

Chemistry 221 A – Inorganic Chemistry, Spring 2019

MWF 10 – 10:50am in VSC 180

Labs on T 8 – 11am, M 1 – 4pm in VSC 263

Professor: Dr. James Dunne

Office: VSC 228

Office hours: M 9-10am, TF 1–2pm (open door policy)

Email: dunnej@central.edu (preferred form of contact)

Course website: on Blackboard

Phone: 628-5101

Required Materials

- “Inorganic Chemistry, 7 ed.”; Weller, Overton, Rourke, and Armstrong, ISBN [978-0-19-876812-8]
- Chemistry spiral notebook, Hayden McNeil, ISBN [978-1-930882-74-4], carbonless copy laboratory notebook
- Safety goggles or glasses
- Molecular model kit
- Access to a general chemistry textbook
- Scientific calculator
- 3” x 5” notecards

Course Description

This course is an introduction to the field of inorganic chemistry. The student is expected to be well-versed in the material covered in general chemistry, as this will serve as the foundation and launching point for the material to be covered this semester. Many of the topics covered are extensions of the material learned in general chemistry, though they will be considered in terms of their application to inorganic chemistry. The course will begin by examining the properties of the elements, and expand outward to consider chemical bonding and the electronic factors that govern metal reactivity. Both lecture and laboratory experience will be used to assess your performance.

Course Goals

By the end of this course, students should have the ability to:

- accurately visualize compounds in three dimensions by correctly assigning symmetry point groups and unit cell formulas.
- utilize orbital interactions to draw MO diagrams for diatomic and simple triatomic molecules
- apply band and crystal field theories to predict conductive and magnetic properties of molecules
- apply three major acid-base theories (HSAB, Lewis acidity, frontier orbitals) to ligand binding in coordination compounds.
- predict chemical reactivity from emf and thermodynamic calculations

- assign IUPAC names and oxidation state to coordination compounds.

Attendance

As with all classes at Central College, it is expected that students will regularly attend scheduled lectures. While attendance is not officially taken, clicker questions and other assignments are offered frequently throughout the semester, and so missed lectures can result in missed assignments. Missed assignments will be given a grade of a 50% (F) so as not to unduly skew the student's overall grade in the course and misrepresent the student's mastery of the material.

Grading

The final grade for the course will be determined based on the student's performance on three in-class exams (40%), laboratory reports (20%), homework assignments (15%), in-class assessments (7.5%), exam corrections (7.5%) and a final exam (10%). The following scale is tentative and MAY be altered in accordance with class performance:

A	94% and up	C+	74-78%		
A-	90-94%	C	70-74%		
B+	86-90%	C-	66-70%	F	below 58%
B	82-86%	D+	62-66%		
B-	78-82%	D	58-62%		

Exams

Three in-class exams will be given during the course of the semester. While the exams are not strictly cumulative, knowledge of material from previous chapters may be necessary. If a student misses an exam due to unexpected illness or family emergency, the student is responsible for informing the instructor as soon as possible in order to schedule a make-up exam date. Unexplained absences during exams will result in a score of a zero be awarded. During exams, no cell phones, computers, MP3 players, or other electronic devices are permitted to be used or visible.

For each exam, students have the opportunity to create an equation sheet for use on the exam. The sheets can be up to 1 page in length, and may contain any equations or chemical constants that the student desires. Only equations or constants may be included on the sheet, ie. no worked examples or definitions. The sheets will be turned in with each exam, and are worth 5 points. Students who choose not to make an equation sheet will awarded the points regardless. The points will not be awarded should the sheet contain information other than equations or constants.

Exam corrections

Upon receiving graded exams, students will have until the following lecture period to correct any missed questions on the exam. Students may use their notes and textbook to make these corrections, as well as seek help from the instructor or tutoring center, but students must work independently. Exam corrections must be done in a different color ink from the original exam to make the corrections clear to the instructor.

Laboratories

As laboratories are an essential aspect of inorganic chemistry, your attendance is expected at each one. The lab portion of the course will include both wet chemistry and spectroscopic

techniques in inorganic chemistry. Students who miss labs for non-college sanctioned events will be awarded a zero for that particular lab. Students who miss more than two labs must withdraw from the course, or receive an F. One missed lab may be made up via the lab make-up policy. More details are provided in the laboratory syllabus.

Homework

Graded problem sets will be assigned periodically throughout the semester. These assignments are designed to provide the student with experience in utilizing and applying the material covered during the lectures. However, they are neither comprehensive nor exhaustive in nature, and should not be solely relied upon by the student for practice. For additional practice, students should use the problems at the end of each chapter in the text book. Due dates for problem sets will be specified when they are assigned.

