



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2009/2010

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ENVIRONMENTAL HEALTH HEH 312: ENVIRONMENTAL CHEMISTRY II

DATE: Wednesday 30th December, 2009

TIME: 11.00 a.m. – 1.00 p.m.

SECTION A – (20 marks)

Answer ALL questions.

- Define the following terminologies:
 - Biological oxygen demand
 - Eutrophication [2 marks]
- Account for the formation of the product below; [2 marks]
$$\text{CH}_3\text{CH}=\text{CH}_2 + \text{HCl} \longrightarrow \text{CH}_3\text{CHClCH}_3$$
- Using energy diagrams, distinguish between catalysts and inhibitors as used in catalysis of chemical processes. [4 marks]
- Define fermentation [1 mark]
 - State and explain three factors that influence fermentation process. [3 marks]
- Polymerization of 1, 3-butadiene gives molecules containing both the following units
$$\text{CH}_2\text{CH}=\text{CHCH}_2 \sim \text{ and } \sim \text{CH}_2\text{CH}=\text{CHCH}_2 \sim$$

$$\begin{array}{c} | \\ \text{CH}=\text{CH}_2 \end{array}$$

The exact proportions depend on the temperature. Account in detail for the formation of the two different units. [3 marks]
- Distinguish between homogeneous and heterogeneous catalysis. [2 marks]
- State the catalysts used in Haber process of Ammonia and the Contact process for sulfuric acid manufacture and give, in each case the equation for the catalyzed reaction. [3 marks]

SECTION B

Answer question 1 and any 2 other questions.

1. i) Write short notes on:
 - a) Copolymerization
 - b) Ionic polymerization
 - c) Coordination polymerization
 - d) Free-radical polymerization
 - e) Water quality measurement parameters [10 marks]
- ii) Convert $189\mu\text{gm}^{-3}$ of NO_2 AT 20°C at 750torr into ppm. [2 marks]
- iii) State any four methods of metal extraction. [2 marks]
- iv) State the effects of each processes in the environment:
 - (i) Products of metal extraction
 - (ii) Acid rain [4 marks]
- v) Using the Ellingham diagram explain why C is a better reducing agent for metal oxides than hydrogen. [2 marks]
2. a) Define and draw the structure of a fat. [3 marks]
- b) Describe in detail soap and detergent formation. [8 marks]
- c) Describe soap action. [4 marks]
3. Describe the following methods of air pollutant analyses:
 - a) West-Gaeke SO_2 analytical method
 - b) Saltzmann NO_2 analysis method
 - c) Non dispersive infra-red spectroscopy (NDIR) for CO analysis. [15 marks]
4. Discuss the health effects of each of the following pollutants on humans
 - a) Respirable suspended particulates
 - b) Sulphur oxides
 - c) Nitrogen oxides [15 marks]
5. a) Give 5 examples of fungicide mercury compounds. [5 marks]
- b) Discuss any 5 ways in which water can be polluted. [10 marks]

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