



**1<sup>ST</sup> SEMESTER 2009/2010**

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**THE UNIVERSITY OF SWAZILAND**

**FINAL 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 :** INTRODUCTORY CHEMISTRY  
SECTION 1 : INORGANIC CHEMISTRY  
SECTION 2 : ORGANIC CHEMISTRY

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

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

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

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INVIGILATOR.**

## SECTION 1 : INORGANIC CHEMISTRY

## QUESTION 1

(a) Define or give brief descriptions of the following terms and phrases. Each and 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]

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 abundances and masses of its naturally occurring isotopes listed below. Show all calculations and express the final answer to five [5] decimal places.

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

- (b) Calculate the formula mass of the mineral mascagnite  $[(NH_4)_2SO_4]$ , 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  $[BaAl_2Si_2O_8]$  by using the following information. Ba = 137.53 amu. Al = 26.9815 O = 15,9994 amu. Si = 28.00855 amu. [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 following molecular formulae by using the correct formula when calculating:

- (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

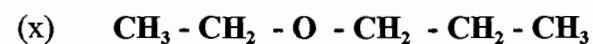
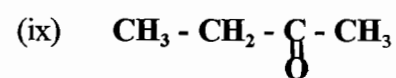
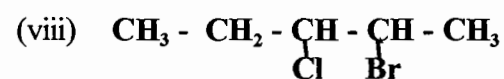
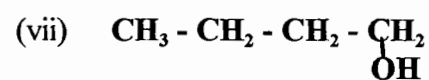
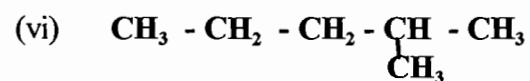
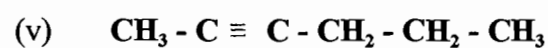
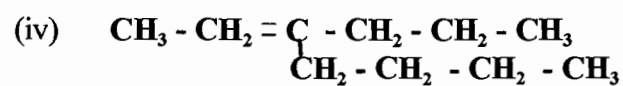
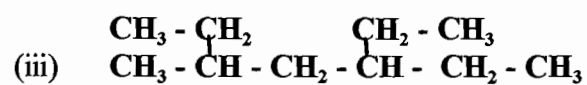
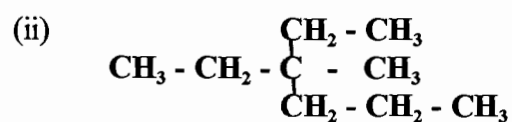
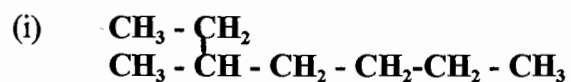
(v) A cycloalkane that has a total of six [6] carbon atoms.

[5]

[25]

## QUESTION 5

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



[20]

- (a) 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.

[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 - hexyne

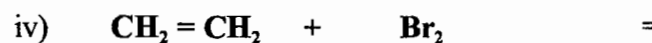
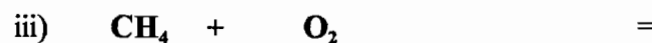
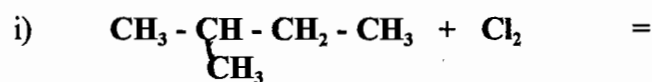
iii) 3 - iodo - 4 - heptanol

iv) 1 ,1 - dichloropentane

v) Cyclohexane

[10]

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



[15]

[25]