



1st SEM. 2005/2006

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UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

**PROGRAMME: REMEDIAL YEAR IN AGRICULTURE
 REMEDIAL YEAR IN AGRICULTURAL EDUCATION**

COURSE CODE: CP 305

TITLE OF PAPER: CHEMISTRY AND SOIL FERTILITY

**SECTION 1: INORGANIC CHEMISTRY
SECTION 2: ORGANIC CHEMISTRY
SECTION 3: SOIL FERTILITY**

TIME ALLOWED: TWO [2] HOURS

**INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS, AT LEAST ONE [1]
 FROM EACH SECTION.**

**NOTE: THE PAPER CONTAINS FIVE [5] PAGES INCLUDING THE
 COVER PAGE.**

**DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY
THE INVIGILATOR.**

SECTION 1 : INORGANIC CHEMISTRY

QUESTION 1

(a) Define or give short descriptions of the following terms and phrases:

- | | | |
|-------|---------------|-----|
| (i) | An atom | [2] |
| (ii) | A liquid | [2] |
| (iii) | An ionic bond | [2] |
| (iv) | A proton | [2] |
| (v) | A solid | [2] |

(b) The order of energies in subshells of atoms is as follows:

1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d

Construct electron configurations of the following elements. Each answer carries four [4] marks.

	<u>Z</u>	<u>Element</u>	
(a)	18	Argon	[5]
(b)	17	Chlorine	[5]
(c)	15	Phosphorus	[5]

[25]

QUESTION 2

(a) Briefly identify three [3] characteristics of ionic compounds.

[6]

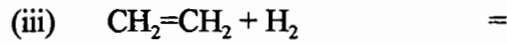
(b) List the four [4] factors which affect the rate of any chemical reaction

[4]

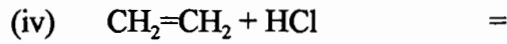
(c) Determine the formula mass of Albite [NaAlSi₃O₃] if the atomic masses are as follows: Na = 22.9898 amu, Al = 26.9815 amu, Si = 28.0855 amu; and O = 15.9994 amu.

[15]

[25]



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[25]

SECTION 3: SOIL FERTILITY

QUESTION 5

(a) Write short notes on the following methods of fertilizer placement.

(i) Broadcasting [5]

(ii) Banding [5]

(b) Briefly discuss the following factors which affect decision-making when using fertilizers:

(i) Soil moisture content [5]

(ii) Ammonia volatilization losses [5]

(iii) Leaching losses [5]

[25]

QUESTION 6

(a) Discuss the following methods of fertility evaluation.

(i) Nutrient deficiency symptoms [5]

(ii) Field trials [5]

(iii) Greenhouse trials [5]

(b) Write brief notes on the following processes and activities.

(i) Denitrification of nitrogen [5]

(ii) Location of plant roots [5]

[25]