

University of Rajshahi
Department of Chemistry
Semester 3rd year, Session 2020-2021

Lesson Plan

DATE _____

Course No: 323F Course Title: Industrial Chemistry-I

Course Teacher: Professor Hasan Ahmad

COURSE OBJECTIVES:

- To familiar with Chemical Industries in Bangladesh
 To learn Chemical & Physical Changes during production
 To design -----

COURSE LEARNING OUTCOME (CLO): Upon successful completion of this course, a student will be able to

1. Explain problems that can arise in chemical Industry & give solution
2. Construct reactor in consultation with Chemical Eng.
3. Design, analyze and optimize chemical process

TEXT BOOK (S):

1. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4th ed., 1977
2. B. K. Sharma: Industrial Chemistry, 10th ed. 2012

REFERENCE BOOK(S):

1. A. Roger: Roger's Industrial Chemistry, A Manual for the Students and Manufacture, Vol. I and II, 6th ed., 1956
2. W. L. Nelson: Petroleum Refinery Engineering, 4th ed., 1987
3. R. K. Das: Industrial Chemistry, Part I and II, 1967

COURSE PLAN/SCHEDULE:

S. No	Topics to be covered	Learning objectives	Ref. to Text Book	No. of lectures
1	Chap-4 Natural Gas: Origin, composition	CLO1 Students should be able to a) know the origin of natural gas; b) know composition of natural gas; c) classify natural gas; d) explain the impurity present and their effects.	1. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4 th ed., 1977 2. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1
2	Chap-4 Natural Gas: Purification of natural gas	CLO1 Students should be able to a) know how to remove impurity from natural gas; b) explain chemistry associated with the removal processes; c) identify merits and demerits of different processes.	1. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4 th ed., 1977 2. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1
3	Chap-4 Natural Gas: Production of hydrogen and nitrogen	CLO1 Students should be able to a) know steps involved in the production of urea; b) know raw materials required for NH ₃ preparation; c) discuss reactions occur during preparation; d) explain the industrial process for NH ₃ preparation; e) physico-chemical principle of NH ₃ forming reaction.	1. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4 th ed., 1977 2. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1
4	Chap-4 Natural Gas: Production of carbon dioxide, production of urea and the physico-chemical processes associated with its production	CLO1 Students should be able to a) identify raw materials require for CO ₂ preparation; b) understand reactions during CO ₂ preparation; c) explain the industrial process associated with urea preparation; d) understand the optimization of reactions	1. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4 th ed., 1977 2. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1

S. No	Topics to be covered	Learning objectives	Ref. to Text Book	No. of lectures
		conditions; e) discuss the application potential of natural gas in industry		
5	Chap-3 Petroleum: General idea of formation, composition and evaluation. Separation Operation: Distillation	CLO2 Students should be able to a) explain the formation of petroleum; b) define crude petroleum; c) discuss the composition of crude petroleum; d) explain the importance of distillation in petroleum refining; e) discuss the construction of fractionating column; f) know how separation of petroleum hydrocarbons is carried out.	1. W. L. Nelson: Petroleum Refinery Engineering, 4 th ed., 1987 2. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1
6	Chap-3 Petroleum: <i>Separation Operation:</i> adsorption, filtration, crystallization, extraction and treating process. <i>Conversion Process:</i> Cracking,	CLO2 Students should be able to a) know other industrially less important process for separating hydrocarbons; b) identify objectives treating process; c) explain the importance of conversion process in petroleum industry; d) define cracking; e) classify cracking.	1. W. L. Nelson: Petroleum Refinery Engineering, 4 th ed., 1987 2. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1
7	Chap-3 Petroleum: <i>Conversion Process:</i> Cracking, polymerization, alkylation, hydrogenation, hydrocracking, isomerization, reforming or aromatization, esterification and hydrolysis, motor and aviation fuel, their characteristics and evaluation.	CLO2 Students should be able to a) know merits and demerits of different cracking processes; b) discuss chemistry of cracking; c) define different conversion processes such as alkylation, hydrogenation, isomerization and aromatization.	1. W. L. Nelson: Petroleum Refinery Engineering, 4 th ed., 1987 2. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1
8	Chap-3 Petroleum: Motor and aviation fuel, their characteristics and evaluation	CLO2 Students should be able to a) define motor and aviation fuel; b) measure the quality of gasoline and diesel; c) construction of gasoline and diesel engine; d) define octane and cetane number; e) know the chemical routes for improving the low octane fuel;	1. W. L. Nelson: Petroleum Refinery Engineering, 4 th ed., 1987 2. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1
9	Chap-7 Sugar Industry: Raw materials, production, detail of the operations and processes,	CLO3 Students should be able to a) know the starting raw materials and composition; b) understand the steps required for sugar manufacture; c) understand methodology for extraction of juice from sugar cane and beet; d) know what precaution is required before extraction; e) have knowledge on the type of impurities in extracted juice.	1. A. Roger: Roger's Industrial Chemistry, A Manual for the Students and Manufacture, Vol. I and II, 6 th ed., 1956	1
10	Chap-7 Sugar Industry: Detail of the operations and processes,	CLO3 Students should be able to a) understand chemistry of removing impurities from extracted juice by clarification; b) know processes of clarification; c) understand the importance of evaporation; d) know why multiple-effect evaporator is used.	1. A. Roger: Roger's Industrial Chemistry, A Manual for the Students and Manufacture, Vol. I and II, 6 th ed., 1956	1
11	Chap-7 Sugar Industry: Detail of the operations and processes, refining of sugar, utilization of by-products.	CLO3 Students should be able to a) know principle of crystallization; b) understand the process of crystallization; c) state the importance of refining raw sugar; d) explain the refining process e) know the by-products from sugar industry; f) usefulness of by-products.	1. A. Roger: Roger's Industrial Chemistry, A Manual for the Students and Manufacture, Vol. I and II, 6 th ed., 1956	1

