



Forman Christian College (A Chartered University)

Department of Chemistry

Course Information

Course Title	Chemistry of Main Group Elements
Course Code	CHEM 250
Course Instructor	Dr. Mariya al-Rashida; Room No. S103
Semester	Spring 2023
Credit	3 + 1
Notes & Handouts and latest researches according to the topic will be provided to the students	

COURSE REQUIREMENTS

Students are expected to attend every class and to arrive on time. Attendance less than 80% may lead to negative effect on grade. Students can consult the instructor during office hours for any difficulty related to the course.

There is no making up for quizzes, while make up for mid term exam is possible for only under extreme cases. Along with theory, practical classes are mandatory, a student will not be allowed to take practical exam if he/she was absent during practicals/lab. Some of the course topics may be covered during practical classes.

Brief Course Outline

Structural characteristics, reactivities, simple compounds, coordination compounds, metal crowns, organometallic compounds of s and p block elements, noble gases and their compounds, interhalogens, pseudohalogens and polyhalides. Anomalies in periodicity, the use of d-orbitals by non-metals, reactivity and d-orbital participation, $p\pi-d\pi$ bonds.

Student Learning Objectives

1. To be able to recall names of representative elements from all groups in periodic table belonging to s and p block.
2. To be familiar with important trends in properties of elements in periodic table.
3. To understand and be able to recall trends in reactivity of each group in s and p block of periodic table.
4. To apply acquired knowledge to explain why and how the reactivity of elements in a group is changing down the group.
5. To search recent literature from chemistry journals and prepare assignment on allocated topic.

Detailed Lecture Plan

Academic Week	Topic	Activities and Assignments
Week 1	Introduction to main group elements (from s and p block) of periodic table, their position in periodic table, metal, semi-metals and non-metals, Elements of s block, elements of group IA, their abundance in nature and physical and chemical properties including characteristic reactions and reactivity	
Week 2	Elements of group IIA, their abundance in nature and physical and chemical properties including characteristic reactions and reactivity	
Week 3	Important compounds of elements of group II A, diagonal relationship	
Week 4	Elements of group III A, the Boron family; Physical and chemical properties, diagonal relationship	Assignment 1 Announced
Week 5	Important compounds of elements of group III A, trends in chemical reactivity, industrial process for extraction of Al from its ore	Quiz 1

Week 6	Elements of group IV A, the carbon family; Physical and chemical properties, diagonal relationship	Mid Term Exam
Week 7	Important compounds of elements of group IV A, trends in chemical reactivity, silicates and silicones, their applications and importance	Assignment 1 Submission
Week 8	Elements of group V A, the Nitrogen family; Physical and chemical properties, diagonal relationship	Assignment 2 Announced
Week 9	Important compounds of elements of group IV A, trends in chemical reactivity, important oxides and acids of nitrogen and phosphorous	Quiz 2
Week 10	Elements of group VI A, the Oxygen family; Physical and chemical properties, diagonal relationship	Assignment 2 Submission
Week 11	Important compounds of elements of group VI A, trends in chemical reactivity, important oxides and acids of sulphur	Quiz 3
Week 12	Elements of group VII A, the Halogen family; Physical and chemical properties, trends in chemical reactivity, important compounds, inter-halogen compounds	Lab Exam
Week 13	Elements of group VIII A, the Nobel gases; Physical properties, explanation of inertness, reactivity of Xe and some of its important compounds	Last Day of Classes
Week 15	Final Examination (as per announced schedule)	

Recommended Book

1. Chemistry of the Elements, second edition (Elsevier) by Greenwood and Earnshaw.

Books for Further Reading

1. Advanced Inorganic Chemistry, A Comprehensive Text by Cotton and Wilkinson.
2. Concise Inorganic Chemistry (4th Edition) By J.D. Lee.
3. Selected topics in inorganic chemistry by Wahdu U. Malik, G.D. Tuli and R.D.Madan, S. Chand and Company Ltd., RamNagar, New Delhi.

Practical List

1. Preparation of Potash Alum
2. Preparation of Potash Alum from discarded Aluminium foil
3. Preparation of Sodium thiosulphate and its confirmatory test
4. Preparation of CuSO_4 from Cu turning
5. Preparation of Lead Chromate
6. Estimation of amount of calcium and magnesium in the given sample of hard water.
7. Complexometric titration for the estimation of metal ions with EDTA
8. Calibration curve of Na solutions by using flame photometer
9. Determination of the quantity of Na in ppm by using flame photometer
10. Estimation of metals by AAS.

Assessment Policy

1. Tests and Examinations: During each semester the student will take the following tests and examinations.

(a) Quizzes: A minimum of 4 quizzes will be conducted throughout the semester **There will be no makeup quizzes for any type of absentees.**

(b) Midterm Exam: The midterm exam will be conducted within the ongoing semester. The paper will be of 30-35 marks. Marked papers will be shared with the students. **There will be no makeup midterm for any type of absentees except in case of genuine a reason whereby prior approval is required from the course instructor.**

(c) Final Examination: The final examination will be held at the end of the semester. The paper will be of 35-40 marks. The final term exam will be conducted from complete syllabus and at least one third of the paper content will comprise from the syllabus covered before midterm.

(d) Paper Pattern: The mid and final term examination will consist of short questions and answers.

2. Course Evaluation

Quizzes	:	10%
Assignments	:	5%
Mid Term	:	20%
Final Term	:	35%
Practical Exam	:	25%
Class participation	:	5%

3. Minimum Attendance Requirement: Students are expected to attend all the classes to take full advantage of the learning opportunities including quizzes, tests, home assignments, projects and presentations. A minimum of 80 percent class attendance is mandatory to sit in the final examination of every semester. No allowance whatsoever shall be given on this account.

Teaching Methodologies

Following teaching methodologies will be adopted for teaching this course;

- 1) Lecture Method
- 2) Discussion Method
- 3) Demonstration Method
- 4) Question Answer Method
- 5) Project/Assignment Method
- 6) Inductive/Deductive Method

Activities

Students will be encouraged to engage themselves in the following activities to enhance the understanding of this course and to appreciate team work, self-grooming and individual confidence;

- 1) Group Activities
- 2) Individual Activities
- 3) Pair Work
- 4) Home Assignment
- 5) Project
- 6) Presentation
- 7) Classroom Discussions