



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

INSTITUTIONAL BASED PROGRAMME (DECEMBER SESSION)

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

(ENVIRONMENTAL HEALTH)

HEH 107: ENVIRONMENTAL CHEMISTRY I

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DATE: WEDNESDAY 2ND MAY 2012

TIME: 4.30 P.M. – 6.30 P.M.

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INSTRUCTIONS

1. Section A is Compulsory
2. Answer question 2 in Section B and TWO other Questions
3. Electronic calculators may be used.

Known facts / Vital information

Speed of light, $C = 2.998 \times 10^8$ m/s
Planck's constant, $h = 6.6262 \times 10^{-34}$ Js
Rydbergs constant, $R = 109677.8 \text{ cm}^{-1}$
 $1\text{nm} = 10^{-9} \text{ m}$

SECTION A (20 MARKS)

1. Define the following terms
 - a) Eutrophication
 - b) Greenhouse effect
 - c) Orbital
 - d) Oxygen hole (4 marks)
2. a) Write the electron configuration of the following elements.
X (16)
Z (27) (2 marks)

- b) The following rules are helpful in filling in electrons into orbitals. State them (2 marks)
- i) Hund's rule
 - ii) Paul's Exclusion principle
3. Distinguish between the following terms
- i) Soap and Detergent (4 marks)
 - ii) In chain polymerization and in step-growth polymerization
4. Give relevant examples to 3 (i) and 3(ii) above. (4 marks)
5. State any 2 assumptions of the Neil Bohr atomic model. (2 marks)
6. Using hybridization, outline how a PVC is formed. (2 marks)

SECTION B

Question 2

- a) An experiment was conducted by Peter, a member of your class. He passed light ($\lambda = 484\text{nm}$) through a N_2O filled glass tube. He noted that the light that came out of the glass had increased by 60 nm.
- i) Discuss the rationale behind this change and calculate the energy change associated with this observation. (12 marks)
- b) Give the products of decomposition of carbon, sulphur, phosphorous and nitrogen in wastewater under different oxygen concentrations. (8 marks)

Question 3

- a) Discuss the theories of Acid-rain formation. (9 marks)
- b) With relevant examples give three effects of acid rain to our ecosystem. (6 marks)

Question 4

- a) Describe how photochemical smog is formed. (5 marks)
- b) Critique the following suggestions on ozone depletion.
- i) Chapman's mechanism
 - ii) Rowland and Molina's suggestions. (10 marks)

Question 5

Describe each of the following cycles, giving critical attention to important chemical processes.

- i) Nitrogen cycle
- ii) Carbon cycle
- iii) Water cycle (15 marks)