima facia* evidence of cheating. All electronic devices, other than a scientific calculator must be completely turned off (Vibrate and standby modes are not accepted) and out of sight during testing. No gadgets (cell phones or other devices) are allowed with the ability to communicate with others during the exam (text or any other form). Cell phones and gadgets cannot be carried on you or in your pockets during the exam, as such texting is not allowed during the exam. Use of a calculator with the ability to communicate with other calculators, that are programmable, that have any permanent alphanumeric memories ("graphing" calculators) is expressly forbidden. Use of such calculators may result in a score of zero on the quiz or exam during which it was discovered and the involvement of the Office of Student Conduct and appropriate personnel. Signing for another student (for example on an attendance sheet) is considered to be a violation of academic integrity.

The University's policy on Academic integrity can be found at:

<http://academicintegrity.rutgers.edu/policy-on-academic-integrity>

We cannot see everything that occurs in the course. If you observe any violations of the rules, you owe it to yourself and your fellow students to report it. If you do not report, you are also hurting your own grade. This will affect the overall curve. You can report it to one of the proctors/instructors during the exam if you would like to remain anonymous. We will treat these reports in the strictest confidence.

The material for this course is copyrighted and may not be used / posted on any other web site at or outside of Rutgers without permission. Any violation of this policy will be treated as an academic integrity violation and will be referred to the Office of Student Conduct or Equivalent for action.

## GRADING

The course grade (A, B+, B, C+, C, D, F) will be based on the total number of points that a student accumulates. The maximum score is expected to be 480 points distributed roughly as follows:

	Points	%
Exam 1	100	20.8
Exam 2	100	20.8
Final Exam	200	41.7
Quizzes/Activities/Attendance/ Pop Quizzes etc...	80	16.7
Attendance	Helps Borderline situations	
Total	480	100.0

The total may change based on the circumstances. The final grade will be based on the total number of points accumulated compared to the total accumulated by the rest of the class and your performance on the final exam. There is no "preset" number of points needed to obtain an "A," "B," or "C." The conversion between point total and letter grade is not yet established and will be determined at the end of the semester. Any student who fails the final exam may fail the course regardless of the total number of points. Some instructors may choose to give pop quizzes etc.

There is no minimum passing score on the final exam, however anyone who scores low on the final may end up with a grade lower than his or her points might otherwise have earned. For example, a student in the C+ point range and low on the final might be given a grade of C or D (or lower). Further, we might assign a failing grade to anyone who scores very low on the final, regardless of the grade indicated by the points, depending on the circumstances.

The exams are not curved individually. At the end of the semester, a grade will be assigned based on the total score. However, a tentative and rough letter grade solely based on the exam may be given during the semester as a very rough guide as how you performed on that exam. The final letter grade for this course will not be based on the rough and tentative letter grades for the individual exams.

If you find yourself doing poorly, come see the instructional staff and read the sections on obtaining help. At the end, we can only grade you on the basis of your performance in the course, which includes the evaluations in class (quizzes, examinations, activities, pop quizzes, etc. and our subjective opinion of what you have learned).

We are sure you understand, there is no extra credit in this class. It is unfair to the rest of the students. Please do not ask if you can do extra work to improve your grade. You are graded on your performance in the course. For obvious reasons, you will not be graded on how hard you worked, or other factors such as personal reasons, financial issues, losing a scholarship, inability to apply for a specific program, not making the Dean's list, non-payment for your course, being a senior, being offered a job, your family situations, the impact on your GPA, a course requirement, transfer of the course to another school, your work requirements, the potential of you getting suspended etc... For the same reasons that we cannot arbitrarily give you a better grade, we cannot do the reverse, we cannot change a D to an F.

We will not disclose what the final point ranges are. We make every effort to include non-point related evaluations to adjust the grades to accurately reflect the level of learning you have demonstrated. Thus, two students with identical numbers of points may receive different grades, if that is warranted based on overall performance and improvement throughout the semester.

