MAASAI MARA UNIVERSITY
UNIVERSITY SPECIAL EXAMINATIONS 2018/2019 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER

SCHOOL OF TOURISM AND NATURAL RESOURCE MANAGEMENT

BACHELOR OF SCIENCE (ENVIRONMENTAL STUDIES)
COURSE CODE: EBH 306

COURSE TITLE: ENVIRONMENTAL CHEMISTRY

DATE: 26TH APRIL, 2019 **TIME: 8:30PM – 10:30PM**

INSTRUCTIONS TO CANDIDATES

ATTEMPT ALL QUESTIONS IN SECTION A AND ANY 3 IN SECTION B

Support your answers with relevant examples and illustrations and clearly show your calculations, where relevant.

This paper consists of 3 printed pages. Please turn over

SECTION A:ANSWER ALL QUESTIONS (25 MARKS)

1. Write down the chemical equation that illustrates that water exposed to carbon dioxide is acidic**.** **[3 marks]**

2. Explain the difference between point and nonpoint sources of pollution. Give an example for each **[3marks]**

3.Write the two-step noncatalytic photochemical reactions for the destruction of stratospheric ozone,(Hint: last half of the Chapman mechanism) **[3 marks]**

4 .For DDT, log K_{ow}=6. What is the approximate bioconcentration factor for DDT in fish? **[3 marks]**

5. Hydroxyl radicals are key in the oxidation of the hydrocarbons in the troposphere. Compare the first step (i.e., OH attack) in the oxidation of methane and ethane (ethane?). **[3 marks]**

6. Based on the structure, circle the compounds below that you expect would absorb infrared radiation **[3 marks]**

Ar O_3 Cl_2

CO_2 H_2 CF_4

7. Henry's Law constant for oxygen is 1.3x 10^{-3} M atm^{-1} at 25^{o}C. Calculate the amount of dissolved oxygen in water at sea level. **[3 marks]**

8. Define eutrophication and show how it arises **[3 marks]**

9. Construct and balance the equation where the PCB molecule ($C_{12}H_7Cl_3$) is destroyed by combustion with oxygen to yield CO_2, H_2O , and HCL **[2 marks]**

Section B ANSWER ANY THREE QUESTIONS (45 MARKS)

10. Briefly explain why temperature decreases with altitude in the troposphere, but increases with altitude in the stratosphere **[15 marks]**

11. Explain the various methods of secondary treatment of sewage , and mention the main purpose of the secondary treatment stage **[15 marks]**

12. Discuss the physical-chemical component / indicator of water quality and mention how to measures them

(a) Turbidity **[3 marks]**

(b) pH **[3 marks]**

(c) Dissolved oxygen **[3 marks]**

(d) Conductivity **[3 marks]**

(e) Temperature **[3 marks]**

13. The COD of a water sample is 25mg of O^2 per litre. What volume of 0.0010mol L^{-1} $Na^2Cr^2O^7$ solution is required to titrate a 40 mL sample to end-point?{ Hint: The dichromate ion oxidizes 1.5 times the material that molecular oxygen does} **[15 marks]**