



180

(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER

MAIN EXAMINATION

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: SCH 350

COURSE TITLE: ENVIRONMENTAL CHEMISTRY

DATE: 8/8/2018

TIME: 9.00-11.00 a.m.

INSTRUCTIONS TO CANDIDATES

Instructions to Candidates: Answer All Questions, Use relevant examples/illustrations and chemical equations for clarity

TIME: 2 Hours

This Paper Consists of 4 Printed Pages. Please Turn Over.

Question one

The atmosphere plays a vital role in regulating different natural cycles and also it is where important atmospheric chemical reactions take place. Answer the following questions

- a. Sketch a graph that shows the mean temperature, mean ozone density and altitude variation. Show the various atmospheric segments in your sketch.
(8marks)
- b. Explain the vital role played by atmosphere in the survival of life in this planet. (6marks)
- c. At short wavelength ($\lambda < 240\text{nm}$) ozone is formed and at long wavelength ($\lambda > 1140\text{nm}$) ozone is destroyed in the atmosphere.

Show by use of equation

- i. Ozone production in the stratosphere
(3marks)
- ii. Ozone destruction in the stratosphere
(4marks)

Question two

- a. Discuss the role of ozone in the stratosphere
(4marks)
- b. 90% of ozone layer in the atmosphere can be found in the Stratosphere.
Discuss the formation of Arctic and Antarctic holes (Ozone layer holes) in the North Pole and South Pole in the stratosphere.
(6marks)

- c. The most important primary photochemical reaction in the atmosphere is the dissociation of NO_2 , through the following equation $\text{NO}_2 + h\nu \rightarrow \text{NO} + \text{O}$
- Give the sequences of reaction that follow this primary photochemical reaction in the atmosphere
(5marks)
 - What chemical species is finally formed in sequences (i) above
(2marks)
 - How the final chemical species in (ii) above is removed from the atmosphere.
(4marks)

Question three

- Explain the following commonly used terms in environment chemistry
(6marks)
 - Dissolved Oxygen (DO)
 - Chemical Oxygen Demand (COD)
 - Biological Oxygen Demand (BOD)
- If we have a state where the flux of energy received by the earth from the sun E_E equal the energy absorbed by the earth $E_A = E_E$
 - Given that $E_A = (1-A)$ and E_E contains the temperature parameter. With necessarily doing the calculation, explain how temperature (Heat Energy) is attributed to the greenhouse effect.
(2marks)
 - Define the greenhouse effect
(3marks)

- c. COD levels of 60mg/L were measured in groundwater. It is suspected that fuel contamination was the main cause. What concentration of hydrocarbon from fuel is necessary to account for all the COD observed? Assume the fuel hydrocarbons to have an average unit formula of CH_2 , The oxidation reaction is



(4marks)

Question four

- a) Give four reasons why open burning of waste should be discouraged in your country (4marks)
- b) Sanitary Land filling is a Waste treatment and disposal method. Discuss the Environmental problems associated with Land filling (5marks)
- c) State and briefly describe any three important environmental chemical reactions that can remove pollutants from aqueous environment. (6marks)