



Course Specifications

Course Title:	Inorganic Reaction Mechanisms
Course Code:	426CHEM-2
Program:	Bachelor of Science in Chemistry
Department:	Chemistry
College:	Sciences
Institution:	King Khaled University

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A. Course Identification

1. Credit hours: 2 (2+0)
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 8 / Year 4
4. Pre-requisites for this course (if any): 323CHEM
5. Co-requisites for this course (if any): none

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2	100%
2	Blended	0	0%
3	E-learning	0	0%
4	Correspondence		
5	Other		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	30
Other Learning Hours*		
1	Study	10
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	
5	Others (specify)	0
	Total	30

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

Introduction to kinetics and mechanisms, factors affecting the stability of complexes; hard and soft acids and bases, substitution reactions of octahedral complexes (D, A, Ia, Id mechanisms), substitution reactions of square planar complexes, cis and trans-effects and influences, solvolysis reactions, electron transfer reactions, outer and inner sphere mechanisms, Ligand reactions and reaction mechanisms of organometallic and bioinorganic systems

2. Course Main Objective

- Distinguish between the different hard acids and bases and understanding the factors that affect their hardness
- Recognize the correct methods for the assumption of inorganic reaction mechanism,
- Understand the different mechanisms for octahedral and square planar complexes.
- Suggest a synthetic root for some selected square planar and octahedral complexes.
- Recognize the different types of mechanism (substitution, electron transfer).
- Verify the validity of the proposed mechanism

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Understand the relationship between the type of mechanism and geometric shape of complex	K1 and K3
1.2	Compare between the different mechanisms for octahedral and square planar complexes	K2
1.3	Verify the validity of the proposed mechanism.	K1
1...		
2	Skills:	
2.1	To analyze, interpret and explain the structure-based mechanism of inorganic reactions	S3
2.2	To apply the kinetic and thermodynamic parameters upon the inorganic reaction and metal complex.	S3
2.3	To apply metal complex in catalyzed reaction	S3
2...		
3	Competence:	
3.1	To present an oral explanation for a subject in the area	C2 and C4
3.2	To interact positively with colleagues in a group work.	, C2 and C4
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction: tools and concepts of inorganic reaction	2

	mechanisms	
2	Rate laws for different reaction mechanisms	4
3	Aqueous ionic complexes, stepwise complex formation, factors affecting the stability of complexes, chelate effect, soft and hard acids and bases.	6
4	Substitution reactions in octahedral complexes - dissociation and association mechanisms - aquation reactions.	6
5	Substitution reactions in square planar complexes, trans effect and the theories for its explanation	4
...	Mechanism for oxidation-reduction reaction, inner sphere and outer sphere reactions.	4
	Ligand reactions and reaction mechanisms of organometallic and bioinorganic systems	4
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		
1.1	Understand the relationship between the type of mechanism and geometric shape of complex	Lectures , Interactive teaching sessions	Written exams, electronic quizzes
1.2	Compare between the different mechanisms for octahedral and square planar complexes	Lectures , Interactive teaching sessions	Written exams, electronic quizzes
1.3	Verify the validity of the proposed mechanism.	Tutorials, problem solving sessions	Oral discussion and examinations
2.0	Skills		
2.1	To analyze, interpret and explain the structure based mechanism of inorganic reactions	Lectures, problem solving sessions	Written exams, oral exams
2.2	To apply the kinetic and thermodynamic parameters upon the inorganic reaction and metal complex.	Lectures, problem solving sessions	Oral discussion, written examinations
...	To apply metal complex in catalyzed reaction	Lectures, problem solving sessions	Oral discussion, written examinations
3.0	Competence		
3.1	To present an oral explanation for a subject in the area	opened essays on selected topics	Class activities
3.2	To interact positively with colleagues in a group work.	Interactive teaching sessions	Oral presentation on a group report
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	3	5%
2	First Mid-term exam.	7	20%
3	Home work	9	5%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
4	Second Mid-term exam	13	20%
5	Final exam	15	50%
6			
7			
8			

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Academic advice as needed by the students.
- Office hours (10 hours per week for all students)

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Robert B. Jordan , "Reaction mechanisms of inorganic and organometallic systems", New York: Oxford University Press, 2007 ISBN 9780195301007.
Essential References Materials	1- "Mechanisms of Inorganic Reactions," Dimitris Katakis and Gilbert Gordon, Wiley-Interscience Publication, 1987, ISBN 0471842583. 2- "Catalysis Without Precious Metals," Ed. R. Morris Bullock, Wiley-VCH, 2010, ISBN 9783527323548
Electronic Materials	1-"Kinetics and Mechanisms of Reaction of Transition Metal Complexes," Ralph G. Wilkins, 2nd Thoroughly Revised Edition, VCH Publishers, 1992, ISBN 9783527282531 (Online book access at http://onlinelibrary.wiley.com/book/10.1002/3527600825) 2- "Ligand Substitution Processes," C.H. Langford and H.B. Gray, W.A. Benjamin, Inc., 1966 (Online book access at http://caltechbook.library.caltech.edu/100/1/Langford_Lsp.pdf) 3- Lecture Synopsis at http://www.chem.ox.ac.uk/icl/dermot/mechanism1/
Other Learning Materials	Cases and handouts will be distributed to students

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Air-conditioned rooms (45 seats)
Technology Resources (AV, data show, Smart Board, software, etc.)	MS-Office Software and Internet connection
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Overhead projector Computer for individual students Internet access

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course delivery (teaching methods and assessment methods)	students	Questionnaire
	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
	Program Leader	Meeting
Course contents (update)	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
Quality of learning resources	Departmental Plan and curriculum committee; external reviewers	Reports

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department counsel
Reference No.	1/22/142
Date	15-9-1442