KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER
MAIN EXAMINATIONS
FOR THE DEGREE B.ED (SCIENCE)

COURSE CODE: SCH 428

COURSE TITLE: ENVIRONMENTAL CHEMISTRY

DATE: 29/08/2022 **TIME:** 9:00AM-11:00AM

INSTRUCTIONS TO CANDIDATES:

- Answer **Question ONE (Compulsory)** and any other **TWO (2)** questions
- Indicate answered questions on the front cover
- Start each question on a new page and make sure the question's number is written on each page

TIME: 2 Hours

This paper consists of **3** printed pages. Please Turn Over

Question 1 [30 Marks]

a. Explain the importance of the ecosystem [2 Marks]
b. Explain the importance of the atmosphere [4 Marks]
c. Explain the difference between a contaminant and a pollutant? [2 Marks]
d. Explain how toxicological chemistry differs from environmental biochemistry. [2 Marks]
e. Explain the difference between point and nonpoint sources of pollution and give an example of each. [4 Marks]
f. Define BOD [2 Marks]
g. Explain the main processes in the phosphorus cycle [6 Marks]
h. Describe the positive and negative effects of increased population growth on the environment [6 Marks]
i. Describe the altitude and region of the atmosphere where aeroplanes fly [2 Marks]

Question 2 [20 Marks]

a. Discuss the sources of municipal wastewater [5 Marks]
b. Describe the process of municipal wastewater treatment [15 Marks]

Question 3 [20 Marks]

a. Explain the difference between point and nonpoint sources of pollution. Give an example of each. [6 Marks]
b. Describe two physical features of lead that make it a functional material and give an example of a common use. [4 Marks]
c. The whole-body half-life of lead is six years. A 15 kg infant has a blood lead level of 80 ppb. *(Assume blood has the same density as water).*
What is the blood lead concentration (μg per 100 mL)? [6 marks]
d. Assuming the whole-body concentration is the same as the blood concentration, calculate the total amount lead in this infant. [4 marks]

Question 4 [20 Marks]

a. Complete the following table. [6 Marks]

Radiation Type	**Spectral Range(nm)**	**Primary Absorber of Sunlight**
UV-A		NO_2
UV-B		O_3
UV-C	200–280	

b. The atmosphere contains 3.9×10^{15} tonnes of nitrogen gas. Annual losses of nitrogen include thunderstorms (6.9×10^{7} tonnes) and nitrogen fixation by bacteria (2.1×10^{8} tonnes). Calculate the residence time of nitrogen in the atmosphere. [4 Marks]

c. Determine the equivalent dose (in g) of 2,3,7,8-Tetrachlorodibenzodioxin(TCDD) corresponding to the following 10.0 g mixture of dioxins? [6 Marks]

	Dioxin Weight	**% TEQ**
A	30	0.5
B	45	0.01
C	25	0.1

d. Describe two proposed methods to dispose of excess plutonium. [4 Marks]

Question 5 [20 Marks]

Discuss the effects of COVID-19 on the various environmental segments