

CHEM 232: Inorganic Synthesis

Syllabus: Spring 2017-2018

Instructor: Dr. Mohamad Hmadeh

Office Hours: Monday and Wednesday: 10:30 am – 12:00 am. And by Appointment

Office Location: Chemistry building, Room 424

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Course Description

Experiments in synthesis, separation, purification, and characterization of inorganic main-group and transition metal compounds by IR, UV-Vis, PXRD, NMR, and ESR spectroscopy. Prerequisite: CHEM 228. Annually. (AUB Undergraduate Catalogue 2014-15).

Learning Outcomes

After completing Chemistry 232 the successful students should be able to:

1. Know the safety and regulation issues for the proper handling and use of Inorganic chemicals.
2. Synthesize, purify and isolate representative examples of main group and transition-metal inorganic compounds following procedures reported in the literature.
3. Conduct reactions under inert gas conditions.
4. Operate FTIR and UV-VIS instruments
5. Analyze IR, UV-VIS, NMR or XRD data to characterize Inorganic compounds.
6. Propose procedures for the synthesis and characterization of new inorganic compounds.
7. Search and retrieve background and technical material from the primary literature.
8. Write detailed reports in a format comparable to the ones used in the primary Inorganic Chemistry literature.
9. Defend experimental results orally in front of class.

Course Policy

- Students must be considerate of their classmates and abstain from disruptive behavior during the lecture period.
- Students are expected to attend all classes and participate in class discussion. Students who do not attend the classes will be dropped out of the course. Students are expected to enter the classroom on time. Attendance is required for both the lecture and the lab. Attendance will be taken at random intervals. Students are expected to read carefully the articles posted on Moodle.
- Students are responsible for all announcements made during the lecture period. The possibility of a make up for a missed experiment will depend on the individual case and experiment. Students are not allowed to miss the exam.
- Mobile phones are not allowed in classrooms and labs.
- Students must respect the AUB Student Code of Conduct. Any violation of this Student Code of Conduct, either academic or non-academic misconduct, will be reported to the appropriate level where the student risks being subject to disciplinary action in accordance with the Student Code of Conduct.

Grading Scheme

- Lab work and attitude (includes taking care of safety rules). After each lab, your lab instructor will tick 0, -1 or -2 to your work. (Talking on the cell phone during the lab will automatically signal -2) : **15%**
- Safety Exam (Students will lose 5% every time they fail the exam from their final course grade) :**5%**
- Participation : **5%**
- Lab Reports **50%**
- Oral exam **25 %**

Resources Available to Students

Handouts and selected articles will be distributed in class or posted on Moodle.

Useful Supporting Books:

Gregory S. Girolami, Thomas B. Rauchfuss and Robert J. Angelici Synthesis and Technique in Inorganic Chemistry: A Laboratory Manual, 3rd Edition, University Science Books, 1999

William L. Jolly The Synthesis and Characterization of Inorganic Compounds, Prentice Hall, 1970

E.A.V. Ebsworth, David W.H. Rankin and Stephen Craddock Structural Methods in Inorganic Chemistry, 2nd Edition, CRC Press, 1991

TENTATIVE LAB SCHEDULE

Experiment 1

Spectroscopic and Magnetochemical Properties of Ni(II) Complexes in Different Geometries.

Experiment 2

Synthesis and Characterization of Aluminum Complexes.

Experiment 3

Synthesis and Characterization of Metal Carbonyl Complexes.

Experiment 4

Synthesis and Characterization of Werner's Coordination Compounds.

Experiment 5

Preparation of Vanadium Complexes.

Experiment 6

Synthesis and Characterization of Titania.

Experiment 7

Synthesis of Cobaloximes : Models of Vitamin B₁₂.

Experiment 8

Synthesis of Polyoxometalates.

Experiment 9

Synthesis, Characterization and transformation of Iron oxide hydroxide.

Experiment 10

Synthesis of Mesoporous Silica from Supramolecular Templating.

Experiment 11

Preparation of a single crystal of Metal Organic Framework (MOF).

- ✓ *AUB strives to make learning experiences as accessible as possible. If you anticipate or experience academic barriers due to a disability (including mental health, chronic or temporary medical conditions), please inform me immediately so that we can privately discuss options. In order to help establish reasonable accommodations and facilitate a smooth accommodations process, you are encouraged to contact the Accessible Education Office: accessibility@aub.edu.lb; +961-1-350000, x3246; West Hall, 314.*
- ✓ *AUB is committed to facilitating a learning environment that is free of all forms of prohibited discrimination. The University's non-discrimination policy and Title IX apply to, and protect, all students, faculty, and staff. Under Title IX, discrimination based on sex and gender, including sexual harassment, is prohibited. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as*

private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at www.aub.edu.lb/titleix. To report an incident, contact the University's Title IX Coordinator Trudi Hodges at 01-350000 ext. 2514, 03-595525, or titleix@aub.edu.lb Confidential reports may be submitted anonymously online through EthicsPoint at www.aub.ethicspoint.com.