



UNIVERSITY OF SWAZILAND

FINAL EXAMINATION

PROGRAMME: B.Sc. AGRICULTURAL EDUCATION YEAR 1
B.Sc. AGRICULTURAL ECONOMICS AND MANAGEMENT
YEAR 1
B.Sc. AGRONOMY YEAR 1
B.Sc. ANIMAL SCIENCE YEAR 1
B.Sc. HOME ECONOMICS YEAR 1
B.Sc. HOME ECONOMICS EDUCATION YEAR 1
B.Sc. FOOD SCIENCE , NUTRITION & TECHNOLOGY YEAR 1
B.Sc. TEXTILE AND APPAREL DESIGN & MANAGEMENT
YEAR 1
B.Sc. HORTICULTURE YEAR 1
B.Sc. LAND AND WATER MANAGEMENT YEAR 1

COURSE CODE: CP 101

TITLE OF PAPER: CHEMISTRY

SECTION 1: INORGANIC CHEMISTRY

SECTION 2: ORGANIC CHEMISTRY

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY FOUR (4) QUESTIONS, TWO (2) QUESTIONS
FROM EACH SECTION

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CHIEF INVIGILATOR**

SECTION 1: INORGANIC CHEMISTRY

QUESTION 1

- (a) Define or give short descriptions of the following terms and phrases. Each answer carries two [2] marks.
- (i) An acid
 - (ii) A liquid
 - (iii) Inorganic chemistry
 - (iv) A deliquescent compound
 - (v) Boiling point
 - (vi) An atom
 - (vii) A subshell
 - (viii) A mixture
 - (ix) Nucleus
 - (x) A proton

[20]

- (b) Calculate the molarity (M) of a solution which was made up by dissolving 12.00 g of sodium chloride in 500 mL of total solution. Given the atomic masses of:

Cl = 35.4530 amu

Na = 22.9898 amu.

[5]

[25]

QUESTION 2

- (a) Calculate the atomic mass of magnesium given the abundances and masses of its naturally occurring isotopes. Show all your calculations and express your final answer to five [5] decimal places.

<u>ISOTOPE</u>	<u>ABUNDANCE,%</u>	<u>MASS, amu</u>
${}_{12}^{24}\text{Mg}$	78.99	23.985042
${}_{12}^{25}\text{Mg}$	10.00	24.985837
${}_{12}^{26}\text{Mg}$	11.01	25.982593

[10]

- (b) What is the mass of three atoms of Platinum (Pt) in amu if the atomic mass of the element is 195.08 amu, and Avogadro's number is 6.022045×10^{23} atoms per mole. Show all the necessary calculations. [15]

[25]

QUESTION 3

- (a) Determine the formula mass of Albite $[\text{NaAlSi}_3\text{O}_3]$ if the atomic masses are as follows:

Na = 22.9898 amu; Al = 26.9815 amu; Si = 28.0855 amu; O = 15.9994 amu

[15]

- (b) If the total mass of sodium chloride is 50 grams what is the mass of chlorine in the compound given the following atomic masses?

Na = 22.9898 amu; Chlorine = 35.453 amu .

[5]

- (c) Calculate the percent component of sodium using the above atomic masses. [5]

[25]

SECTION 2**QUESTION 4.**

- (a) Define or give brief descriptions of the following terms and phrases. Give an example where possible. Each answer carries two [2] marks.

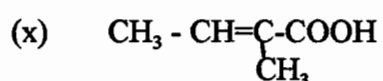
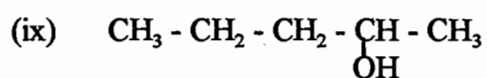
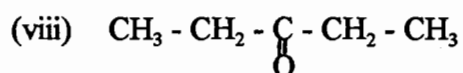
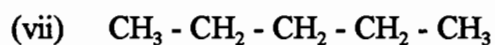
- (i) Saturated hydrocarbon
- (ii) Para director
- (iii) An alcohol
- (iv) A phenol
- (v) A hydrocarbon
- (vi) An alkene
- (vii) An alkyne
- (viii) An electrophile
- (ix) An alkane
- (x) A nucleophile

