

**KITUI RURAL SUB-COUNTY KCSE REVISION MOCK
EXAMS 2015**

233/2
CHEMISTRY
PAPER 2
(THEORY)
TIME: 2 HOURS

SCHOOLS NET KENYA

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NAME _____
SCHOOL _____

INDEX NO. _____
SIGNATURE _____
DATE _____

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KITUI RURAL CONSTITUENCY FORM FOUR JOINT EXAMINATION, 2015

Kenya Certificate of Secondary Education (K.C.S.E)

233/2
CHEMISTRY
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INSTRUCTIONS:

- Write your name, school and index number in spaces provided above.
- Sign and write the date of examination in spaces provided above.
- Answer **ALL** the questions in the spaces provided.
- Mathematical tables and silent electronic calculators may be used.
- All working must be clearly shown where necessary.

FOR EXAMINER'S USE ONLY

Question	Maximum score	Candidate's score
1	12	
2	13	
3	10	
4	11	
5	8	
6	11	
7	15	
Total score	80	

*This paper consists of 11 printed pages.
Candidates should check to ensure that all pages are printed as indicated*

1. Study the information in the table below and answer the questions that follow. The letters do not represent the symbol of the elements.

Elements	Atomic number	Melting point (°C)	Boiling point (°C)
X	11	97.8	890
Y	13	660	2470
Z	14	1410	2360
P	17	-101	-35
Q	18	-189	-186
R	19	63.7	480

- a) Write the electron arrangement for ions formed by elements P and Y.

P (1 mark)

Y (1 mark)

- b) Why is it that the melting point and boiling point of elements P and Q are very low? (1 mark)

- c) Element Y reacts with P forming a compound. Draw dots (•) and cross (x) diagrams for this. (2 marks)

- d) Explain why the melting point of Y is higher than that of X. (1 mark)

- e) Select an element which is :

- i) The most reactive non-metal. (1 mark)

- ii) Can react with both acids and bases. (1 mark)

f) Write an equation to show the reaction of element X with:

i) Oxygen gas (1 mark)

ii) Water (1 mark)

g) Which element has the greatest tendency of forming covalent compounds? Explain. (2 marks)

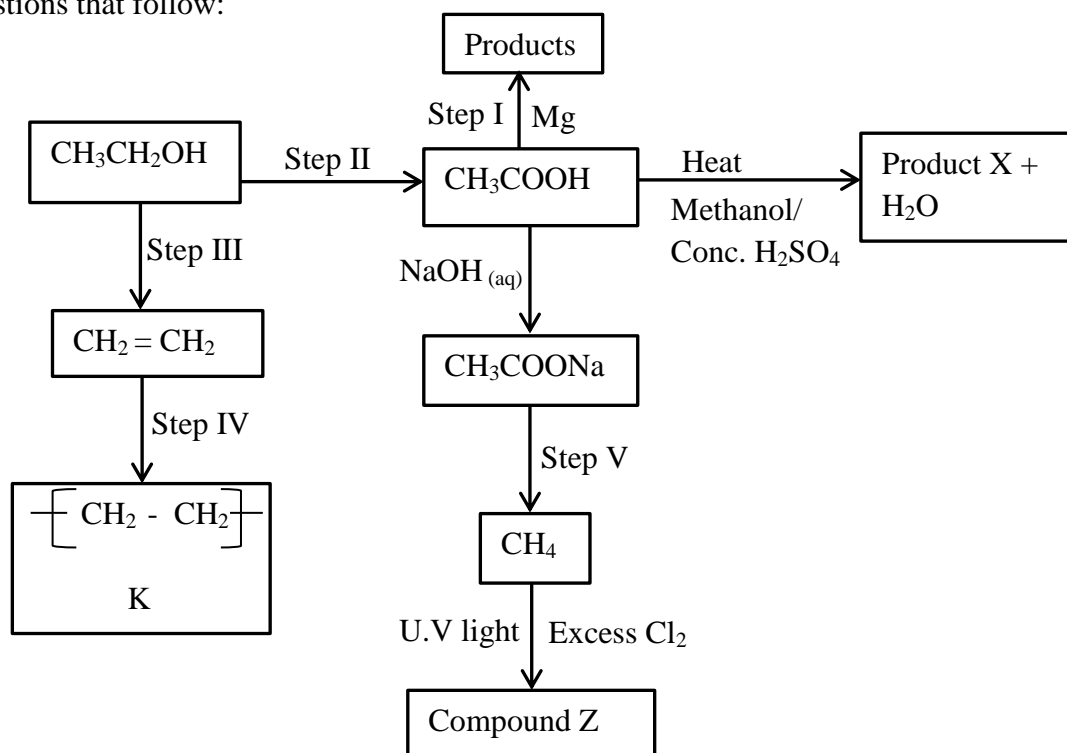
2. I) Give the systematic names of the following compounds.

