

LAIKIPIA



UNIVERSITY

CHEM 317

UNIVERSITY EXAMINATIONS

1ST SEMESTER 2022/2023 ACADEMIC YEAR

THIRD YEAR EXAMINATION FOR THE DEGREES OF
BACHELOR OF SCIENCE (GEN), BACHELOR OF
EDUCATION (SCIENCE)

CHEM 317: ENVIROMENTAL CHEMISTRY I

STREAM: R

TIME: 2 HRS

DAY: WED [14.30 – 16.30]

DATE: 07/12/2002

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.



QUESTION ONE

(a) Define the following terms: -

(i) Catalytic converter

(ii) Radiative forcing

(iii) Thermocline

(iv) Free radical

(v) Surfactants (5 marks)

(b) Distinguish between the following terms

(i) Smog and photochemical smog (2 marks)

(ii) Soap and detergent (2 marks)

(iii) Bioaccumulation and bioamplification (2 marks)

(c)

(i) State the importance of ozone in the atmosphere and give equations to show how it is formed. (3 marks)

(ii) Briefly describe the three stages of wastewater treatment. (5 marks)

(iii) Write the chemical formula for CFC-113. (3 marks)

(d)

(i) Why is carbon dioxide the most significant contributor to global warming? (3 marks)

(ii) Show the series of chemical equations in the mechanism of ozone depletion initiated by reactive chlorine atoms in the atmosphere. (6 marks)

(iii) Show the four steps (use equations) involved in the removal of NO_x from stack gases by the scrubbing process. (4 marks)

QUESTION TWO

(a)

(i) Give a microbial mediated redox reaction involving iron in water and state the importance of such reactions. (2 marks)



- (ii) Describe the Winkler method for determination of dissolved oxygen in natural waters. (Show chemical equations procedure) (5 marks)
- (iii) Briefly explain physical, chemical and biological weathering processes (3 marks)
- (iv) What is the concentration of carbon dioxide in the atmosphere (0° C and 1 atm) using units parts per million (ppm). The mixing ratio of carbon dioxide is $3.25 \times 10^{-2} \%$ (2 marks)

QUESTION THREE

- (a) Radon is an indoor pollutant in some areas. Explain using equations how it is harmful to human beings. (4.5 marks)
- (b)
 - (i) List at least three characteristics of the troposphere (1.5marks)
 - (ii) State two health effects of particulate matter in air and by use of a chemical equation, explain how particulate matter in the form of ammonium sulphate droplets may reach the atmosphere. (4 marks)
 - (iii) DDT is a persistent pesticide in the environment. Draw its structure, write its full name, and state its effect on insects. (5 marks)
 - (iv) What is the role of tetraethyl lead in automobile combustion engine? Show relevant chemical equations. (5 marks)

