



1st SEMESTER 2013/2014

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THE UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

**PROGRAMMES: B.Sc. IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING
YEAR 1**

**B.Sc. IN AGRICULTURAL ECONOMICS AND
AGRIBUSINESS MANAGEMENT YEAR 1**

**B.Sc. IN AGRICULTURAL EDUCATION AND EXTENSION
YEAR 1**

B.Sc. IN AGRONOMY YEAR 1

B.Sc. IN ANIMAL SCIENCE DAIRY OPTION YEAR 1

B.Sc. IN ANIMAL SCIENCE YEAR 1

B.Sc. IN CONSUMER SCIENCES YEAR 1

B.Sc. IN CONSUMER SCIENCES EDUCATION YEAR 1

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

B.Sc. IN HORTICULTURE YEAR 1

**B.Sc. IN TEXTILE AND APPAREL DESIGN AND MANAGEMENT
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 subshell
- ii) An atom
- iii) An electron
- iv) A strong acid
- v) An acid
- vi) An isotope
- vii) A proton
- viii) A mixture
- ix) An endothermic reaction
- x) Inorganic chemistry

[20]

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

[5]

[25]

QUESTION 2

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

i) 0.001M [5]

ii) $1 \times 10^{-2} \text{ M}$ [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. $\text{N} = 14.0067 \text{ amu}$; $\text{H} = 1.007 \text{ amu}$; $\text{S} = 32.06 \text{ amu}$; $\text{O} = 15.9994 \text{ amu}$. [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. $\text{Ba} = 137.53 \text{ amu}$; $\text{Al} = 26.9815 \text{ amu}$; $\text{Si} = 28.00855 \text{ amu}$; $\text{O} = 15.9994 \text{ amu}$

[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>
$^{24}_{12}\text{Mg}$	78.99	23.985042
$^{25}_{12}\text{Mg}$	10.00	24.985837
$^{26}_{12}\text{Mg}$	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) An alcohol

[20]

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

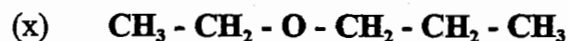
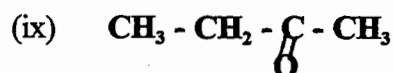
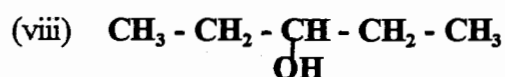
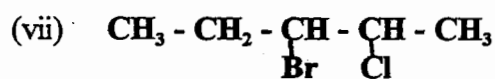
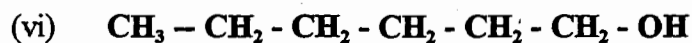
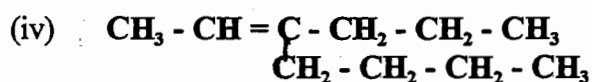
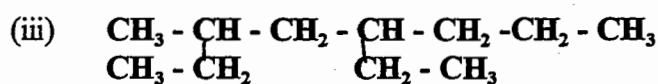
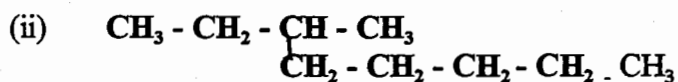
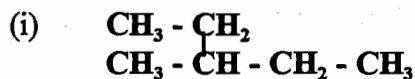
- (i) An alkane that has eight [8] carbon atoms
- (ii) An alkane that has twelve [12] hydrogen atoms
- (iii) An alkene that has eight [8] carbon atoms
- (iv) An alkane that has twenty four hydrogen atoms
- (v) A cycloalkane that has six [6] carbon atoms.

[5]

[25]

QUESTION 5

- (a) Give the **IUPEC** 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 - hexane
- (iii) 2 - bromo - 3 - heptane
- (iv) 2,2 - dibromohexane
- (v) Cyclopentane

[10]

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

- (i) $\text{CH}_3 - \text{CH}_2 - \text{CH}_3 + \text{Cl}_2 =$
- (ii) $\text{CH}_4 + \text{F}_2 =$
- (iii) $\text{CH}_2 = \text{CH}_2 + \text{I}_2 =$
- (iv) $\text{CH}_4 + \text{O}_2 =$
- (v) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2 - \text{CH}_3 + \text{Br}_2 =$

[15]

[25]