i) $\text{CH}_3\text{CH}_2\text{COOH}$ (1 mark)

ii) $\text{CH}_3\text{COOCH}_2\text{CH}_3$ (1 mark)

iii) $\text{CHCCH}_2\text{CH}_3$ (1 mark)

II) The scheme below shows a series of reactions starting with ethanol. Study it and answer the questions that follow:



a) Name the types of reactions, reagents and conditions in steps:-

i) Step II

Name ($\frac{1}{2}$ mark)

Reagents ($\frac{1}{2}$ mark)

Condition ($\frac{1}{2}$ mark)

ii) Step III

Name ($\frac{1}{2}$ mark)

Reagent ($\frac{1}{2}$ mark)

Condition. ($\frac{1}{2}$ Mark)

b) Write the equation for the reaction that take place in step I (1 mark)

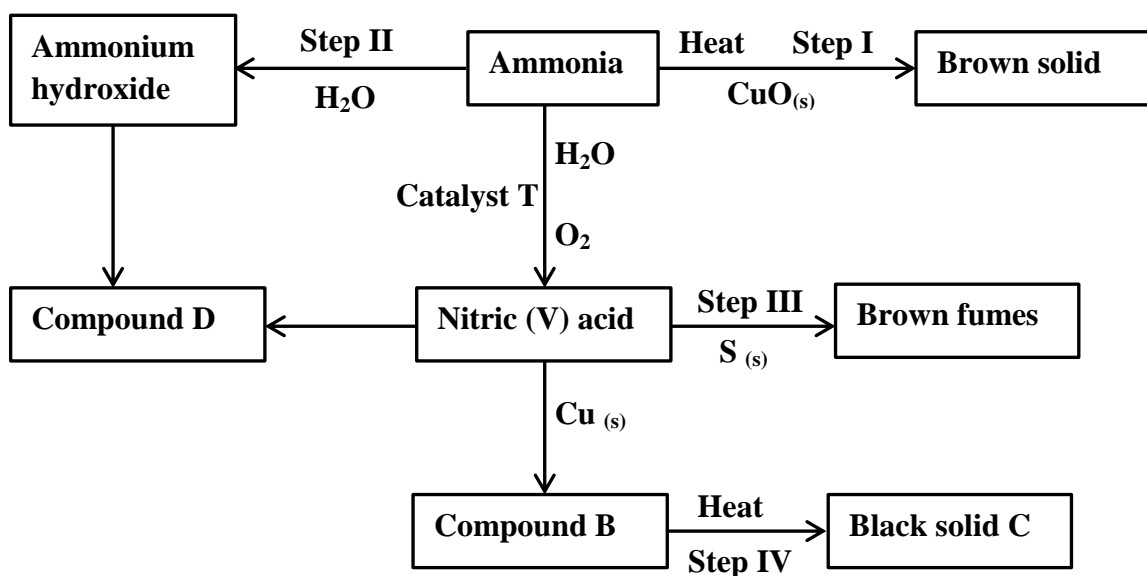
c) Name the product X (1 mark)

d) Identify the process leading to the formation of compound Z (2 marks)

e) Name compound K and state **one** of its uses. (2 marks)

f) If the RMM of K is 39,200. Determine the value of n. (2 marks)

