THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

EXAMINERS' REPORT ON THE PERFORMANCE OF CANDIDATES CSEE, 2012

032 CHEMISTRY
(School Candidates)

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Table of Contents

FOREWORD

The Examiners' Report on the Performance of Candidates in Chemistry subject in the Certificate of Secondary Education Examination (CSEE) 2012 was prepared in order to provide feedback to students, teachers, parents, policy makers and the public in general on the performance of candidates.

The Certificate of Secondary Education Examination marks the end of four years of secondary education. It is summative evaluation which among other things, shows the effectiveness of education system in general and education delivery system in particular. Essentially, candidates' responses to the examination questions is a strong indicator of what the education system was able or unable to offer to students in their four years of secondary education.

The analysis presented in this report is intended to contribute towards understanding of some of the reasons behind the performance of candidates in Chemistry subject. The report highlights some of the factors that made candidates fail to score high marks in the questions. Such factors include general lack of knowledge in relation to a particular concept, failure to interpret the requirement of the questions, and inability to answer questions which demand explanation and supporting reasons or balanced chemical equations. The feedback provided will enable the educational administrators, school managers, teachers and students to identify proper measures to be taken in order to improve candidates' performance in future examinations administered by the Council.

The National Examinations Council of Tanzania will highly appreciate comments and suggestions from teachers, students and public in general that can be used for improving future Examiners' Reports. Each school is given a complimentary copy of the report, extra copies can be purchased from the Council. Information about the cost and postage charges can be provided on request.

Finally, the Council would like to thank Chemistry coordinators, Subject Teachers and others who participated in preparation of this report. We would like also to express sincere appreciation to all the staff who participated in analyzing the data used in this report.

Dr. Charles E. Msonde

Ag. EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report on CSEE 2012 Chemistry paper one is based on the analysis of candidates' performance on the stated examination. The examination assessed candidates' competences in accordance with 2007 Certificate of Secondary Education chemistry syllabus and the 2008 CSEE format.

The paper consisted of three sections, namely A, B, and C. Section A was consisted of two questions; section B had nine questions; and section C was composed of two questions which were all compulsory. Each question in section A had ten items (i) – (x) each carried 1 mark; in section B, each question had two parts, (a) and (b), whereas each question carried a weight of 6 marks. Section C had two essay type questions, each carried 13 marks.

A total of 170,959 candidates sat for this Paper. Out of which, 75,441 candidates (44.1%) passed the examination and 84,293 candidates (55.9%) failed. A large number of candidates who passed (49,428) equivalent to 65.5 percent scored grade D, implying that the majority of the candidates passed with a lower grade.

The next section provides analysis of the candidates' performance in each question. It starts with the demand of the question followed by general performance percentage wise, then the possible reasons for low performance and misconceptions observed.

2.0 ANALYSIS OF CANDIDATES PERFORMANCE BY QUESTIONS

2.1 SECTION A: OBJECTIVE QUESTIONS

2.1.1 Question 1: Multiple Choice Items

The question was consisted of ten multiple choice items composed from different topics of the syllabus. Candidates were required to choose the correct answer from the given alternatives and write its letter beside the item number in the answer booklet provided.

The question was attempted by 95.5 percent of all the candidates and 38.2 percent of them scored 5 marks and above, out of which 0.5 percent scored all the 10 marks. The rest, equivalent to 61.8 percent scored below 5 marks, out of which 1.7 percent scored a zero mark.

Majority of the candidates showed poor attempts in items (iii), (iv), (vii) and (ix). In item (iii), they were required to find the amount of the acid

(sulphuric acid or acetic acid) which should react with one gramme of magnesium ribbon in order to produce the greatest amount of hydrogen gas in a short time. Majority of the candidates selected alternative C which was incorrect answer while the correct alternative was D with a volume of $20cm^3$ of 0.5M sulphuric acid. Choosing alternative C might have been caused by the fact that both alternatives C and D, involved sulphuric acid solution containing the same number of moles. This reveals a poor understanding of the effect of volume on collision of reacting species.

