



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED & HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENT & HEALTH SCIENCES

UNIVERSITY EXAMINATION FOR:

DEGREE OF BACHELOR OF SCIENCE IN PUBLIC HEALTH

BSPH 15S/YEAR 2/SEMESTER 2

CODE: ACH 4207: ENVIRONMENTAL CHEMISTRY

SEMESTER EXAMINATION

SERIES: SEPT. 2017

TIME: 2HRS

Instructions to Candidates

This paper consists of FIVE questions

Answer question ONE (COMPULSORY) and any other TWO questions

This paper consists of two printed pages

Mobile phones are NOT allowed in the examination room

QUESTION ONE: (30 Marks) Compulsory

- a) The earth has layers and an atmosphere:
 - i. Name these layers (2 marks)
 - ii. State two functions of the atmosphere (2 marks)
 - iii. Explain how oxygen developed in the atmosphere (2 marks)

- b) Environmental Chemistry has emerged as a major field of science
 - i. State what environmental chemistry is, and explain why people in the public health profession have to study environmental chemistry? 3 marks
 - ii. The hydroxyl radical is at the centre of the chemistry of the troposphere, state how it is produced in this layer (2 marks)

- iii. State what aerosols are, and give their major natural sources in the atmosphere (3 marks)
- c) Some reactions in the atmosphere occur due to the presence of a third body.
 - i. State what a third body is (1 mark)
 - ii. State the purpose of a third body in a reaction (1 mark)
 - iii. Present the equation of O atom and O₂ molecule in the presence of a third body, and state what would have happened in its absence? (2 marks)
 - iv. Give the structure of soot (2 marks)
- d) Pollutants are found in various forms in the environment, including soot, aerosols, particulate matter, generated by different processes
 - i. Explain the term air pollution, and give two categories of air pollutants, with an example of each category (5 marks)
 - ii. Give three different methods for removing particulate matter from industrial emissions (3 marks)
 - iii. Gasoline can burn in the atmosphere, either completely or incompletely. Give the balanced equations of each of these scenarios (2 marks)

Question Two: (20 marks)

- a) Give four groups of toxic substances in the environment (4 marks)
- b) Explain how toxicants become harmful to living organisms (5 marks)
- c) Give two examples of heavy metals and their toxic effects on humans (6 marks)
- d) Differentiate the terms adsorption and absorption and, explain why the sky is blue? (5 marks)

Question Three: (20 marks)

- a) Explain the terms -
 - i. Luminescence (2 marks)
 - ii. Physical Quenching (2 marks)
- b) Discuss the electrostatic methods for removing particulate matter from industrial emissions, and explain what is done to the particles after they have been removed (8 marks)
- c) State the factors to be considered when designing and operating an industrial water treatment plant (8 marks)

Question Four (20marks)

- a) Describe the movement of O₂ in blood (4 marks)
- b) Give one possible anthropogenic source of CO with a relevant equation (2 mark)
- c) Give the impact of CO in the lungs, stating its main effect on the individual, and narrate some symptoms of its manifestations. (8 marks)

- d) How is the effect of CO reversed? (2 mark)
- e) Give one example each of the origin of NO_x from a natural source and from an anthropogenic source (4 marks)

Question Five (20 marks)

- a) State the importance of technology in the study of environmental chemistry (6 marks)
- b) Explain the factors of concern in the exposure to toxic substances (10marks)
- c) State what you understand by the term climate change, giving some examples of the its manifestation (4 mark)