3. The scheme below shows various reactions starting with ammonia. Study it and answer the questions that follow.



- a) List the raw materials used in the manufacture of ammonia by Haber process (1 mark)
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-
- b) Write an equation that occurs between ammonia and oxygen in the presence of a catalyst T. (1 mark)
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-
- c) Using an appropriate equation explain how the reaction in step III occurs (2 marks)
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-
- d) Identify the property of ammonia applied in step I (1 mark)
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- e) i) Write the formula of compound D (1 mark)
-
- ii) Calculate the mass of compound D that would contain 14g of nitrogen
(H = 1, N = 14, O = 16) (2 marks)
-
-
-
-
-

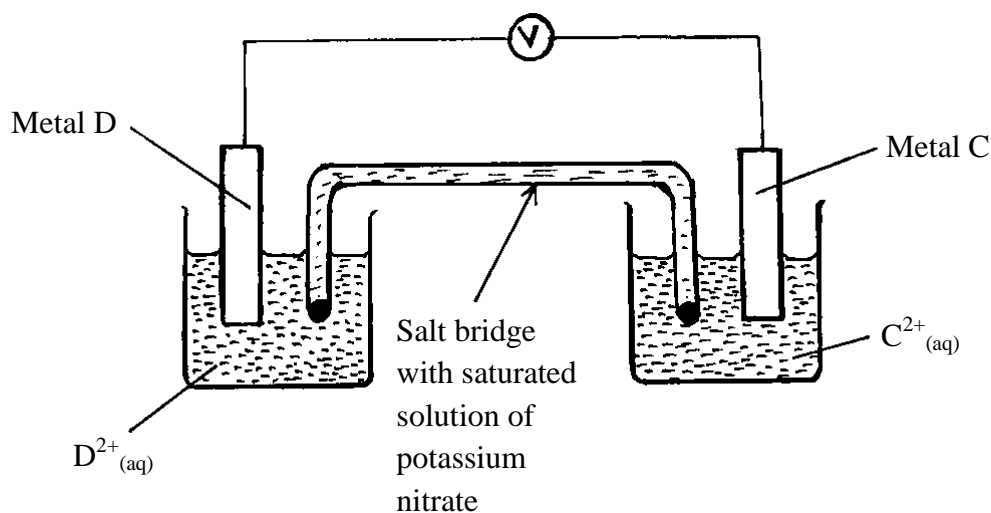
f) State **two** uses of ammonia gas.

4. The table below gives the standard electrode potentials for metals represented by letters A, B, C and D. Study it and answers the questions that follow.

Metals	Standard electrode potential (volts)
A	- 0.44
B	- 2.38
C	+ 0.34
D	- 0.85

a) Which metal represents the strongest oxidizing agent? Give a reason. (2 marks)

b) Metals C and D were connected to form a cell as shown in the diagram below.



i) Write the equations that occur at electrodes

I) C (1 mark)

II) D (1 mark)

ii) Indicate on the diagram, with an arrow the direction in which electrons flow. (1 mark)

iii) What is the function of salt bridge? (1 mark)