In item (vi), the candidates were required to find the molarity of a solution which contains 26.5g of anhydrous sodium carbonate in $5dm^3$ of solution. In order to get the correct response, they had to find the molar mass of sodium carbonate (Na_2CO_3) and use correct formula to obtaining molarity. Candidates who made wrong choice lacked the knowledge in writing proper chemical formula and use of correct formula to determine molarity and concentration of solutions. Candidates could not realize that the inclusion of chemically incorrect information has an impact on calculation.

In item (vii), the candidates were required to identify the theory which provides the evidence of Brownian movement. Majority of the candidates selected alternative E which was incorrect answer while the correct alternative was D. The failure in this question might have been caused by the confusion of the two concepts "Brownian movement and Brownian theory".

In item (ix), candidates were required to choose one correct option that can enable a representation of $C_2H_4Cl_2$ in different structures. Majority of the candidates were attracted by option C "structural formulae", this suggest that many students were not aware that isomers are compounds with the same chemical formula but have different structures

2.1.2 Question 2: Matching Items

The question consisted of a list of 10 items in List A and the corresponding responses in list B. Candidates were required to choose correct responses from list B which corresponds with the item in list A.

The question was attempted by 95.3 percent of candidates, whereas 13.5 percent scored between 5 and 10 marks, out of which 0.5 percent scored all the 10 marks. The rest, equivalent to 78.1 percent scored below 5 marks, out of which 12.4 percent scored a 0 mark.

Items (iv) and (viii) were the most poorly attempted by the majority of the candidates. In item (iv), the candidates were unable to distinguish the names assigned to processes of extraction of metals and non-metals. In item (viii), the candidates showed poor understanding on the properties and differences between the allotropes of carbon.

2.2 SECTION B: SHORT ANSWER QUESTIONS

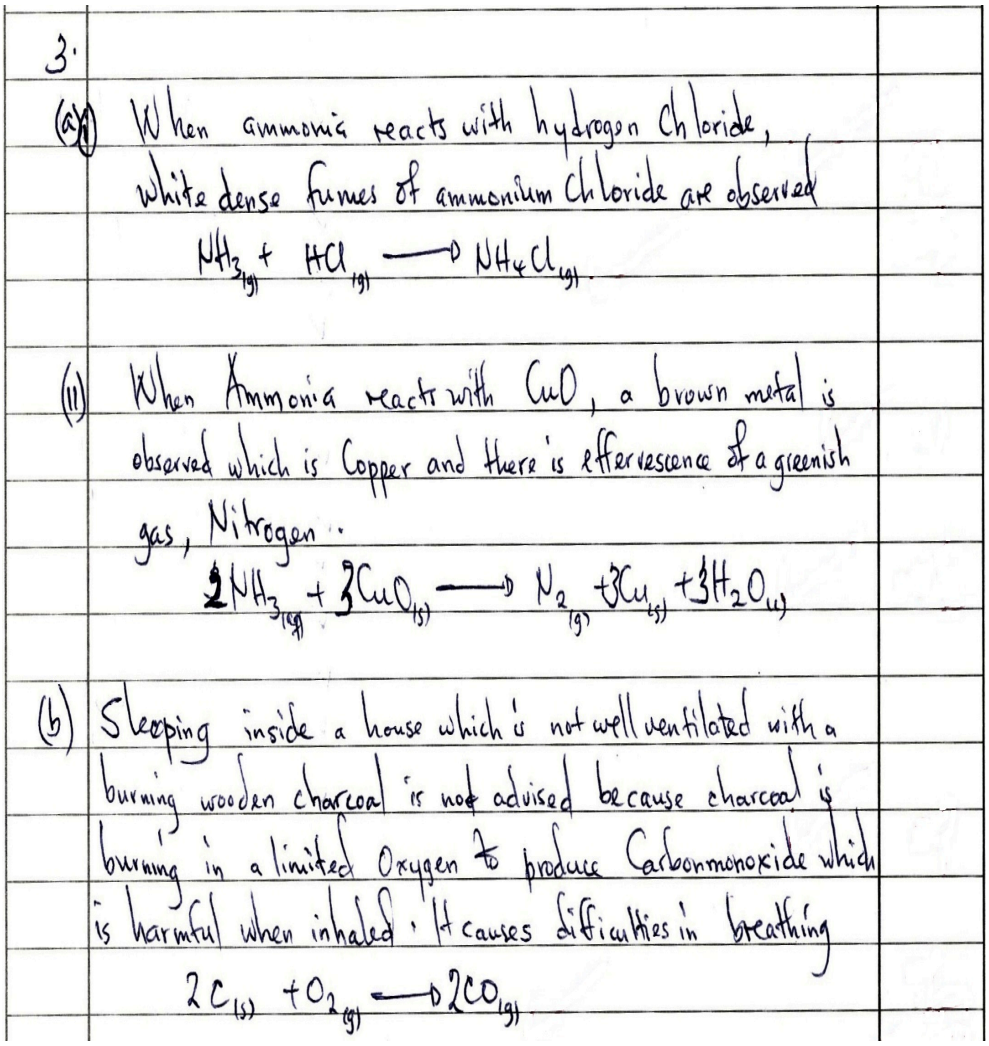
2.2.1 Question 3: Fuels and Energy, Non-metals and their Compounds