We will not discuss the grades and performance of other students with you.

Please understand we can only communicate with you about your issues. We cannot discuss your grades and related matters with others or with your parents.

#### STUDENTS WITH DISABILITIES (Provide letter by the end of the second week of the course)

Please contact the office of Disability Services at <https://ods.rutgers.edu/> or tel: 848-445-6800 if you need a permanent or a temporary accommodation.

If you have a disability, you must contact the course coordinator and recitation instructor right away to make the necessary arrangements to support a successful learning experience. Also, you must arrange for the course coordinator/recitation instructor to receive a letter from your College's Disability Concerns Coordinator verifying that you have a disability by the end of the second week of the course.

#### GENERAL COMMENTS AND ADDITIONAL HELP

General Chemistry is considered by many students to be a difficult course. In order to be successful, you must be conscientious and devote considerable time to the course material. Your success will depend primarily on your ability to analyze logically the wording in the chemical problems assigned for homework and given on quizzes and exams. You must learn to relate the basic concepts to the mathematical expressions that describe them. For most students, the best way to learn the material is to work on the homework problems independently, with the solutions manual closed. Good analytical skills and problem solving techniques must be acquired in order to pass the exams that consist primarily of word problems. Rote memorization of the book will not allow you to pass the course. Chemistry is a cumulative subject where one principle builds upon another. This course in general chemistry moves along at a fast pace and you need to stay on top of the material at all times. Experience shows that students who fall far behind encounter difficulties and rarely catch up again.

If, despite attending all lectures and recitation classes and working out all homework problems, you realize that some difficulties remain with understanding the course material, then seek help early! We encourage you to see any instructor in the course. We will be glad to assist you as long as you take the initiative. Feel free to contact The Rutgers Learning Centers (<https://rlc.rutgers.edu/>) for various forms of assistance.

#### CHAIN OF COMMAND

In general, routine questions regarding course material, homework problems, quizzes, quiz absences, exam scores, etc. should be directed first to your recitation instructor. Only for further information, or if the above procedure fails to resolve a particular problem, should you contact Dr. Marvasti, the course coordinator/administrator. Send the coordinator/administrator e-mail or contact the coordinator/administrator in person. Please do not call the chemistry department.

#### WEATHER AND OTHER EMERGENCIES

Check the Rutgers website for any information concerning campus operations due to weather conditions or other emergencies. The "Campus Operating Status" can be found at

<http://nb.rutgers.edu/about-us/new-brunswick-campus-operating-status>.

or by going to the main New Brunswick webpage at

<http://nb.rutgers.edu>

Changes in schedule and other adjustments will be announced on Sakai or by email. Students are still responsible for all the material even if a particular lab is cancelled due to weather emergency.



When announcements are made, campus status information will also be available through:

- Rutgers University Facebook page
- Rutgers University Twitter (@RutgersU)
- RU-info Channel on RU-tv 3
- RU-info Call Center at 732-445-INFO (4636)

For more information about the university's policy concerning adverse weather conditions, please visit <http://emergency.rutgers.edu/weather.shtml>.

Campus status information will also be available through these media stations and their websites:

- News-12 New Jersey
- New Jersey 101.5 (FM)
- WCTC Radio (1450 AM)
- WCBS Radio (880 AM)
- The Breeze Radio (107.1 and 99.7 FM)
- WRNJ Radio (1510 AM, 104.7 and 92.7 FM)
- WRSU Radio (88.7 FM)

Textbook: "Principles of General Chemistry", Martin S. Silberberg, 2<sup>nd</sup> Ed