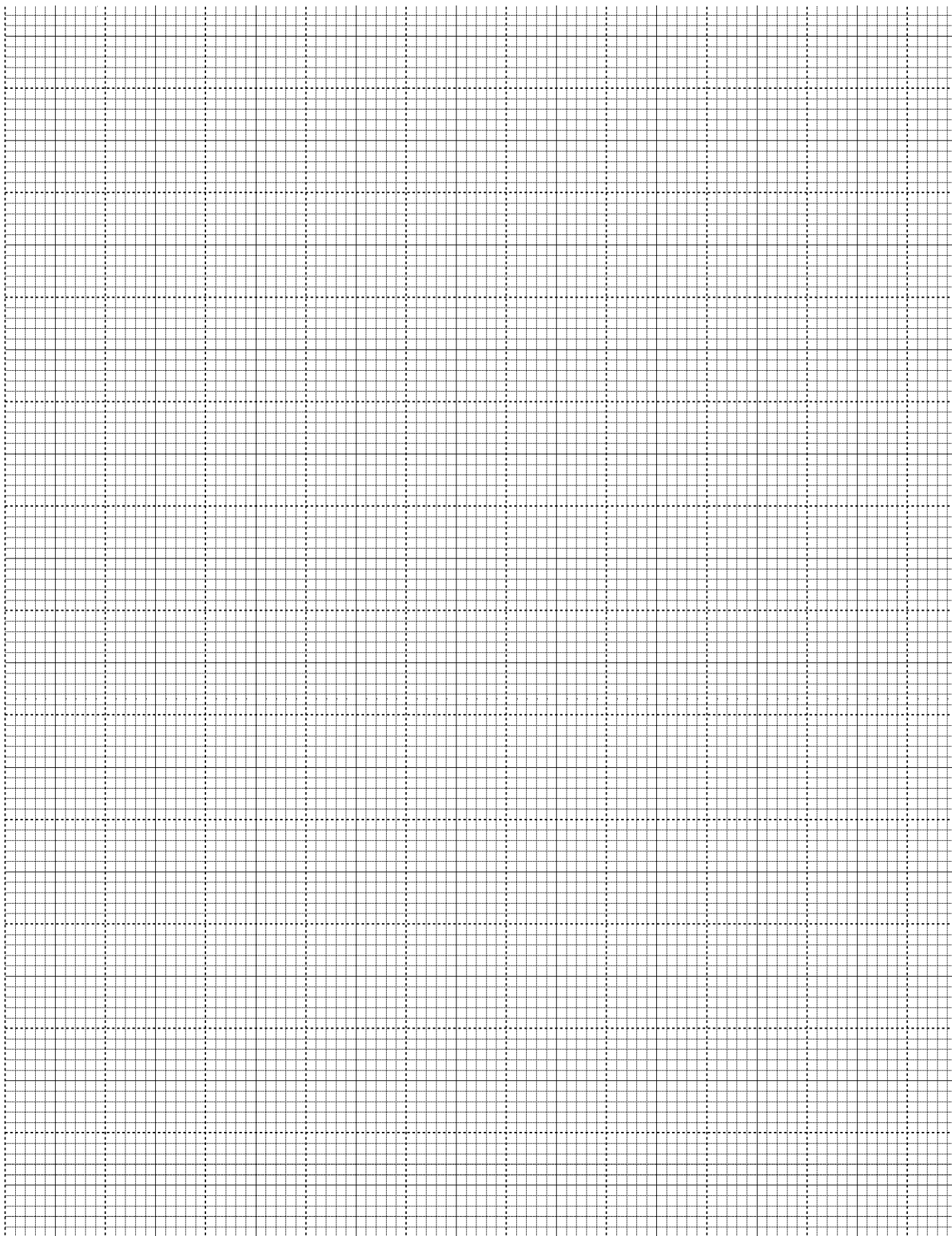
- c) During electrolysis of aqueous copper II sulphate using copper electrodes, a current of 0.4 amperes was passed through the cell for 2.5 hours.
- i) Write an ionic equation for the reaction that took place at the anode. (1 mark)
-
-
- ii) Determine the change in mass of the anode which occurred as a result of the electrolysis process (Cu = 64, 1 Faraday = 96500 coulombs) (2 marks)
-
-
-
-
-
-
-
- d) An iron spoon is to be electroplated with silver. Draw a labelled diagram of the apparatus that could be used to carry out this process. (2 marks)

5. a) A pure calcium carbonate weighing 7.5g was placed in a flask with 50cm³ of dilute hydrochloric acid. The flask was kept at constant temperature and the carbon (IV) oxide evolved was collected in a graduated flask. The volume of carbon (IV) oxide was recorded every 20 minutes interval (some of CaCO₃ remained undissolved at the end of the experiment) the results of the experiment are given in the table below. Study it and answer the questions that follow.

Time from the start of reaction	Volume of CO ₂ formed at s.t.p. in cm ³
20	655
40	910
60	1065
80	1100
100	1120
120	1120

i) On the grid provided plot a graph of the volume of carbon (IV) oxide formed against time.