In part (a), the candidates were required to give explanation, supported by a chemical equation to show what is observed when ammonia reacts with hydrogen chloride and copper (II) oxide. In part (b), they were required to give a reason as to why it is not advisable to sleep inside a house which is not well ventilated with a burning wooden charcoal; and to write the chemical equation to represent their answer.

The question was attempted by 80.6 percent of the candidates, out of which 91.7 percent scored below 3 out of 6 marks, of which 57.9 percent scored a zero mark. On the other hand, only 0.2 percent scored all the 6 marks. Moreover, 19.7 percent of the candidates scored between 0.5 and 2.5 marks, indicating a general poor performance in this question.

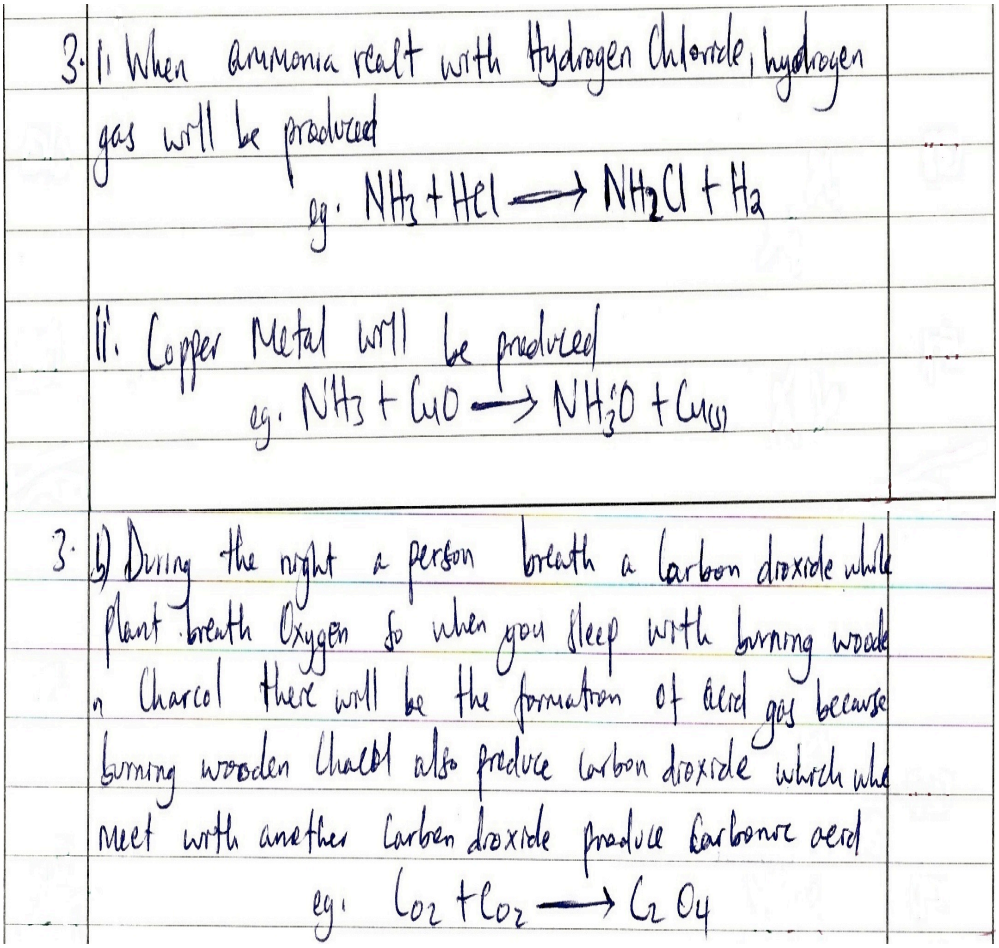
In part (a), responses showed that, many candidates had problems of associating balancing chemical equations with the appropriate state symbols of both reactants and products. This indicates the lack of knowledge on the properties of ammonia gas (as reducing agent). In part (b), the candidates failed to give the meaning of the house which is “not well ventilated” i.e. a house with insufficient supply of oxygen. This led to the failure to write the correct chemical equation for the reaction of carbon (charcoal) in a limited supply of oxygen. Poor responses of most of the candidates might have been caused by lack of knowledge on the properties and composition of charcoal. Extract 3.1 and 3.2 illustrate the case of candidate’s poor and correct responses respectively.

Extract 3.1



In extract 3.1 the candidate presented a correct chemical equation with explanation as demanded by the question.

Extract 3.2



In extract 3.2 the candidate provided incorrect answers, by writing in 3(a) (i) the product being hydrogen gas instead of ammonium chloride. Also in 3(a) (ii), she/he wrote the products of the reaction to be $NH_3O + Cu_{(s)}$ instead of $3Cu_{(s)} + 3H_2O_{(l)} + N_{2(g)}$. In 3(b), the candidate was expected to realise that, burning charcoal consumes oxygen which is essential for breathing and produce carbon monoxide which is toxic.

