NATIONAL OPEN UNIVERSITY OF NIGERIA

CHM 306

Petroleum Chemistry

Course Guide

CHM 306 Petroleum Chemistry Course Guide

Course Developer/Writer
Dr A. A. Kasali, Lagos State University, Ojo Lagos

Course Editor
Dr Olusegun Abiola, University of Lagos, Akoka Lagos

Course Coordinator
Dr H. Aliyu & Mr. Adakole Ikpe, National Open University of Nigeria

Programme Leader
[Prof Femi Peters, National Open University of Nigeria]

Credits of cover-photo: Henry Ude, National Open University of Nigeria

National Open University of Nigeria - 91, Cadastral Zone, Nnamdi Azikiwe Express Way, Jabi, Abuja, Nigeria

www.nou.edu.ng centralinfo@nou.edu.ng
oer.nou.edu.ng oerunit@noun.edu.ng OER repository

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Introduction

Introduction to Petroleum Chemistry is a second semester course. It is a two -unit credit degree course available to all students offering the Bachelor of Science (B.Sc.) Chemistry.

Petroleum Chemistry is a special field of general chemistry. The practitioner is primarily a chemist and must be trained in the same way and work with the same method as his/her colleagues who specialise in other areas of chemistry. If we are to follow this, it is not possible to discuss the development of petroleum chemistry without treating the development of general chemistry simultaneously.

The concept of Petroleum Chemistry has various meanings to people in different fields. The main concern of Petroleum Chemistry is with the petroleum engineers, with petroleum occupation, and with problems associated with petroleum production. Petroleum Chemistry is a discipline which studies the various problems associated with petroleum production. The purpose underlying the study of Petroleum Chemistry is to develop greater and better ways of solving associated problems with production of petroleum products.

What you will Learn in this Course

The course consists of units and a Course Guide. This Course Guide tells you briefly what the course is about, what course materials you will be using and how you can work with these materials. In addition, it advocates some general guidelines for the amount of time you are likely to spend on each unit of the course in order to complete it successfully.

It gives you guidance in respect of your Tutor-Marked Assignment which will be made available in the assignment file. There will be regular tutorial classes that are related to the course. It is advisable for you to attend these tutorial sessions. The course will prepare you for the challenges you will meet in the field of Petroleum Chemistry.

Course Aims

The aim of the course is not complex. The course aims to provide you with an understanding of Petroleum Chemistry; it also aims to provide you with solutions to problems in Petroleum Chemistry.

Course Objectives

To achieve the aims set out, the course has a set of objectives. Each unit has specific objectives which are included at the beginning of the unit. You should read these objectives before you study the unit. You may wish to refer to them during your study to check on your progress. You should always look at the unit objectives after completion of each unit. By doing so, you would have followed the instructions in the unit.

Below are the comprehensive objectives of the course as a whole. By meeting these objectives, you should have achieved the aims of the course as a whole. In addition to the aims above, this course sets to achieve some objectives. Thus, after going through the course, you should be able to:

- explain the concept of Petroleum Chemistry and its significance
- identify the basic concepts, terms and important events in the development of Petroleum Chemistry.
- identify the significance, strategies, approaches and problems in Petroleum Chemistry

Course Materials

The main components of the course are:

1. The Course Guide
2. Study Units
3. References / Further Reading
4. Assignments
5. Presentation Schedule.

Study Units

The study units in this course are as follows:

Module 1 Basic Concepts in Petroleum Chemistry

Unit 1 Origin of Crude Oil
Unit 2 Fate of Organic Matter in Sedimentary Basins
Unit 3 Gas Origin, Transportation and Uses
Unit 4 Oil Well, Oil Field and Reservoir

Module 2 Composition of Crude and Natural Gas

Unit 1 Composition, Properties and Classification of Crude oil
Unit 2 Origin, Transportation and Uses
Unit 3 Basic Petroleum Refining
Unit 4 Natural Gas Treatment Processes

Module 3 Distribution of Petroleum and Natural Gases Resources

Unit 1 Distribution of Natural Gases
Unit 2 Nigeria Natural Gas Potential
Unit 3 Petrochemicals from Natural Gas

The first unit of module one focuses on the basic concept in Petroleum Chemistry *vis-a-vis* the origin of petroleum. The second unit deals with the fate of organic matter in sedimentary basins. The third and the fourth units are concerned with the origin of natural gas, its transportation and the various types of oil and gas well, oil fields and reservoir.

Units one, two, three and four of module two deal with the composition, properties and classification of crude oil and natural gases, refining and treatment of natural gas.
While, units one, two and three of module three are concerned with distribution of petroleum, distribution of natural gases, Nigeria natural gas potential and petrochemicals from natural gas.