<b>Chapter 1 Keys to the Study of Chemistry (p 1)</b>	<b>Chapter 7 Quantum Theory and Atomic Structure (p 214)</b>
1.1 Some Fundamental Definitions	7.1 The Nature of Light
1.2 The Scientific Approach	7.2 Atomic Spectra
1.3 Chemical Problem Solving	7.3 The Wave-Particle Duality of Matter and Energy
1.4 Measurement in Scientific Study	7.4 The Quantum-Mechanical Model of the Atom
1.5 Uncertainty in Measurement: Significant Figures	
<b>Chapter 2 The Components of Matter (p 31)</b>	<b>Chapter 8 Electron Configuration, Chemical Periodicity (p 245)</b>
2.1 Elements, Compounds, and Mixtures; An Atomic Overview	8.1 Development of the Periodic Table
2.2 The Observations that led to an Atomic View of Matter	8.2 Characteristics of Many-Electron Atoms
2.3 Dalton's Atomic Theory	8.3 The Quantum-Mechanical Model and the Periodic Table
2.4 The Observations that Led to the Nuclear Atom Model	8.4 Trends in Three Key Atomic Properties
2.5 The Atomic Theory Today	8.5 Atomic Structure and Chemical Reactivity
2.6 Elements: A first Look at the Periodic Table	
2.7 Compounds: Introduction to Bonding	
2.8 Compounds: Formulas, Names, and Masses	
2.9 Classification of Mixtures	
<b>Chapter 3 Stoichiometry of Formulas and Equations (p 71)</b>	<b>Chapter 9 Models of Chemical Bonding (p 278)</b>
3.1 The Mole	9.1 Atomic Properties and Chemical Bonds
3.2 Determining the Formula of an Unknown Compound	9.2 The Ionic Bonding Model
3.3 Writing and Balancing Chemical Equations	9.3 The Covalent Bonding Model
3.4 Calculating Amounts of Reactant and Product	9.4 Bond Energy and Chemical Change
3.5 Fundamental of Solutions Stoichiometry	9.5 Between the Extremes: Electronegativity and Bond Polarity
<b>Chapter 4 Three Major Classes of Chemical Reactions (p 113)</b>	<b>Chapter 10 The Shapes of Molecules (p 305)</b>
4.1 The Role of Water as a Solvent	10.1 Depicting Molecules and Ions with Lewis Structures
4.2 Writing Equations for Aqueous Ionic Reactions	10.2 Valence-Shell Electron-Pair Repulsion Theory, Molecular Shape
4.3 The Precipitation Reactions	10.3 Molecular Shape and Molecular Polarity
4.4 Acid-Base Reactions	
4.5 Oxidation-Reduction Reactions (Redox)	
4.6 Elements in Redox Reactions	
<b>Chapter 5 Gases and the Kinetic-Molecular Theory (p 145)</b>	<b>Chapter 11 Theories of Covalent Bonding (p 332)</b>
5.1 An Overview of the Physical States of Matter	11.1 Valence Bond (VB) Theory and Orbital Hybridization
5.2 Gas Pressure and Its Measurement	11.2 The Mode of Orbital Overlap and the Types of Covalent Bonds
5.3 The Gas Laws and Their Experimental Foundations	11.3 Molecular Orbital Theory(MO) Theory and Electron Delocalization
5.4 Further Applications of the Ideal Gas Law	
5.5 The Ideal Gas Law and Reaction Stoichiometry	
5.6 The Kinetic-Molecular Theory: A model for Gas Behavior	
5.7 Real Gases: Deviations from Ideal Behavior	
<b>Chapter 6 Thermochemistry (p 185)</b>	<b>Chapter 12 Intermolecular Forces (partial)</b>
6.1 Forms of Energy and their Interconversion	12.6 Bonding in Solids (pp 388-391)
6.2 Enthalpy: Heats of Reaction and Chemical Change	12.3 Types of Intermolecular Forces
6.3 Calorimetry: Laboratory Measurement of Heats of Reaction	12.4 Properties of the Liquid State
6.4 Stoichiometry of Thermochemical Equations	12.5 The Uniqueness of Water
6.5 Hess's Law of Heat Summation	
6.6 Standard Heats of Reaction	