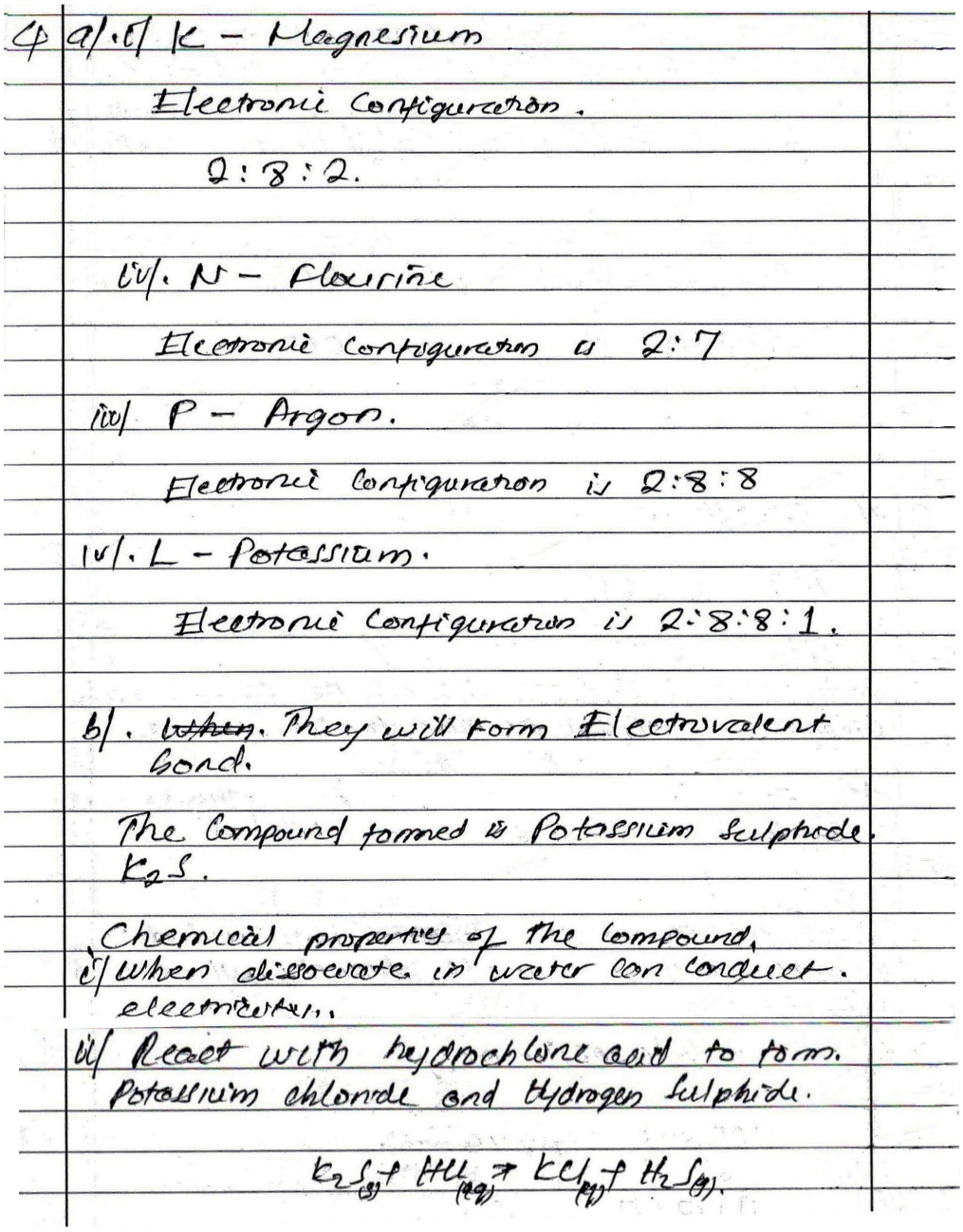
2.2.2 Question 4: Atomic Structure, Periodic Classification of Elements, Chemical Formula and Chemical Bonding

In part (a) the candidates were provided with a periodic table from which they were required to identify and write down the electronic configuration for the elements K, N, P, and L. In part (b), they were required to give the type of bond of a compound formed when Q combines with L; to write the chemical formula for the compound formed; and to list two chemical properties for the compound formed.

The question was attempted by 91.9 percent of the candidates. The performance was fairly good, as 49.1 percent scored between 3 and 6 marks. The rest, 50.9 percent scored below 3 marks, of which 11 percent scored a 0 mark.

The candidates who performed well were able to identify and write down the electronic configuration for the elements K, N, P, and L and to give the type of bond of a compound formed when Q combines with L. They were also able to list correctly with the chemical properties of the bond formed as shown in extract 4.1.

Extract 4.1


4 a/. (i) K – Magnesium

Electronic configuration.

2:8:2.

(iii). N – Flourine

Electronic configuration is 2:7

(iii) P – Argon.

Electronic configuration is 2:8:8

(iv). L – Potassium.

Electronic configuration is 2:8:8:1.

b/. ~~When~~. They will form Electrovalent bond.

The Compound formed is Potassium Sulphide. K_2S.