Each unit consists of one or two weeks' work and includes an introduction, objectives, reading materials, exercises, conclusion, summary, tutor-marked assignments (TMAs) and references/further reading. The unit directs you to work on exercises related to the required reading. In general, these exercises test you on the materials you have just covered or require you to apply it in some way and thereby assist you to evaluate your progress and to reinforce your comprehension of the material. Together with TMAs, these exercises will help you in achieving the stated learning objectives of the individual units and of the course as a whole.

Presentation Schedule

Your course materials have important dates for the early and timely completion and submission of your TMAs and attending tutorials. You should remember that you are required to submit all your assignments by the stipulated time and date. You should guard against falling behind in your work.

Assessment

There are three aspects to the assessment of the course. First is made up of Self Assessment Exercises, second consists of the Tutor-Marked Assignments and third is the written examination/end of course examination.

You are advised to do the exercises. In tackling the assignments, you are expected to apply information, knowledge and techniques you gathered during the course. The assignments must be submitted to your facilitator for formal assessment in accordance with the deadlines stated in the presentation schedule and the assignment file. The work you submit to your tutor for assessment will count for 30% of your total course mark. At the end of the course you will need to sit for a final or end of course examination of about three hours duration. This examination will count for 70% of your total course mark.

Tutor-Marked Assignment (TMA)

The TMA is a continuous assessment component of your course. It accounts for 30% of the total score. You will be given four (4) TMAs to answer. Three of these must be answered before you are allowed to sit for the end of the course examination. The TMAs would be given to you by your facilitator and returned after you have done the assignment. Assignment questions for the units in this course are contained in the assignment file. You will be able to complete your assignment from the information and material contained in your reading, references and study units. However, it is desirable in all degree levels of education to demonstrate that you have read and researched more into your references, which will give you a wider view point and may provide you with a deeper understanding of the subject.

Make sure that each assignment reaches your facilitator on or before the deadline given in the presentation schedule and assignment file. If for any reason you cannot complete your work on time, contact your facilitator before the assignment is due to discuss the possibility of an extension. Extension will not be granted after the due date unless in exceptional circumstances.

Final Examination and Grading

The end of course examination for introduction to Petroleum Chemistry will be for about two hours and it has a value of 70% of the total course score. The examination will consist of questions, which will reflect the type of self-testing, practice exercise and Tutor-Marked Assignment problems you have previously encountered. All areas of the course will be assessed.
It is better to use the time between finishing the last unit and sitting for the examination to revise the whole course. You might find it useful to review your self-test, TMAs and comments on them before the examination. The end of course examination covers information from all parts of the course.

Course Marking Scheme

Assignment	**Marks**
Assignments 1- 4	Four assignments, best three marks of the four count at 10% each – 30% of course marks.
End of course examination	70% of overall course marks.
Total	100% of course materials.

Facilitators/Tutors and Tutorials

There are 16 hours of tutorials provided in support of this course. You will be notified of the dates, times and location of these tutorials as well as the name and phone number of your facilitator, as soon as you are allocated a tutorial group.

Your facilitator will mark and comment on your assignments, keep a close watch on your progress and any difficulties you might face and provide assistance to you during the course. You are expected to mail your Tutor-Marked Assignment to your facilitator before the schedule date (at least two working days are required). They will be marked by your tutor and returned to you as soon as possible.

Do not delay to contact your facilitator by telephone or e-mail if you need assistance.

The following might be the circumstances in which you would find assistance necessary, hence you would have to contact your facilitator if:

- You do not understand any part of the study or the assigned readings
- You have difficulty with the self-tests
- You have a question or problem with an assignment or with the grading of an assignment.

You should endeavour to attend the tutorials. This is the only chance to have face to face contact with your course facilitator and to ask questions which are answered instantly. You can raise any problem encountered in the course of your study.

To gain much benefit from course tutorials, prepare a question list before attending them. You will learn a lot from participating actively in discussions.

Summary

Introduction to Petroleum Chemistry is a course that intends to provide the concept of the discipline and is concerned with basic processes and the entire system of petroleum generation, extraction and purification. Upon completing this course, you will be equipped with the basic knowledge of crude oil and natural gas, generation, distribution and purification. In addition, you will be able to answer the following type of questions:

- What is crude oil?
- What is natural gas?
- Of what importance is crude oil and natural gas to national development?
- Define the term crude oil.
- Define natural gas.
- Discuss the different stages of petroleum generation.
- Define the term organic matter, and source rock.
- Discuss the role of photosynthesis in crude oil generation.
- What is diagenesis, catagenesis and metagenesis?

Definitely, this list of questions that you can answer is not limited to the above. To gain the most from this course you should endeavour to apply the principles you have learnt to your understanding of Petroleum Chemistry.

I wish you success in the course and I hope that you will find it both interesting and useful.