

Course Book

<p>Course Description</p>	<p>Course overview: The purpose of this course is to provide students with an understanding of Petroleum Chemistry. The course addresses the chemical composition and refinery productions of (oil and gas), and provide knowledge of chemical compounds. The course will also review the chemical basis for the most important chemical reactions. The course provides the student with a basic knowledge and understanding types of petrochemical hydrocarbon compounds, technical aspects, business model, and impact on society and the environment. The primary emphasis is on the identification of of design production of chemicals. At the end of the course, the student should be able to speak in a general way on all aspects of the petroleum products.</p>
<p>Course objectives</p>	<ul style="list-style-type: none"> ○ Describe the study of Petroleum Chemistry and their synthesis. ○ Petroleum Chemistry is a course that addresses the chemical composition and physical properties of petroleum, ○ methods of fractionation and analysis, and the chemical basis for the most common refinery processes. ○ It also provides and an overview of the products from oil refining. ○ Some additional subjects will be included. ○ These are typical unit operations and historical tendencies in the fields of petroleum processing.
<p>Student's obligation</p>	<ul style="list-style-type: none"> ➤ Attendance – is expected at all lectures and labs. Attendance in lecture and lab is required for course completion. Class attendance is monitored and recorded. YOU are responsible for missed information. Attendance does affect your grade because you probably missed something you needed to learn how to do. ➤ Students in all sections of this course will be required to do the following: <ol style="list-style-type: none"> 1. Students will participate in lecture activities including discussions, quizzes and in class assignments 2. Quizzes are designed to assist you in understanding the course materials and to provide you with examples of the type of questions that will be on the exams. 3. Students will turn in assigned homework problems and questions

	<ol style="list-style-type: none"> Students may participate in optional cooperative learning groups Students will participate in laboratory experiments and turn in laboratory reports NO CELL PHONES- Cell phones are not allowed to be used as calculators in class or lab 																																									
Required Learning Materials	<ol style="list-style-type: none"> First five minutes is to remind students with a previous subject in last lecture. Notes and handout of lecture are given to students containing details of the topics using power point presentation. During the lecture, lecturer explains subject by a written on white board to become more understandable and simple. At the end of the lecture, lecturer allows students ask their questions. Regarding practical lectures, they give in the Lab where the students are divided into more than one groups. The students work as multigroup at the lab to run equipment's and to submit a report for what they have done at the lab for the next practical lecture. 																																									
Evaluation	<table border="1"> <thead> <tr> <th>Task</th> <th>Weight (Marks)</th> <th>Due Week</th> <th>Relevant Learning Outcome</th> </tr> </thead> <tbody> <tr> <td>Paper Review</td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="6">Assignments</td> <td>Homework</td> <td>10</td> <td rowspan="6">Tech student to have activity and make their works properly and professionally.</td> </tr> <tr> <td>Class Activity</td> <td>10</td> </tr> <tr> <td>Report</td> <td>10</td> </tr> <tr> <td>Seminar</td> <td>1</td> </tr> <tr> <td>Essay</td> <td></td> </tr> <tr> <td>Project</td> <td></td> </tr> <tr> <td>Quiz</td> <td>8</td> <td></td> <td>To know exam style</td> </tr> <tr> <td>Lab.</td> <td>5</td> <td></td> <td></td> </tr> <tr> <td>Midterm Exam</td> <td>16</td> <td></td> <td rowspan="2">To know his level after finishing term</td> </tr> <tr> <td>Final Exam</td> <td>40</td> <td></td> </tr> <tr> <td>Total</td> <td>100</td> <td></td> <td>To know if student successes or no</td> </tr> </tbody> </table>	Task	Weight (Marks)	Due Week	Relevant Learning Outcome	Paper Review				Assignments	Homework	10	Tech student to have activity and make their works properly and professionally.	Class Activity	10	Report	10	Seminar	1	Essay		Project		Quiz	8		To know exam style	Lab.	5			Midterm Exam	16		To know his level after finishing term	Final Exam	40		Total	100		To know if student successes or no
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Specific learning outcome:	<p>After completing Petroleum Chemistry, students will be equipped with a basic understanding of the following:</p> <ol style="list-style-type: none"> The overall chemical composition of petroleum, including the phase composition of generalized oil types Physical parameters for evaluation of oil quality 																																									