[20]

- (b) What is the molecular formula for an alkane that contains ten [10] carbon atoms ?
[1]
- (c) Write the molecular formula of an alkene containing four [4] carbon atoms.
[1]
- (d) What is the molecular formula for an alkyne containing twelve [12] hydrogen atoms ?
[1]
- (e) Determine the molecular formula of a cycloalkane that contains eight [8] carbon atoms.
[1]
- (f) What is the molecular formula for an alkyne that has twenty [20] hydrogen atoms?
[1]
[25]

QUESTION 5

- (a) Assign the IUPAC names to each of the following compounds. Each answer carries one [2] marks
- (i)
$$\begin{array}{c} \text{CH}_2\text{-CH}_3 \\ | \\ \text{CH}_3\text{-CH-CH}_2\text{-CH}_2\text{OH} \end{array}$$
- (ii)
$$\begin{array}{c} \text{CH}_2\text{-CH}_3 \\ | \\ \text{CH}_3\text{-C-CH}_3 \\ | \\ \text{CH}_2\text{-CH}_2\text{-CH}_3 \end{array}$$
- (iii)
$$\begin{array}{c} \text{CH}_3\text{-CH}_2 \qquad \text{CH}_2\text{-CH}_3 \\ | \qquad \qquad | \\ \text{CH}_3\text{-CH-CH}_2\text{-CH-CH}_3 \end{array}$$
- (iv)
$$\begin{array}{c} \text{CH}_3\text{-CH}=\text{C-CH}_2\text{-CH}_3 \\ | \\ \text{CH}_2\text{-CH}_2\text{-CH}_3 \end{array}$$
- (v)
$$\text{CH}_3\text{-CH}=\text{CH-CH}_2\text{-CH}_3$$
- (vi)
$$\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}=\text{CH}_2$$



[20]

(a) Write the IUPAC condensed structural formulae for the following compounds. (Each answer carries one [1] mark.)

(i) dichloromethane

(ii) 2,3 - bromohexane

(iii) chlorocyclopentane

(iv) 2 - methyl - 2 - heptanol

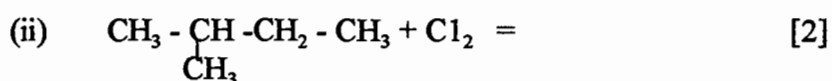
(v) 3 - methyl - 2 - butylamine

[5]

[25]

QUESTION 6

Copy and complete the following equations. (Each answer carries two [2] marks except for questions (a) which carries one [1] mark)



- (iii) $\text{CH}_4 + 2\text{O}_2 + \text{spark} =$ [2]
- (iv) $\text{CH}_3 - \text{CH}_2 - \text{CH}_3 + 5\text{O}_2 =$ [2]
- (v) $\text{CH}_2 = \text{CH}_2 + \text{I}_2 =$ [2]
- (vi) $\text{CH}_3 - \text{CH} = \text{CH}_2 + \text{HCl} =$ Two Compounds. [4]
- (vii) $\text{CH}_3 - \text{C} = \text{CH} + \text{H}_2 =$ [2]
- (viii) $\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3 + \text{HCN} =$ [2]
- (ix) $\text{CH}_3 - \text{CH} = \text{CH}_2 + \text{Cl}_2 =$ [2]
- (x) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO} + \text{H}_2\text{O} =$ [2]
- (xi) $\text{R} - \overset{\text{H}}{\underset{\text{H}}{\text{C}}} - \text{OH} + [\text{O}] = [\text{R} - \overset{\text{OH}}{\underset{\text{H}}{\text{C}}} - \text{OH}] - \text{H}_2\text{O} =$ [2]
- (xii) $\text{R} - \overset{\text{R}}{\underset{\text{R}}{\text{C}}} - \text{OH} + [\text{O}] =$ [2]

[25]