



**1<sup>st</sup> SEMESTER 2010/2011**

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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 SCIENCES YEAR 1  
B.Sc. IN CONSUMER SCIENCES EDUCATION YEAR 1  
B.Sc. IN CONSUMER SCIENCES YEAR 1  
B.Sc. IN FOOD SCIENCE, NUTRITION AND TECHNOLOGY  
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**

**INSTRUCTIONS: 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) A shell
- ii) An atom
- iii) An electron
- iv) A strong acid atom
- v) An acid
- vi) An isotope
- vii) A proton
- viii) A compound
- ix) An exothermic reaction
- x) Organic chemistry

[20]

(b) Calculate the equivalent mass of Magnesium hydroxide  $[\text{Mg}(\text{OH})_2]$  given the following information: Mg = 24.305 amu; O = 15.9994 amu ; H = 1.007 amu.

[5]

[25]

## QUESTION 2

(a) Use the product rule to calculate the pH values of the following concentrations:

i) 0.0001M [5]

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

(b) Calculate the percent element composition of the mineral Mascagnite  $[(\text{NH}_4)_2\text{SO}_4]$  given the atomic masses of the following elements. N = 14.0067 amu; H = 1.007 amu; S = 32.06 amu; O = 15.9994 amu.

[15]

[25]

## QUESTION 3

(a) Find the formula mass of the mineral Celsian  $[\text{BaAl}_2\text{Si}_2\text{O}_8]$  given the following information. Ba = 137.53 amu; Al = 26.9815 amu; Si = 28.00855 amu; O = 15.9994 amu

[10]

- (b) Calculate the atomic mass of magnesium [Mg] given the masses and the abundances of its naturally occurring isotopes below. All calculations should be shown and the final answer given to five [5] decimal places.

<u>ISOTOPE</u>	<u>ABUNDANCES (%)</u>	<u>MASSES (AMU)</u>
24 Mg 12	78.99	23.985042
25 Mg 12	10.00	24.985837
26 Mg 12	11.01	25.982598

[15]

[25]

## SECTION 2 : ORGANIC CHEMISTRY

## QUESTION 4

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

- (i) An alkane
- (ii) An alkyne
- (iii) An alkene
- (iv) A saturated hydrocarbon
- (v) An hydrocarbon
- (vi) An ether
- (vii) An electrophile
- (viii) A phenol
- (ix) Halogenation
- (x) Addition reaction

[20]

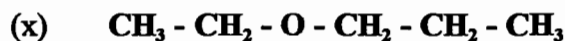
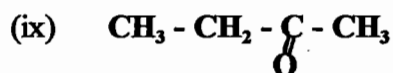
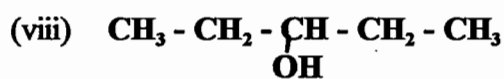
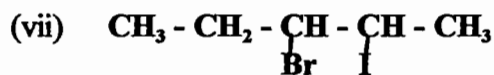
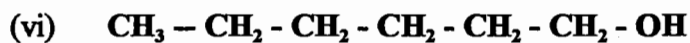
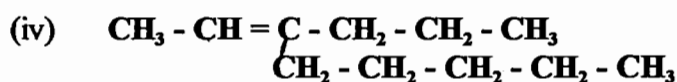
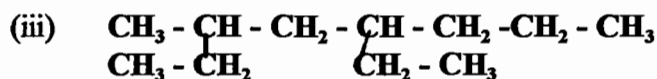
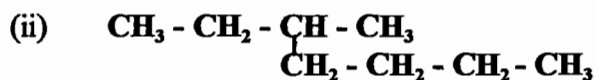
(b) Use the correct formula to determine the molecular formulae of the following statements.

- (i) An alkane that has eight [8] carbon atoms
- (ii) An alkane that has twelve [12] hydrogen atoms
- (iii) An alkene that has eight [8] carbon atoms
- (iv) An alkane that has twenty four hydrogen atoms
- (v) A cycloalkane that has 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 such as an hydrogen halide gives two products of different quantities. State a rule which indicates the route that is followed by the electrophile in order to favor one of the products. Include an equation in order to illustrate the rule.

[5]

[25]

## QUESTION 6

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

(i) 3 - Chloro - 2- octanol

(ii) 2 - methyl - 3 - hexene

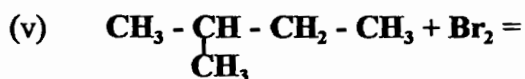
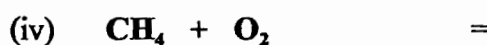
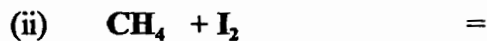
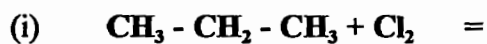
(iii) 2 - bromo - 3 - heptane

(iv) 2,2 - diiodohexane

(v) Cyclopentane

[10]

(b) Copy and complete the following equations or only supply the required half equation. Each answer carries three [3] marks.



[15]

[25]