

CHUKA



UNIVERSITY

## UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN ANIMAL HEALTH  
PRODUCTION

## CHEM 0102: BASIC CHEMISTRY

STREAMS: DIP. ANHE

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 06/12/2017

11.30 A.M. – 1.30 P.M.

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**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

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## QUESTION ONE (30 MARKS)

- (a) Define the following terms [3 marks]
- Mass number
  - Isotopes
  - Isomers
- (b) The number of electrons, protons and neutrons in a species are equal to 18, 16 and 16 respectively. Assign the proper symbol to the species. [4 marks]
- (c) State 3 uses of isotopes in agriculture. [3 marks]
- (d) Discuss briefly 3 factors that affect the rate in which a solute dissolve to form a solution. [3 marks]
- (e) Differentiate between a Brownsted – lowry acid and a Lewis acid. [2 marks]
- (f) Identify the conjugate base, conjugate acid, base and acid in the following reaction.  

$$HBr_{(aq)} + HN_{3(aq)} \rightarrow Br_{(aq)}^- + NH_4^+_{(aq)}$$
 [4 marks]
- (g) Aspirin, which is acetylsalicylic acid, was the first non-steroidal anti-inflammatory drug used to alleviate pain and fever. If a solution of aprin has  $[H_3O^+] = 1.7 \times 10^{-3} M$ , what is the pH of the solution? [3 marks]
- (h) State 3 physical properties of ethyne. [3 marks]
- (i) State 2 uses of alkanes. [2 marks]

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- (j) Draw the structures of the following compounds. [3 marks]
- (i) 2 – methylbutane
  - (ii) 3 – Ethyl – 3 – methylheptane
  - (iii) 3 – methylpent – 2 – ene

### QUESTION TWO (20 MARKS)

- (a) Draw the lewis dot structure of the following molecules
- (i) CO [3 marks]
  - (ii) NH<sub>3</sub> [3 marks]
- (b) State and explain 4 factors affecting rate of a reaction [8 marks]
- (c) Make brief notes on the following types of bonds giving examples
- (i) Covalent bonds [3 marks]
  - (ii) Hydrogen bond [3 marks]

### QUESTION THREE (20 MARKS)

- (a) What are the  $[H_3O^+]$  and  $[OH^-]$  of diet coke that has a pH of 3.17? [4 marks]
- (b) Differentiate between hydrophobic and hydrophilic substances. [4 marks]
- (c) State 4 properties of colloids. [4 marks]
- (d) The results from ten experiments to study the reaction  $C_4H_9Cl_{(aq)} + H_2O_{(l)} \rightarrow C_4H_9OH_{(aq)} + HCl_{(aq)}$  are as shown in the table.

Time, + (s)	$[C_4H_9Cl](M)$
0.0	0.1000
50.0	0.0905
100.0	0.0820
150.0	0.0741
200.0	0.0671
300.0	0.0549
400.0	0.0446
500.0	0.0368
800.0	0.0200
10,000	0.0

- (i) Plot a graph of concentration  $[C_4H_9Cl]$  against time (sec). [4 marks]
- (ii) Calculate the instantaneous rate at  $t=600s$ . [2 marks]
- (iii) Calculate the average rate between 50.0s and 100.0s [2 marks]

**QUESTION FOUR (20 MARKS)**

(a) Name the following compounds [4 marks]

(b) Draw the structures of the following compounds

(i) 4 – methylpent – 2 – yne

(ii) 3 – ethyl – 2 – methylpentane

(iii) 2, 5 – dimethylhex – 2 – ene

(iv) Methyl cyclopropane

(c) Briefly explain 4 chemical properties of alkenes. [8 marks]

(d) Outline four uses of alkanols. [4 marks]