Chemical properties of the compound.

i/ When dissociate in water can conduct electricity.

ii/ React with hydrochloric acid to form. Potassium chloride and hydrogen sulphide.

$K_2S_{(s)} + HCl_{(aq)} \rightarrow KCl_{(aq)} + H_2S_{(g)}$.

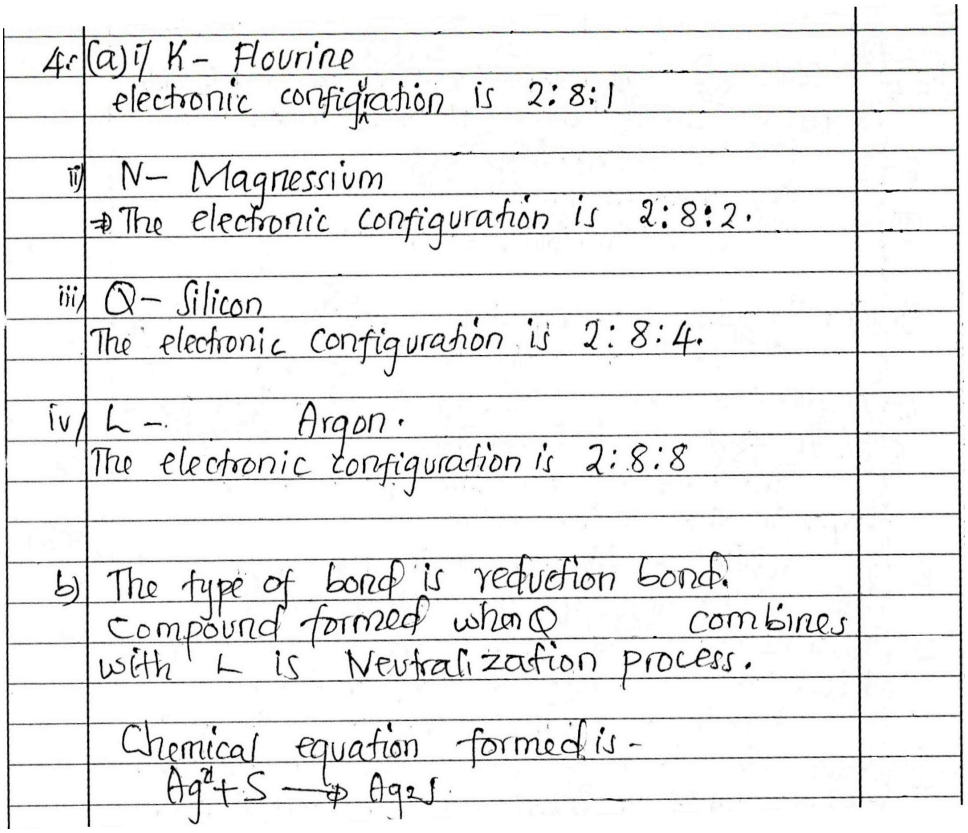
In extract 4.1, the candidate presented accurate answers, named the elements properly, gave electronic configuration and lastly gave chemical properties of the formed bond.

However, the candidates who performed poorly were unable to write the correct chemical formula and to give two chemical properties of the compound formed. Others simply rewrote the question instead of giving the

answer. In addition, in part (b), others gave general properties of the compounds formed by electrovalent/ionic bonding instead of writing chemical properties of the bond between Q and L or K and S.

Poor performance in this part indicates that, the candidates were not familiar with the properties of metal sulphides. Extract 4.2 illustrates an example of the poor responses in this question.

Extract 4.2



In extract 4.2 the candidate in part (a) provided incorrect names of elements which lead to incorrect electronic configuration. In part (b), she/he presented a type of reduction bond which does not exist between Q and L. She/he also gave wrong chemical equation.

