

LAIKIPIA



UNIVERSITY

UNIVERSITY EXAMINATIONS

1ST SEMESTER 2022/2023 ACADEMIC YEAR

FOURTH YEAR EXAMINATION FOR THE DEGREES
OF BACHELOR OF EDUCATION
(SCIENCE)/BACHELOR OF SCIENCE (GENERAL)

CHEM 414: ENVIRONMENTAL CHEMISTRY II

STREAM: R

TIME: 2 HRS

DAY: FRIDAY [8.30AM – 10.30AM] DATE: 09/12/2022

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

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INSTRUCTIONS TO CANDIDATES

Answer All Questions. Question 1 carries 30 marks, while the other questions carry 20 marks each

QUESTION ONE (30 MARKS)

(a) Define the terms below

- (i) Free radicals (1 mark)
- (ii) Ozone hole (1 mark)
- (iii) Photochemical smog (1 mark)
- (iv) Greenhouse effect (1 mark)
- (v) Catalytic converter (1 marks)

(b)

- (i) List two important aspects of the atmosphere (2 marks)
- (ii) What is the purpose of $\text{Pb}(\text{C}_2\text{H}_5)_4$ in an internal combustion engine? Show the reactions involved. (4marks)
- (iii) List the different categories of noise. (3 marks)

(c)

- (i) List the gases below in order of increasing Global Warming Potential(GWP); CH_4 , CFC, N_2O and CO_2 (2 marks)
- (ii) Distinguish between BOD and COD in waste water treatment. (2 marks)
- (iii)What is biological water quality monitoring? (3 marks)

(d)

- (i) Describe using a diagram, the electrodialysis technique for industrial waste water treatment. (5 marks)
- (ii) What is environmental biochemistry? (2 marks)
- (iii)Write an equation showing the wavelength range in which ozone is depleted in the atmosphere (2 marks)

QUESTION TWO (20 marks)

- (a) (i) Describe the method of electrostatic precipitators for the control of particulate emission. (4 marks)
- (ii) Write the chemical formula of CFC-11 (1 mark)
- (iv) Define speciation with respect to water pollution. (1 mark)
- (b)
- (i) What are economic environmental policy instruments? Give five examples. (6 marks)
- (ii) Discuss why organophosphate and carbamate pesticides are considered more environmentally friendly than organochlorine pesticides? Show possible reaction pathways in the environment. (6 marks)
- (iii) List two functional groups that are likely to be found in biodegradable polymers. (2 marks)

QUESTION THREE (20 marks)

- (a) By use of a diagram describe the institutional structure of the Kenya Water Sector as proposed by Water Act 2016. (5 marks)
- (b)
- (i) Explain biochemical methylation of mercury and its propagation in the food chain. (5 marks)
- (ii) Use an illustration to describe the action of chemicals on enzymes. (5 marks)
- (iii) Describe the steps of EIA. (5 marks)