(3 marks)

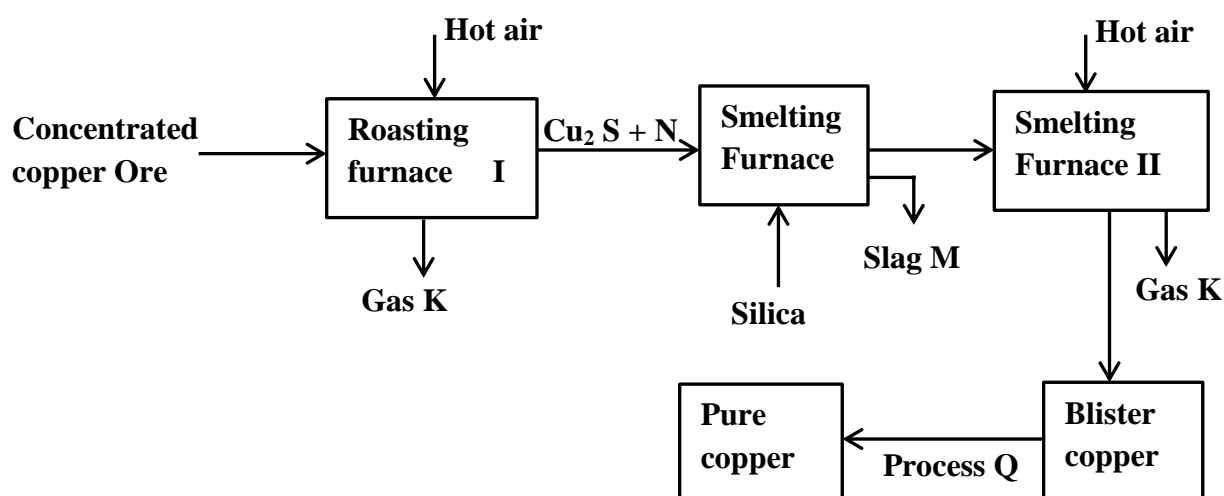


ii) From the graph determine the volume of the gas collected after 43 seconds. (1 mark)

iii) Determine the rate of reaction at the 25th minute (2 marks)

iv) What mass of CaCO_3 will react with the acid after 100 seconds? (2 marks)

6. The flow chart below outlines some processes involved during extraction of copper. Study it and answer the questions that follow:-



a) Explain the meaning of ore concentration. (1 mark)

b) Name gas K (1 mark)

c) Write the chemical formula of one of the ores used in the process. (1 mark)

- d) Write a balanced chemical equation for the reaction that takes place in the roasting furnace. (1 mark)
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-
- e) Identify process Q and substance N (1 mark)
-
-
- f) Write a balanced chemical equation for the reaction in which the slag is formed. (1 mark)
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-
- g) State **two** uses of copper metal. (2 marks)
-
-
-
- h) Give **two** effects that the above process could have on the environment. (2 marks)
-
-
-
7. In an experiment to determine the heat of neutralization of 100cm^3 of 1M Nitric acid and 100cm^3 of potassium hydroxide. The following results were obtained.
- Initial temperature of acid = 24.0°C
- Initial temperature of alkali = 25.0°C
- Final temperature of the mixture of acid and alkali = 37.5°C
- i) Define heat of neutralization (1 mark)
-
-
- ii) Write an ionic equation for the reaction between nitric (V) acid and potassium hydroxide. (1 mark)
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-
- iii) Calculate:
- a) The amount of heat produced during the experiment
(Take specific heat capacity of solution = $4.2\text{ Jg}^{-1}\text{K}^{-1}$, density of solution = 1g/cm^3) (3 marks)
-
-
-
-

b) The molar heat of neutralization for this reaction.

(2 marks)

iv) Explain why if the experiment was carried using Ethanoic acid of equal volume and molarity, the molar heat of neutralization is less.

(2 marks)

v) Write down the thermochemical equation for the reaction between nitric (V) acid and potassium hydroxide

(2 marks)

vi) Draw an energy level diagram for neutralization reaction between potassium hydroxide and nitric (V) acid above.

(2 marks)

vii) The theoretical value of the enthalpy of neutralization of above reaction is 57.2 KJ how does this value compare with the value calculated in III (b) above. Explain.

(2 marks)
