

National Commission for Academic Accreditation & Assessment

Course Specification

Institution	KING KHALID UNIVERSITY
College/Department	College of Science/Department of Chemistry

A Course Identification and General Information

1. Course title and code:	Chemistry of Transition Elements Chem 323
2. Credit hours: (Theory + Practical):	4 (3+1)
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)	Bachelor Degree in Chemistry (BSc)
4. Name of faculty member responsible for the course	Anyone
5. Level/year at which this course is offered	Level 5 / 3 rd Year
6. Pre-requisites for this course (if any)	Chem 222
7. Co-requisites for this course (if any)	-
8. Location if not on main campus	-

B Objectives

<p>1. Summary of the main learning outcomes for students enrolled in the course.</p> <ul style="list-style-type: none"> - This course aims to study the chemistry of transition metals together with lanthanides and actinides and their uses. The emphasis will include a focus on coordination chemistry and theories that interpret bonding in complex formation and their applications in biological systems. - This course aims to study different synthetic methods of preparation and structure elucidation of some complexes.
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <ul style="list-style-type: none"> - Problem solving skills, relating to qualitative and quantitative information. - E-Learning System is being introduced. - Students can download course material which can be helpful for the students learning. - For the research, use internet such as Wikipedia, Googleetc. - Interpersonal skills, relating to the ability to interact with other people and to engage in team-working through group discussion.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
<p>Theoretical part: Introduction to transition elements, lanthanides and actinides. Electronic configuration of transition elements. General properties of transition elements.</p>	1	3
<p>Practical part: Introduction Safety instructions, Use of balance and the metric system</p>	1	1
<p>Theoretical part: Introduction to coordination chemistry, Types of ligands, nomenclature of complexes, different oxidation states, coordination number .</p>	1	3
<p>Practical part: Preparation of a double salt from copper sulfate and ammonia</p>	1	1
<p>Theoretical part: Bonding theories of complexation: Coordination chemistry theory.</p>	1	3
<p>Practical part: Preparation of a double salt from copper sulfate and ammonia</p>	1	1

<p>Theoretical part: Introduction to coordination chemistry, Types of ligands, nomenclature of complexes, different oxidation states, coordination number .</p> <p>Practical part: Preparation of tetraammine copper(II) sulfate complex.</p>	1	3
<p>Theoretical part: Valence Bond Theory (VBT)</p> <p>Practical part: A comparative analysis of the double salt and the tetraammine copper(II) sulfate complex</p>	1	3
<p>Theoretical part: Crystal Field Theory (CFT)</p> <p>Practical part:</p> <ul style="list-style-type: none"> - Determination of Cu content (expressed by wt.%) in tetraammine copper(II) sulfate complex - Preparation of the hexammine cobalt (III) chloride complex 	2	6
<p>Theoretical part: Effective Atomic Number (EAN), magnetic properties of complexes, factors affecting the magnitude of Δ - CFSE and some evidences on its existence. Spectrochemical series.</p> <p>Practical part:</p> <ul style="list-style-type: none"> - Practical test 1 - Analysis of the hexammine cobalt (III) chloride complex 	2	6
<p>Theoretical part: Jahn - Teller effect, Electronic spectra of metal complexes.</p> <p>Practical part:</p> <ul style="list-style-type: none"> - Preparation of cis and trans Potassium bis(oxalato)diaquachromate(III) - Analysis Cr(III) and oxalato in the complex (Potassium bis(oxalato)diaquachromate(III)) 	2	6
<p>Theoretical part:</p> <ul style="list-style-type: none"> - Molecular orbital theory (MOT) - Formation constants of complexes in solutions. <p>Practical part:</p> <ul style="list-style-type: none"> - Preparation of Potassium tris(oxalato)iron (II) and Potassium tris(oxalato)iron (III) - Preparation of the hexammine nickel (II) chloride complex 	2	6
<p>Theoretical part:</p> <ul style="list-style-type: none"> - Isomerism in metal complexes - Radioactive decay in lanthanides and actinides. <p>Practical part:</p> <ul style="list-style-type: none"> - Analysis of ammonium in hexammine nickel (II) chloride complex - Final practical and theoretical exam 	2	6

2 Course components (total contact hours per semester):

Lecture: 45	Tutorial: 0	Laboratory 15	Practical/Field work/Internship	Other:
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3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)

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4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

(i) Description of the knowledge to be acquired

- Know about the concepts of transition metal complexes and inorganic theories.
- Able to know the different synthetic methods of metal complexes and understand the reactions and the geometrical structures.
- know the different oxidation states of transition metals and their stabilities in solution.