Problem sets will be graded based on both completion and correctness. Completion of each problem set is worth 40% of the homework grade (6% of overall grade), and will be checked visually by the instructor. Within each problem set, a select number of problems will be examined and graded on correctly solving the problem. Accurately solving these problems is worth 60% of the homework grade (9% of overall grade). This is done to give students access to a larger number of problems to use as practice in order to master the material. Only a smaller subset of the problems will be graded to allow the instructor to return the work in a timely fashion so that students may use the problem sets as study tools for exams.

In-class assessments

Kahoot! questions will be utilized in class on a regular basis. Consequently, students must register with Kahoot! and always bring either laptop or smart phone capable of accessing the internet to class. These questions are designed to provide immediate feedback to both the student and instructor as to how rapidly and effectively topics are understood by the entire class. When a question results in less than an 80% consensus on an answer, one incorrect answer will be pointed out along with discussing why it is incorrect. Students will then briefly discuss with each other what answer they had selected, and try to convince each other as to which of the remaining answers is correct (Think-Pair-Share). This will continue until an 80% consensus is arrived at, or only one answer remains. These questions are graded on attendance, and a 50% will be given to students who are either absent, or did not bring an internet-capable device with them.

Additionally, quick writes will be used periodically during lecture. Students are expected to bring a package of 3x5 notecards with them to class for this purpose. When assigned, students will write everything they can recall about a particular topic on one (or more!) notecards. These will be collected immediately afterwards, and assessed based on completion. The purpose of this is to give students practice recalling content from memory with no other aids, thereby improving their recollection and mastery of the content. Additionally, the topics for these quick writes will focus largely on the underlying theory of the material, and why inorganic compounds react in the manner described. A grade of a 50% will be awarded to students who do not turn in a quick write.

Final Exam

The final exam will be held on Thursday, May 16 at 1pm, and will be approximately two hours long. The exam will be cumulative over the semester. As with the in-semester exams, an equation sheet can be made by the students so long as it includes only chemical constants and equations.

Disabilities

Central College abides by interpretations of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973 that stipulates no student shall be denied the benefits of an education "solely by reason of a handicap." Disabilities covered by law include, but are not limited to, learning disabilities, hearing, sight, or mobility impairments, and other health related impairments. If you have a documented disability that may have some impact on your work in this class for which you may require accommodations, please see me and Nancy Kroese, Director of Student Support Services and Disabilities Services Coordinator (x5247), during the first two weeks of the semester so that such accommodations may be arranged.

Plagiarism and Other Academic Dishonesty

Plagiarism, cheating, and unauthorized collaboration in any form are violations of academic integrity and may result in course penalties ranging from a lowered grade on the assignment to a failed grade for the course. In the case of serious or repeated instances, students may also be suspended or dismissed from the college. A copy of Central's Academic Integrity policy can be found in the Student Handbook, the Central Catalog, and on the web (Resources tab). It is your responsibility to read and understand the contents of that policy before you submit work to be graded. Questions regarding the policies and enforcement of the policies may be addressed to me during class or during office hours.

Notification of Participation in College-Sanctioned Events

Mock Trial participants, choir tour participants, athletes, and others who must miss a class to take part in a college-sanctioned event are expected to notify instructors well in advance and to complete assignments or exams in advance of the absence. It is the student's responsibility to communicate with the professor in advance regarding absences, and determine a schedule for make-up work (where applicable). If the instructor is not notified of an absence BEFORE class, the student will be awarded a zero for that assignment.

Tentative Schedule and Suggested Problems

The following are the chapters that will be covered during the course broken into their respective units. Exams will be given at the end of each unit, and cover the material discussed within that unit. The exam dates given are flexible, and may be pushed back depending on the pace of the course.

Unit 1:

Nuclear chemistry – Gilbert Ch. 21

Periodic properties and quantum theory – Weller Ch. 1

Chemical bonding – Weller Ch. 2.1 – 2.6

Molecular symmetry – Weller Ch. 3

(Exam 1, Feb. 13)

Unit 2:

Chemical bonding – Weller Ch. 2.7 – 2.13

Solid state chemistry – Weller Ch. 4

Thermodynamics – Gilbert Ch. 14

(Exam 2, March 8)

Unit 3:

Acids and bases – Weller Ch. 5

Oxidation and reduction – Weller Ch. 6

Coordination chemistry – Weller Ch. 7, 20

(Exam 3, April 15)

(Final exam, May 16)