NATIONAL OPEN UNIVERSITY OF NIGERIA

CHM 319

Environmental Chemistry
Course Guide

CHM 319 Environmental Chemistry Course Guide

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Introduction

This course guide tells you briefly about the course, the course materials available how to work with them and maximize your learning through effective time management. Environmental Chemistry is a first semester two-unit degree course for all students offering Bachelor of Science (B.Sc.) Chemistry.

Without a clear scientific understanding and an accurate interpretation of the interactions going on among the chemical species in our environment (in relationship to plants, animals and humans) chemistry, more or less, becomes irrelevant both to the specialist, environmental engineer, health workers, decision makers and the general populace. The price to pay for such ignorance is huge in terms of environmental degradation and the attendant health problems, many of which are often catastrophic and irreversible. It is thus important to approach the study with a mind-set not only of a willing student but also of a determined learner who will obtain high scores and apply the knowledge to solving environmental problems in real life situations, whenever the needs arise.

What You Will Learn in This Course

In this course, you will learn about important chemical phenomena in the three environmental compartments: air, water and soil. You will be familiar especially with how such chemical phenomena are relevant to the study and monitoring of environmental pollution, and possible means of averting associated hazards. Certainly, the interconnection of chemistry with such fields as engineering, agriculture, geography, and so on will be better appreciated in the process of going through this course.

Aims of the Course

Broadly, the course is aimed at helping every student to have an introductory, and indepth knowledge of important chemical interactions going on in the environment. It is also aimed at preparing students to profer solutions to issues of environmental problems arising from natural and anthropogenic sources.

Objectives of the Course

To achieve the aims set out you should be able to:

- explain vividly the central concepts involved in each unit of study
- use chemical equations, where necessary, to explain changes going on in a given environmental compartment and

- apply the knowledge gained to practically tackle environmental and/or health related issues.

Working through This Course

Each unit has specific learning objectives at the beginning. Endeavour to read these objectives before you study the unit. Again, go through the objectives after completing the unit to see whether you have internalised the concepts treated in the unit.

Read the textbooks and other materials which may be provided by the National Open University of Nigeria. Go through the self assessment exercises and ensure that you answer the questions. At certain points in this course, you would be asked to submit assignments for assessment purposes.

The course should take you about 15 weeks to complete. Read each unit with full concentration. You must attend the tutorial sessions so that you can avail yourself the opportunity of comparing notes and ideas. At the end of this course, there is going to be a final examination based on what you have learnt; every unit is important, please.

The Course Materials

The main components of the course are:

1. The Course Guide
2. Study Units
3. Self Assessment Exercises
4. Tutor-Marked Assignments
5. Presentation Schedule.
6. References/Further Reading

Study Modules and Units

Module 1 Natural Cycles and Atmospheric Chemistry

Unit 1 Concepts of Elementary Cycles

Unit 2 Characteristics of the Atmosphere

Module 2 Sources, Types and Effects of Environmental Pollution

Unit 1 Water Pollution

Unit 2 Air Pollution

Unit 3 Soil Pollution

Module 3 Waste Management

Unit 1 Wastewater Treatment

Unit 2 Composition of Solid Wastes

Module 4 Water Chemistry and Analysis

Unit 1 Physical Parameters Relevant to Water Analysis

Unit 2 Important Chemical Parameters in Water Chemistry and Analysis

Unit 3 Biochemical Parameters in Water Chemistry and Analysis

Unit 4 Anions and Other Constituents of Concern in Water Chemistry and Analysis

Module 5 Chemical and Physical Instrumentation in Environmental Sciences

Unit 1 Chemical Instrumentation in Environmental Sciences

Unit 2 Physical Instrumentation in Environmental Sciences

There are **five modules** comprising of two, three, two, four and 2 units for modules one, two, three, four and five respectively. Thus, this course is made up of 13 units.

In Unit 1 of module one we treat elementary (biogeochemical) cycles: carbon, nitrogen, sulfur and water cycles while in unit 2 we deal with the characteristics of the atmosphere with emphasis on environmentally relevant chemical reactions taking place in the troposphere, stratosphere, mesosphere, thermosphere and exosphere. In the three units of module two, we examine the sources, types and effects of environmental pollution in the air, water and soil compartments. In module three, our unit 1 deals with wastewater treatment while Unit 2 deals with the composition of solid (municipal, industrial and hazardous) wastes. The four units of module four focus on water chemistry and analysis with emphasis on physical, chemical and biochemical parameters, and anions and other constituents of concern relevant to water chemistry. In module five we are concerned with chemical and physical instrumentation in environmental sciences treated in the unit.

