Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY

BTAC

ACH 4207: ENVIRONMENTAL CHEMISTRY

SPECIAL/SUPPLEMENTARY EXAMINATION

JULY 2014 SERIES 2 HOURS

Instructions to candidates:

This paper consist of **FIVE** questions
Answer question **ONE** (compulsory) and any other **TWO** questions

Question ONE

a) Describe the general characteristics of the troposphere **(4marks)**

b) Highlight the natural processes of nitrogen fixation **(4marks)**

c) Describe the environmental effects of flood irrigation **(4marks)**

d) Indicate the fate of H_2S and CH_3-S-CH_3 emissions in the atmosphere **(4marks)**

e) List any FOUR green house gases and indicate their sources **(4marks)**

f) Oxygen plays an important role in the chemistry of the atmosphere and earth's crust Explain this observation. **(2marks)**

g) Explain why the HO radical is referred to as nature's vacuum cleaner. **(2marks)**

h) CFCs have characteristics that make them useful compounds. However the same characteristics make them environmental hazards. Explain these observations. **(4marks)**

i) Give the reason why HCFCS and HCFS were targeted for emissions reduction under the Kyoto protocol. **(2marks)**

Question TWO

a) Explain why the stratosphere is more susceptible to pollution than the troposphere.

(4marks)

b) Describe the processes involved in distributing energy from the sun that define the green house effect. **(6marks)**

c) Explain the properties of gaseous molecules that define their potential to cause green house effect **(2marks)**

d) Give two reasons why N_2O is a more effective green house gas than CH_4. **(4marks)**

e) Highlight TWO measures that can be used to mitigate the environmental impacts of green house gas emissions. **(4marks)**

Question THREE

a) Describe the environmental effects of over-abstraction of ground water. **(4marks)**

b) Using appropriate equations describe the high temperature formation and removal of NOx from the atmosphere. **(6marks)**

c) Indicate the source of HO radicals in the atmosphere, using appropriate equations.

(4marks)

d) Write equations to show the removal of SO_2 and NO_2 from the atmosphere by reaction with HO radicals. **(4marks)**

e) Define a secondary pollutant with an example **(2marks)**

Question FOUR

a) Describe the reactions that result in the formation and non-catalytic destruction of O_3 in the stratosphere. **(6marks)**

b) Explain the significance of the non-catalytic destruction of O_3 in the stratosphere.

(4marks)

c) Write equations showing the catalytic destruction of O_3 by CFCS in the stratosphere **(6marks)**

d) Describe TWO environmental impacts of O_3 depletion in the stratosphere. **(4marks)**

Question FIVE

a) Using appropriate examples, describe the formation of acid rain. **(4marks)**

b) Describe the effect of acid rain on the mobilization of toxic heavy metals in polluted soils. **(6marks)**

c) Highlight the sources and environmental effects of excessive nutrients on aquatic systems **(5marks)**

d) Outline waste water treatment by primary processes. **(5marks)**