	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Chemistry Masters Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Advanced Inorganic Reaction Mechanisms	4710202008		T=2	P=0	ECTS=4.48	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Prof. Dr. Nuniek Herdyastuti, M.Si.

Learning model	**Case Studies**
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	Study of thermodynamic stability, stereochemistry of complex compounds, mechanisms and kinetics of octahedral and rectilinear complex substitution reactions in group collaboration forums with discussion activities.
References	**Main :**

1. Basolo, F. and Pearson R.G. 1973. Mechanisms of Inorganic Reactions ., Wiley Eastern Private LTD. New Delhi
2. Benson, D., 1968. Mechanisms of Inorganic Reactions in Solution , McGraw-Hill, London.
3. Douglas, B.E. ; McDaniel, D. H. ; Alexander, J.J., 1994. Concepts and Models of Inorganic Chemistry , Third Edition, John Wiley & Sons, Inc. New York
4. Huheey, J.E. ; Keiter, E.A. ; Keiter, R.L., 1990, Inorganic Chemistry, Prinsciples of Structure and Reactivity , Fourth Edition, Harper Collins College Publishers.
5. Miessler, G.L. & Tarr, D. A., 1991, Inorganic Chemistry, Prentice Hall International, Inc., London.

Supporters:	
Supporting lecturer	Dr. Amaria, M.Si. Prof. Dr. Sari Edi Cahyaningrum, M.Si. Dr. Dina Kartika Maharani, S.Si., M.Sc.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Understand basic theories about rates, reaction mechanisms of complex compounds	1. Distinguish between simple reactions and complex reactions 2. Write the equation for the rate of product formation and reactant reduction 3. Determine the reaction order of a reaction	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Discussion, Question and answer 2 X 50			0%
2	Understand rate law	1. Distinguish between intermediate terms and activated complexes (transition state)2. Write down the rate law of complex reactions 3. Write down the rate law for product formation and reactant reduction using a steady state approach and at the same time determine the reaction order	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Discussion Questions and answers and practice questions 2 X 50			0%
3	Understand the water exchange reaction and the factors that influence it.	Differentiate water exchange rates for class I, II and III metal complexes.		2 X 50			0%
4	Understand the difference between inert and labile complexes	1. Distinguish between inert and labile complexes 2. Predict inert or labile complexes from d orbital configurations		2 X 50			0%
5	Understand octahedral complex substitution reactions and the factors that influence them.	1. Write a substitution reaction with an octahedral complex dissociation mechanism		2 X 50			0%
6	Understand the influence of ligands on complex compound reactions	2. Determine the equation for the rate and order of substitution reactions using the octahedral complex association mechanism 1. Explain the relationship between the sensitivity of the incoming ligand and the rate of the water exchange reaction 2. Explain the relationship between the sensitivity of the remaining ligand and the rate of the water exchange reaction 3. Explain the relationship between the steric effect of the leaving ligand and the rate of the exchange reaction water 4. Explain the		2 X 50			0%

		relationship between the electronic effects of inert ligands and the rate of water exchange reactions. 5. Describe the differences between cis and trans complexes on the rate of water exchange reactions. 6. Explain the difference between first and second order reactions with various concentrations of incoming ligand [Y] 7. Explain the relationship between the effect of the charge on the central atom and the rate of the water exchange reaction. 8. Predict the type of substitution reaction mechanism that will occur if given reaction rate data or a reaction rate image 1. Predict the percentage distribution of cis and trans complex compounds from the substitution reaction dissociation mechanism with trigonal bipyramid intermediates 2. Predict the percentage distribution of cis and trans complex compounds from the substitution reaction disassociation mechanisms with tetragonal pyramidal intermediates 3. Predict the percentage distribution of cis and trans isomers of complex compounds from association attacks with pentagonal bipyramid intermediates 4. Draw stereochemistry of octahedral complexes with bidentate ligand types					
7	Understand the influence of ligands on complex compound reactions	2. Determine the equation for the rate and order of substitution reactions using the octahedral complex association mechanism 1.		2 X 50			0%

		Explain the relationship between the sensitivity of the incoming ligand and the rate of the water exchange reaction 2. Explain the relationship between the sensitivity of the remaining ligand and the rate of the water exchange reaction 3. Explain the relationship between the steric effect of the leaving ligand and the rate of the exchange reaction water 4. Explain the relationship between the electronic effects of inert ligands and the rate of water exchange reactions. 5. Describe the differences between cis and trans complexes on the rate of water exchange reactions. 6. Explain the difference between first and second order reactions with various concentrations of incoming ligand [Y] 7. Explain the relationship between the effect of the charge on the central atom and the rate of the water exchange reaction. 8. Predict the type of substitution reaction mechanism that will occur if given reaction rate data or a reaction rate image 1. Predict the percentage distribution of cis and trans complex compounds from the substitution reaction dissociation mechanism with trigonal bipyramid intermediates 2. Predict the percentage distribution of cis and trans complex compounds from the substitution reaction disassociation mechanisms with tetragonal pyramidal intermediates 3. Predict the percentage						

		distribution of cis and trans isomers of complex compounds from association attacks with pentagonal bipyramid intermediates 4. Draw stereochemistry of octahedral complexes with bidentate ligand types					
8	UTS			2 X 50			0%
9	Understand square complex substitution reactions and the factors that influence them.			2 X 50			0%
10	Understand square complex substitution reactions and the factors that influence them.			2 X 50			0%
11	Understand square complex substitution reactions and the factors that influence them.			2 X 50			0%
12							0%
13							0%
14							0%
15							0%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.

10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.