



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

MAIN EXAMINATION

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JANUARY – APRIL 2014 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF NATURAL SCIENCE

SCHOOL FOCUSED PROGRAMME

CHEM 310: ENVIRONMENTAL CHEMISTRY

Date: APRIL 2014

Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions

- Q1. a) Define the following terms illustrating with an example where possible:
- i) Eutrophication
 - ii) Sink
 - iii) Free radicals
 - iv) Potentiation
 - v) Photo-oxidation
- (10 marks)**
- b) Explain effects of ozone depletion in terms of:
- i) Causes
 - ii) Effect on man and environment
 - iii) Methods and ways abating effects of ozone depletion.
- (10 marks)**
- c) Pesticides are considered economic pollutants without which agriculture would fail to supply food for the growing population.
- i) Discuss the impacts of pesticides on the environment.
 - ii) What are the control measures available to reduce levels of pollution emanating from pesticides?
- (10 marks)**

- Q2. a) Lead (Pb) and Cadmium (Cd) are heavy metals which are toxic? Explain their main sources in the environment, their health effects and ways of reducing their environmental impact. **(10 marks)**
- b) The major source of fuel in most industrial plants is coal and petroleum. The utilization of these fuels produces HC, SO_x, NO_x and CO.
- i) Describe how you would determine levels of nitrogen oxides within an industrial plant. **(6 marks)**
- ii) What are control measures available to limit the emission of these pollutant. **(10 marks)**
- Q3. a) Explain why are chloroflourocarbons (CFCs) such as CF₂Cl₂ and CFC₃ such effective green house gases, their sources and effects on the global climate. **(10 marks)**
- b) Discuss the various legislative measures through which the government of Kenya has put in place through NEMA to protect the environment. **(10 marks)**
- Q4. a) Fungicides and herbicides can be classified broadly into two based on mode of action. Discuss using relevant examples. **(10 marks)**
- b) Polycyclic Aromatic Hydrocarbons (PAHs) are considered to be among dangerous particulate matter in air.
- i) Describe how they are generate.
- ii) What are their effects on human health and environment?
- iii) How can they be controlled? **(10 marks)**
- Q5. a) Hydroxyl free radicals are considered to be the major species playing a major role in both the generation and removal of pollutants present in the atmosphere.
- i) Using examples illustrate how $\dot{O}H$ (hydroxyl free radicals) are involved in generation of pollutants.
- ii) Illustrate the various pathways leading to removal of gaseous pollutants involving $\dot{O}H$. **(10 marks)**
- b) The precipitation of NO_x and SO_x in form of acid rain (secondary pollution) accounts for most sinking of SO_x and NO_x. Discuss the environmental effects of acid rain to plants, animals and structures. **(10 marks)**

END