Each unit is designed for a duration of one week, for an effective study. That is, covering the entire course should last about 13 weeks. It is expected that two extra weeks would be used for intensive personal revision of the whole course units before the examination commences. Each unit consists of introduction, objectives, reading materials, exercises, conclusion, summary, tutor-marked assignments (TMAs), further reading and references.

The exercises with TMAs help you to achieve the stated objectives and to evaluate your progress in the process of mastering the concepts in the material.

Presentation Schedule

Your course materials have important dates for the early and timely completion and submission of your TMAs and attendance of tutorials. You are required, as a matter of compulsion, to submit all your assignments by the stipulated time and date. It is suggested that you have a personal study time-table to ensure that each unit is completed on schedule. Having accumulated study schedule or unsolved exercises is unhealthy and capable of truncating your success. Avoid it.

Assessment

There are three aspects to the assessment of this course: Self Assessment Exercises (SAEs), Tutor-Marked Assignments (TMAs) and End of Course Examination (ECE) and subsequent grading by the facilitator. Each SAE is designed to help you assess your personal understanding of a particular unit. The TMA for a unit must be written for assessment by the course facilitator. The ECE at the end of the course is meant to last between two and three hours.

Tutor-Marked Assignment (TMA)

The TMA is a continuous assessment component of the course. It accounts for 30 per cent of the total score. You are expected to answer at least four (at most six) of all the TMAs as condition for the end of course examination.

Return a completed TMA schedule to your facilitator. Each TMA is contained in the assignment file. You will certainly be able to complete your assignment from the information and material contained in your reading and references especially as you research more into your references to acquire a wider view point and deeper understanding of the subject matter. Your TMA will be graded by the facilitator and returned to you as soon as possible.

If for any reason you cannot complete and submit your assignment on schedule, contact your facilitator beforehand to discuss the possibility of an extension. This is not automatic, however.

End of Course Examination

The end of course examination will have two sections: Section A and Section B. Section A consists of short-structured questions counting for 25percent of the total marks and lasting one hour, while Section B will be made up of four essay questions of 15 marks each lasting one and half hours. A candidate will be required to answer only three of those questions in Section B counting for a maximum of 45percent. Thus, the end of course examination counts for 70 per cent of the total assessment. The breakdown of the assessment is given below:

- **TMAs** equal 30 per cent
- **End of course Examination (ECE)**
- Section A = 25%
- Section B = 45%
- Total = 70%

Overall Total = **TMA** + **ECE** = 30 + 70 = **100%**

Tutors/Tutorials

There are five contact periods of tutorial classes in support of this course. Each contact period is made up of two hours. Each period is a time of face-face interaction between the facilitator and the students on one hand, and among all the participants on the other hand. It is a time to discuss individual problems encountered in the course of his/her study.

You will be notified of the dates, times and location of these tutorials as well as the name, phone number and e-mail address of your facilitator as soon as you are allocated a tutorial group. Do not hesitate to contact your facilitator by telephone or e-mail if you need an academic assistance.

Endeavour to attend the tutorials; it is the only chance you have for effective interaction that enhances effective learning. Various challenges you will encounter as you study Environmental Chemistry as a course will be passionately reviewed during these sessions. Prepare your questions and bring them for class discussion. Even when you think you have known everything, come and listen to the problems of others; you will certainly benefit from them.

Summary

Environmental Chemistry as a course, deals with chemical interactions that have serious impacts on the air, water and soil compartments of the environment. It helps a candidate to appreciate the fact that when we talk about environmental contamination or pollution, the species involved know no boundary. It also brings into sharp focus the possible roles of a chemist, in conjunction with other stake-holders in environmental sciences and engineering generally, in solving pollution problems that may appear intractable ordinarily.

By and large, environmental chemistry study helps an individual to be conscious of the need to preserve the environment by judicious use and disposal of resources available to us so as not to embark on a journey of self-elimination or extermination.

While I wish you a resounding success in this course, I sincerely wish that your targets be two-fold: passing your examination well and also applying your knowledge to cause a positive change in our environment.