

# Introduction to Inorganic Chemistry

CHMB31H3, Fall 2015

## Syllabus

knowledge of material from introductory chemistry courses (CHMA10H3 and CHMA11H3). Using this knowledge as a basis, inorganic chemistry can be turned into a piece of cake (a somewhat big but still a piece...). Keep in mind that these 92 naturally occurring elements, these 92 LEGO blocks, are what all the stuff is made of: from the most distant stars and galaxies to the tiniest grain of dust in my office. This means that inorganic chemistry is everywhere.

Our course material is divided in two parts. The first part will cover introductory topics. You have already encountered most of this material in CHMA10H3 and CHMA11H3 courses and it would be a good idea to refresh your memory (the detailed topic list is given below). During this part we shall not only review these basic concepts but also further expand and apply them to the problems that are

- c. Structure of nucleus, radioactivity, fission and fusion
- d. Nucleosynthesis: the birth of elements in stars and laboratory (basics of stellar and interstellar inorganic chemistry and artificial nuclear reactions)
- e. The periodic table of the elements: Overview

NOTE: Topics 2a, 2b, and 2e are related to the first year chemistry material and it would be a good idea to refresh your old knowledge early!

### 3. Molecules, compounds and bonding (Chapter 2)

- a. Lewis bonding model and VSEPR theory
- b. Valence bond (VB) theory
- c. Basics of molecular orbital (MO) theory

NOTE: Topics 3a, and 3b have been covered in detail in the first year. In this case, solid prior knowledge is expected. We shall devote significant portion of our time to MO theory (3c.)

### 4. Review of Important concepts

- a. Chemical equilibrium
- b. Thermodynamics
- c. Types of inorganic reactions
- d. Redox reactions and electrochemistry (Chapter 5)
- e. Acids, bases and their reactions (Chapter 4)

NOTE: Topics 4a, 4b, and 4c are not covered in the textbook but we really need them. Use your CHMA10H3 and CHMA11H3 textbook and/or notes as sources (that should be adequate) to review this important material; solid prior knowledge is expected. Important revision of CHM10H3 and CHM11H3 is expected. Use your CHMA10H3 and CHMA11H3 textbook and/or notes as sources (that should be adequate) to review this important material; solid prior knowledge is expected. Important revision of CHM10H3 and CHM11H3 is expected.

- b. Basic classes of inorganic compounds and their periodic characteristics
- 7. Hydrogen (Chapter 10)
- 8. The Group 1 elements (Chapter 11)
- 9. The Group 2 elements (Chapter 12)
- 10. The Group 13 elements (Chapter 13)
- 11. The Group 14 elements (Chapter 14)
- 12. The Group 15 elements (Chapter 15)
- 13. The Group 16 elements (Chapter 16)
- 14. The Group 17 elements (Chapter 17)
- 15. The Group 18 elements (Chapter 18)

Some special topics that will be covered only if the time permits:

1. Special topic I Inorganic chemistry in nature I: Introduction to inorganic chemistry in living systems and medicinal inorganic chemistry
2. Special topic II Inorganic chemistry in nature II: Introduction to mineralogy: silicate and  
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3. Special topic III Inorganic Chemistry in nature: Inorganic chemistry of atmosphere and gaseous giant planets

The readings and problems from your textbook will be given to you at the end of each lecture in your lecture notes. The lecture notes will be posted on the Blackboard regularly in pdf format. These notes

and hours of material really not a good idea to master this subject, if you come to the lectures and the top of the material covered and be more successful in the course (in comparison to only relying on WebOption).

This course (unfortunately) does not have tutorials in the program. However, just like during previous years, we shall have some practice time during the class.

### Laboratory Component of CHMB31H3

The laboratory component starts during the week of September 14<sup>th</sup> and runs every other week.

There are in total 5 experiments to be performed, each designed to demonstrate basic points from the lectures:

- Experiment 1: Acid-base and redox chemistry
- Experiment 2: The chemistry of groups 1 and 2
- Experiment 3: The chemistry of groups 13 and 14
- Experiment 4: The chemistry of groups 15 and 16
- Experiment 5: The chemistry of group 17 and inorganic analysis

Although every effort has been made to ensure that the experiments closely follow the lecture content, due to scheduling and other issues related to the organization of this course and classes in general, this is not always the case.

Keep in mind that the laboratory component of this course is mandatory. Other details regarding the laboratory (i.e. requirements, best practices etc.) you will find in the introduction part of the lab manual. The complete lab manual will be posted on the Blackboard portal as a .pdf file for no charge.

### Experiment/lab schedule

Week of:	Practical groups	Experiment
Sept. 14 <sup>th</sup>	PRA001, PRA003 & PRA005	Experiment 1
Sept. 21 <sup>st</sup>	PRA002, PRA004 & PRA006	
Sept. 28 <sup>th</sup>	PRA001, PRA003 & PRA005	Experiment 2
Oct. 5 <sup>th</sup>	PRA002, PRA004 & PRA006	



up to the week of the test. The second term test (late November; date/place also TBA) is going to cover the material covered between the first term test and second term test.

The final exam is cumulative with about 1/3 of questions covering material from the first half of the course (material from the first term test) and 2/3 of questions covering the second part of the course (material covered after the first term test). The final will have both multiple choice and short answer questions and will take 3 hours.

You have examples of old term tests and final exams posted on the blackboard already. The format of your exams will be the same. Use these as extra practice problems. Please note that you will find old homework assignments (problem sets) among these old tests/exams. These are provided to you as a source of extra practice problems; you will not have homework assignments in this course besides the lab datasheets.

#### Missed term test policies

If you miss a term test, you must provide the appropriate documentation within one week of the term test.



*f* To submit their own work for credit in more than one course without the permission of the instructor.

*f* To falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.

*f* To use or possess an unauthorized aid in any test or exam.

There are other offences covered under the Code, ~~these~~ these are by far the most common. Please respect these rules and the values which they protect. Offences against academic integrity will be dealt with according to the procedures outlined in the Code of Behavior on Academic Matters.

### CHMB31H3 Resources

Your required textbook:

Shriver, Weller, Overton, Trogden, and Armstrong, *Inorganic Chemistry* 6<sup>th</sup> edition. New York: W.H. Freeman and Company, 2014.

Also only recommended

Hadzovic Solutions manual for *Inorganic Chemistry* 6<sup>th</sup> edition. New York: W.H. Freeman and Company, 2014.

Other suggested books

Greenwood N.N., Earnshaw A. *Chemistry of the Elements* 2<sup>nd</sup> edition. Oxford: Butterworth-Heinemann, 1997. (Call No. QD466 .G74 1997 SCAR; available ~~here~~ <http://simplelink.library.utoronto.ca/url.cfm/2717>)

This is an excellent inorganic chemistry textbook. Importantly for us, it has a very good coverage nucleosynthesis and formation of elements in the stars. The rest of it is an advanced reading. If you would like to explore and learn more about the elements, their properties and compounds, this book is a great starting point. It covers in particular ~~the~~ detail the elements, their properties and compounds.

Miessler G.L., Tarr D.A. *Inorganic Chemistry* 3<sup>rd</sup> edition. Upper Saddle River: Pearson Education; 2004. (Call No. QD151.3 .M54 2004)





THE GUIDED TOURS OF METALLOPROTEINS

<http://www.chem.utoronto.ca/coursenotes/GTM/main.htm>

The other place where we find inorganic chemistry is in us and all other living creatures!

GOOD LUCK AND SEE YOU SOON!!

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