(ii) Teaching strategies to be used to develop that knowledge

- Class room lectures
- Power point representations
- Introductory lecture gives an overview of the content and significance of the course and of its relationship to students' existing knowledge. Each subsequent lecture begins with a similar overview linking the particular content of the presentation to the general overview.
- Assignments
- Individual handwritten assignments require use of library reference material and web sites to identify information required to complete tasks.
- E-learning through university website

(iii) Methods of assessment of knowledge acquired

Questions may be in the form of: multiple choice, matching, fill in the blank, short answers, and problems

- First Midterm Exam : 10 %

<ul style="list-style-type: none"> - Second Midterm Exam: 10 % - Assignments: 5 % - Practical tests 25% - Final examination: 50%
<p>b. Cognitive Skills</p>
<p>(i) Description of cognitive skills to be developed</p> <ul style="list-style-type: none"> - Comparing and contrasting - Storing, manipulating, and retrieving information - The ability to use the Internet for more information specially you tube. - Demonstrate good understanding of the basic concepts of transition metal complexes and inorganic theories.
<p>(ii) Teaching strategies to be used to develop these cognitive skills</p> <ul style="list-style-type: none"> - Assigning research questions that can be answered through collecting and analyzing data - Solving questions related to the course from websites and text books.
<p>(iii) Methods of assessment of students cognitive skills</p> <ul style="list-style-type: none"> - Assignments, Midterm & oral Exams and Final examination at the end of semester
<p>c. Interpersonal Skills and Responsibility</p>
<p>(i) Description of the interpersonal skills and capacity to carry responsibility to be developed</p> <ul style="list-style-type: none"> - The essential components of communication skills are based on developing critical skills, observation, and feedback. - Encouraging students to use online resources - Using the Internet to collect statistical data - Using Microsoft Office (e.g. Excel, Microsoft Access, front page) to analyze data and prepare statistical reports.
<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> - An introductory lectures to the information the students need from the Pre-requisites for this course - Using PowerPoint (it's easy to cover more material quickly). - Group discussion and Online workshops
<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <ul style="list-style-type: none"> - Assessment of group assignment includes component for individual contribution. - Providing feedback.

- Encouraging self-assessment during the learning process.
d. Communication, Information Technology and Numerical Skills
(i) Description of the skills to be developed in this domain.. <ul style="list-style-type: none"> - Ability of using computers. - Developing teamwork skills. - Collaboration to finish team assignments. - Presenting reports on their lab works. - What relation of Data, Information, and Knowledge
(ii) Teaching strategies to be used to develop these skills <ul style="list-style-type: none"> - Debates - Group working. - Student assignments for writing and presenting skills for general chemistry concepts.
(iii) Methods of assessment of students numerical and communication skills <ul style="list-style-type: none"> - Instructor's feedback - Test questions require solving of simple and advanced general chemistry problems. - Assessments of student's assignments.
e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required
(ii) Teaching strategies to be used to develop these skills
(iii) Methods of assessment of students psychomotor skills

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm Examination – I	7	10%
2	Midterm Examination – II	14	10%
3	Assignments	6 & 13	5%
4	Practical Tests	7 and 15	25%
5	Final Examination	16	50%

D. Student Support

1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

The faculty member has 2 hours per week for these cases.

E Learning Resources

1. Required Text(s) - عائض الشهري وآخرون، "كيمياء العناصر الأنتقالية"، ١٤١٥ هـ. - محمد بشير حسن وآخرون، "الكيمياء اللاعضوية العملية" .. منشورات جامعة سبها - الإدارة العامة للمكتبات والنشر - ليبيا ١٩٩٦.
2. Essential References <ul style="list-style-type: none">• J .E .Huheey " 'Inorganic Chemistry" ،٤th Edition, Harper and Row, 1993• G. Marr and B.W. Rockett , "Practical Inorganic Chemistry". Van Nostrand Reinhold Company. London 1972.
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) <ul style="list-style-type: none">• N.N. Greenwood, A. Earnshaw, "Chemistry of Elements", 2nd Edition, Butterworth-Heinemann, 1997.• P.W. West and R.Bustin, "An Experience Approach to Experimental Chemistry". Collier Mc Millan Publisher, London 1976.
4-.Electronic Materials, Web Sites etc <ul style="list-style-type: none">- King Khaled University webpage- Black Board
5- Other learning material such as computer-based programs/CD, professional standards/regulations Cases and handouts will be distributed to students

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.) Number of seats in each class room – 20 Laboratories - 1 Accessories – Overhead projector
2. Computing resources MS-Office Software and Internet connection
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) Overhead projector

Computer for individual students
Internet access
Isidraw and Chemdraw and Chemoffice

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Confidential completion of standard course evaluation questionnaire.
- Focus group discussion with small groups of students.

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Observations and assistance from colleagues, independent assessment of standards achieved by students,
- Independent advice on assignment tasks, etc.

3 Processes for Improvement of Teaching

Developing the lectures periodically

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

Meetings are conducting with teachers for checking the grading of the exams.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Teachers' survey
- Students' survey