S. No	Topics to be covered	Learning objectives	Ref. to Text Book	No. of lectures
12	Chap-9 Refractory and Allied Materials: Definition and classification, utilization of cement,	CLO4 Students should be able to a) define refractory materials; b) understand the application of refractory materials; c) define cement and its classification; d) understand Portland cement and its classification.	1. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012 2. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4 th ed., 1977	1
13	Chap-9 Refractory and Allied Materials: raw materials, chemistry involved in the preparation of cement,	CLO4 Students should be able to a) know raw materials for Portland cement manufacture; b) understand manufacturing processes for Portland cement; c) learn chemistry of manufacturing process;	1. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012 2. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4 th ed., 1977	1
14	Chap-9 Refractory and Allied Materials: setting and hardening process in cement and testing of cement.	CLO4 Students should be able to a) understand setting and hardening processes of Portland cement; b) chemistry of setting and hardening processes; c) understand how the cement quality is measured.	1. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012 2. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4 th ed., 1977	1
15	Chap-9 Refractory and Allied Materials: Definition and classification, utilization of glass, raw materials,	CLO4 Students should be able to a) define glass; b) understand vitrification and devitrification; c) learn fundamental physical and chemical properties of glass; d) understand different types of glasses and their applications; e) know the raw materials of glass;	1. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012 2. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process Industries, 4 th ed., 1977	1
16	Chap-9 Refractory and Allied Materials: chemistry involved in the preparation of glass and ceramics,	CLO4 Students should be able to a) explain the preparation of ordinary glass; b) learn chemistry involved in preparation; c) understand ceramics and their classification.	1. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012 2. Randolph Norris Shreve, Joseph Andrew Brink: The Chemical Process	1
17	Chap-1 Unit Operations and Unit Processes: Introduction, evaporation, and their applications in common industries, introduction of evaporators and classification, operating principles of single and multiple effect evaporators,	CLO5 Students should be able to a) define unit operations and unit processes; b) learn different types of evaporator; c) learn use of evaporator; d) explain factors that influence the selection of evaporator. e) understand working principle of some selected evaporators;	1. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1
18	Chap-1 Unit Operations and Unit Processes: Introduction, crystallization, and their applications in common industries,	CLO5 Students should be able to a) learn crystallization principle; b) understand classification of crystallizer; c) learn use of crystallizers in industry;	1. B. K. Sharma: Industrial Chemistry, 10 th ed. 2012	1

ASSESSMENT

Sl. No.	Evaluation Components	Duration	Weightage 20%	Date & Time	Venue
1	1,2,3	40 min	15%	Class Test#1, Date.....	Room# 224
2	5	One week		Assignment#1, Date Date.....	
3	4,5,6,7	1.00 hr		Class Test#1, Date.....	
4	-----	-----			
5	Attendance %	Continuous	5%		