



**SUPPLEMENTARY 2010/2011**

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**THE UNIVERSITY OF SWAZILAND**

**SUPPLEMENTARY EXAMINATION PAPER**

**PROGRAMMES:** B.Sc. IN AGRONOMY YEAR 1  
B.Sc. IN HORTICULTURE YEAR 1  
B.Sc. IN AGRICULTURAL ECONOMICS AND  
AGRIBUSINESS MANAGEMENT YEAR 1  
B.Sc. IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING  
YEAR 1  
B.Sc. IN ANIMAL SCIENCE YEAR 1  
B.Sc. IN CONSUMER SCIENCES EDUCATION YEAR 1  
B.Sc. IN FOOD SCIENCE, NUTRITION AND TECHNOLOGY  
YEAR 1  
B.Sc. IN CONSUMER SCIENCES YEAR 1  
B.Sc. IN TEXTILE AND APPAREL DESIGN AND MANAGEMENT  
YEAR 1  
B.Sc. IN AGRICULTURAL EDUCATION AND EXTENSION  
YEAR 1

**COURSE CODE: CP 101**

**TITLE OF PAPER :** INTRODUCTION CHEMISTRY  
SECTION 1 : INORGANIC CHEMISTRY  
SECTION 2 : ORGANIC CHEMISTRY

**TIME ALLOWED:** TWO [2] HOURS

**INSTRUCTION:** ANSWER FOUR [4] QUESTIONS WITH TWO [2]  
QUESTIONS FROM EACH SECTION

**NOTE:** THIS PAPER CONTAINS SIX [6] PAGES INCLUDING  
THE COVER PAGE

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CHIEF INVIGILATOR.**

## SECTION 1 : INORGANIC CHEMISTRY

## QUESTION 1

- (a) Define or give brief descriptions of the following terms and phrases. Each answer carries two [2] marks.
- (i) An acid
  - (ii) An electron
  - (iii) A shell
  - (iv) An atom
  - (v) An isotope
  - (vi) A proton
  - (vii) A compound
  - (viii) A subshell
  - (ix) A molecular formula
  - (x) An endothermic reaction.

[20]

- (b) Given the following information: Atomic masses : Mg = 24.305 amu; O<sub>2</sub> = 15.9994 amu; H<sub>2</sub> = 1.007 amu; Calculate the equivalent mass of magnesium hydroxide [Mg(OH)<sub>2</sub>].

[5]

[25]

## QUESTION 2

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

Isotope	Abundances (%)	Masses (amu)
<sup>24</sup> <sub>12</sub> Mg	78.99	23.985042
<sup>25</sup> <sub>12</sub> Mg	10.00	24.985837
<sup>26</sup> <sub>12</sub> Mg	11.01	25.982593
		[15]

- (b) Calculate the formula mass of the mineral Mascagnite  $[(\text{NH}_4)_2\text{SO}_4]$ , given the atomic masses of the following elements. O = 15.9994 amu. N = 14.0067 amu. H = 1.007 amu. S = 32.06 amu. [10]

[25]

## QUESTION 3

- (a) Find the percent element composition of the mineral Celsian  $[\text{BaAl}_2\text{Si}_2\text{O}_8]$  by using the following information. Ba = 137.53 amu. Al = 26.9815 amu. O = 15.9994 amu. Si = 28.0855 amu. [15]

[15]

- (b) By using the Product Rule, determine the pH values at the following concentrations.

(i) 0.001 M [5]

(ii)  $2.0 \times 10^{-2}$  M [5]

[25]

## SECTION 2 : ORGANIC CHEMISTRY

## QUESTION 4.

(a) Define or give brief descriptions of the following terms or phrases. Include a **structural** formula where possible. Each answer carries two [2] marks.

- (i) An hydrocarbon
- (ii) An alkene
- (iii) An alkane
- (iv) An alkyne
- (v) A saturated hydrocarbon
- (vi) An ether
- (vii) An organohalogen
- (viii) A phenol
- (ix) A nucleophile
- (x) An addition reaction.

[20]

(b) Determine the molecular formulae of the following statements:

- (i) An alkane that has seven [7] carbon atoms.
- (ii) An alkane that has six [6] hydrogen atoms.
- (iii) An alkene that has six [6] carbon atoms.
- (iv) An alkene that has a total of twenty four hydrogen [24] atoms

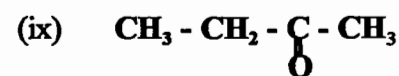
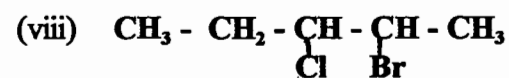
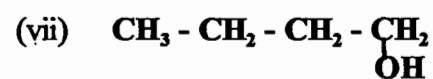
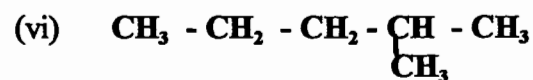
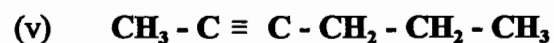
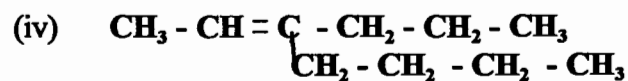
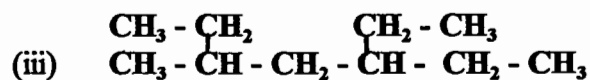
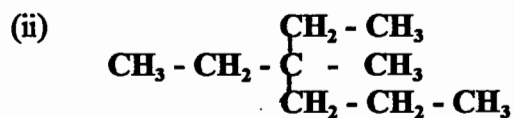
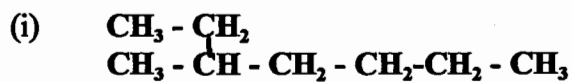
(v) A cycloalkane that has a total of six [6] carbon atoms.

[5]

[25]

## QUESTION 5

(a) Give the IUPAC names to each of the following compounds. Each answer carries two [2] marks.



[20]

- (b) The reaction between an unsymmetrical alkene and an unsymmetrical reagent like an hydrogen halide gives two products of different quantities. State a rule that specifies the route followed by the electrophile so that one product is favored. Include an equation to illustrate the rule [5]

[25]

## QUESTION 6

- (a) Write condensed IUPAC structural formulae for the following named compounds. Each answer carries two [2] marks.

(i) 2 - bromo - 2 - heptanol

(ii) 3 - methyl- 2 - pentyne

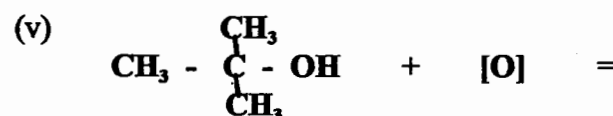
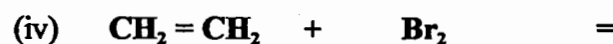
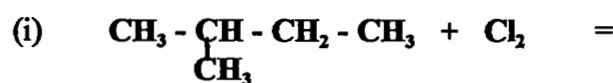
(iii) 3 - iodo- 4 - heptanol

(iv) 1 , 1 - dichloropethane

(v) Cyclohexane

[10]

- (b) Either copy and complete the following equations or just provide the required answers only. Each answer carries three [3] marks.



[15]

[25]