

CHUKA



UNIVERSITY

## UNIVERSITY EXAMINATIONS

### EXAMINATION FOR THE AWARD OF DEGREE OF CERTIFICATE IN

**CHEM 00102: BASIC CHEMISTRY**

**STREAMS: CERT**

**TIME: 2 HOURS**

**DAY/DATE: TUESDAY 03/12/2019**

**11.30 AM – 1.30 PM**

**INSTRUCTIONS:**

**Answer question one (compulsory) and any other 2 question.**

- 1 a) Define the following terms (2marks)
- (i) Atom
  - (ii) Isotopes
- b) Differentiate between kinetic energy and potential energy? (2marks)
- c) State 3 characteristics of chemical changes. (3 marks)
- d) Calculate the mass of naturally occurring carbon if 98.90% of carbon atoms are C-12 and 1.1% are C-13? (2marks)
- e) Give the structural formula of the following hydrocarbons? (3marks)
- (i) 3-bromopentane
  - (ii) 2-methylpropane
  - (iii) Cyclopropane
- f) Differentiate between atomic number and mass number? (2 marks)
- g) Draw the structure of atom showing the position of the 3 subatomic particles (2marks)
- h) Give the number of protons, neutrons and electrons in each of the following species?  
(6marks)

- (i)  $^{17}_8\text{O}$   
 (ii)  $^{13}_6\text{C}$   
 (iii)  $^{32}_{16}\text{S}$

- i) Outline 3 uses of isotopes in Agriculture? (3 marks)
- j) The pH of water collected in a certain region of Chuka on a particular day was 4.82. what is the  $\text{H}^+$  concentration of water? (2marks)
- k) Give uses of alkenes (3 marks)

**QUESTION TWO**

- a) Briefly explain three factors which affects the rate at which solutes dissolves in water to form solutions. (6marks)
- b) Briefly explain three properties of water as a solvent? (6 marks)
- c) Outline 3 major classifications of colloids (3 marks)
- d) Give the IUPAC names of the following hydrocarbons (5 marks)
- i)  $\text{CH}_3\text{CH}(\text{Br})\text{CH}_2\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$     ii)  $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)_2$     iii)  $\text{CH}_3\text{CH}=\text{C}(\text{Cl})-\text{CH}_3$     iv)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- v)  $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$

**QUESTION THREE**

- a) Using dots and crosses illustrate the bonding in the following? (6 marks)
- i) NaCl                      ii) MgO                      iii)  $\text{CO}_2$
- b) Briefly describe metallic bonding (3 marks)
- c) Identify the acid, base, conjugate acid and conjugate base for the following reactions?  
 (4marks)
- i)  $\text{HF} + \text{H}_2\text{O} \rightleftharpoons \text{F}^- + \text{H}_3\text{O}^+$   
 ii)  $\text{HSO}_4^- + \text{NH}_3 \rightleftharpoons \text{SO}_4^{2-} + \text{NH}_4^+$
- d) Explain the properties of ionic compounds? (4marks)

**QUESTION 4**

a) Consider this reaction,



Suppose that a particular moment during the reaction, molecular oxygen is reacting at a rate of 0.024M/S. At what rate is N<sub>2</sub>O<sub>5</sub> being formed? (4 marks)

b) Briefly explain 4 factors which affects the rate of reactions? (8 marks)

c) Briefly describe the reactions of alkenes? (8 marks)

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