	<p>3- Principles of major refining processes</p> <p>4- Methods of fractionation and analysis of crude oil products and fractions.</p> <p>5- Potentials and processes for the production of renewable liquid fuels from biomass sources</p> <p>6- Important secondary unit operations</p> <p>7- Understand factors that affect the choice of production chemicals including greener chemicals.</p> <p>8- Understand the control of production chemicals for the oil & gas industry.</p> <p>9- Understand the chemistry of the refinery process as it relates to casings and other applications.</p> <p>10- Understand the equipment and procedures for evaluating petrochemical performance.</p>	
Course References:	<p>1- Handbook of Petroleum Product Analysis by James G. Speight.</p> <p>2- The Chemistry and Technology of Petroleum by James G. Speight.</p> <p>3- Refining Petroleum for Chemicals by Gould R.F.</p>	
Course topics (Theory)	Week	Learning Outcome
Course book of Petroleum Chemistry	1	Back ground on petroleum chemical compositions.
Processes and equipment	2	Gives info on refinery process
Benzene	3	Gives in details about benzene production
Benzene	4	
Toluene and the xylenes	5	Gives in details about toluene and xylene production
Olefin plants	6	Gives in details about Olefin plants production
Olefin plants	7	
Cyclohexane	8	Gives in details about cyclohexane production
Cumene and phenol	9	Gives in details about Cumene and phenol productions
Cumene and phenol	10	

Ethylbenzene	11	Gives in details about Ethylbenzene production
Methyl tertiary butyl ether (MTBE)	12	Gives in details about Methyl tertiary butyl ether (MTBE) production
Practical Topics	Week	Learning Outcome
Determination of petroleum products liquid boiling point (BP) by simple distillation.	1	Determining the boiling point of chemical which have a big difference in the bp, ranges.
fractional distillation	2	Determining the boiling point of chemical which have a small difference in the bp, ranges.
ASTM and TBP Determination by Distillation in lab.	3	Determining the TBP of fractions.
Density and relative density of Asphalt	4	All about density of asphaltene
Melting Point of Petroleum Wax	5	To evaluate the melting point of wax
How to test the alcohol content of gasoline	6	To determine alcohols in petroleum products.
Aniline point determination	7	To evaluate the aromaticity of fractional products.
Ethane and methane preparation	8	A Chemical reaction
Qualitative acidity measurement of HCs and their distillation residue D1093	9	To determine acidity of HCs.

Example:

Q1- The boiling point of diesel is

a- 270 °C to 340 °C

b- 350 °C to 500 °C

c- 500 °C to 600 °C

d- more than 500 °C, answer: a

q2- The reaction $2\text{CH}_n + \text{O}_2 \rightarrow 2\text{CO} + n\text{H}_2$ is termed

A. Oxidation B. Partial oxidation C. Reduction ANSWER: B

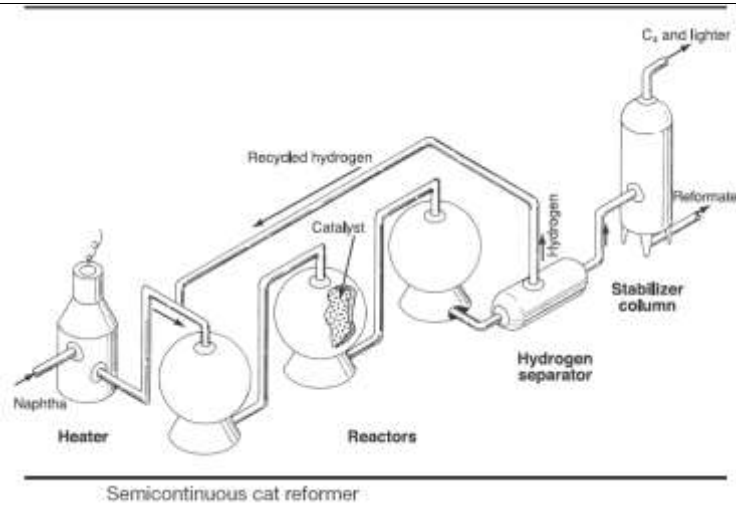
Q3- The determination of the properties of various fractions of crude oil is termed

A. Crude assay

B. Crude vaporization

C. True boiling point assay

Q4) Draw design of semicontinuous catalytic reforming?



Answer:

The boiling point of benzene is higher than that of cyclopentane.

A. True B. False

Extra notes:

Around 10% of lectures might be changed during course.

External Evaluator