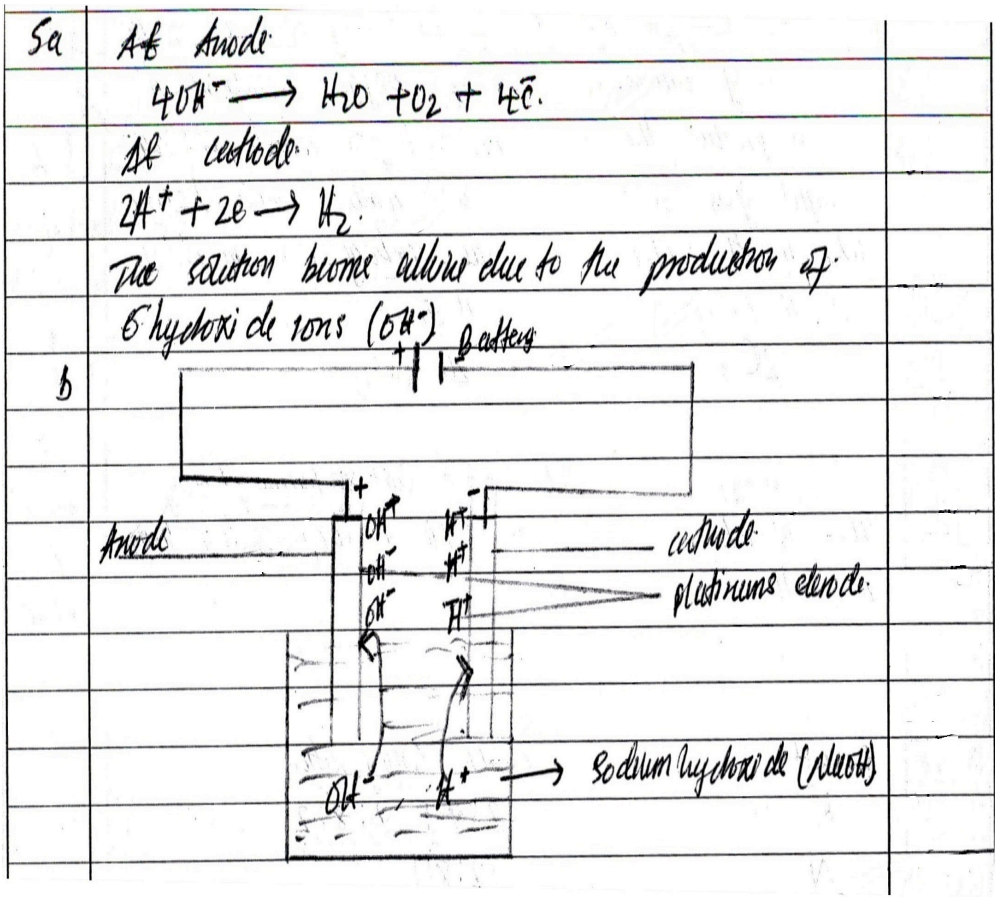
2.2.3 Question 5: Ionic Theory and Electrolysis

In part (a) of this question, candidates were given a solution of sodium hydroxide electrolysed using platinum electrodes and they were required to write an ionic equation for the reactions which took place at the electrodes, and give a reason why the solution becomes alkaline. In part (b), they were required to draw and label electrolytic cell and indicate the directions of the movement of ions when an electric current was passed through it.

Many candidates (74.9%) attempted the question, out of which 92.9 percent scored below half the allocated marks, of which 62.4 percent scored a zero mark. Only 0.1 percent scored all 6 marks, indicating a poor performance in this question.

Few candidates who performed well demonstrated a clear understanding about ionic theory and electrolysis as they were able to write an ionic equation for the reactions which took place at the electrodes. They were also able to give a reason why the solution becomes alkaline. Not only that, but they were also able to draw correctly labeled electrolytic cell; and indicated the directions of the movement of ions when an electric current was passed. Extract 5.1 illustrate the case.

Extract 5.1

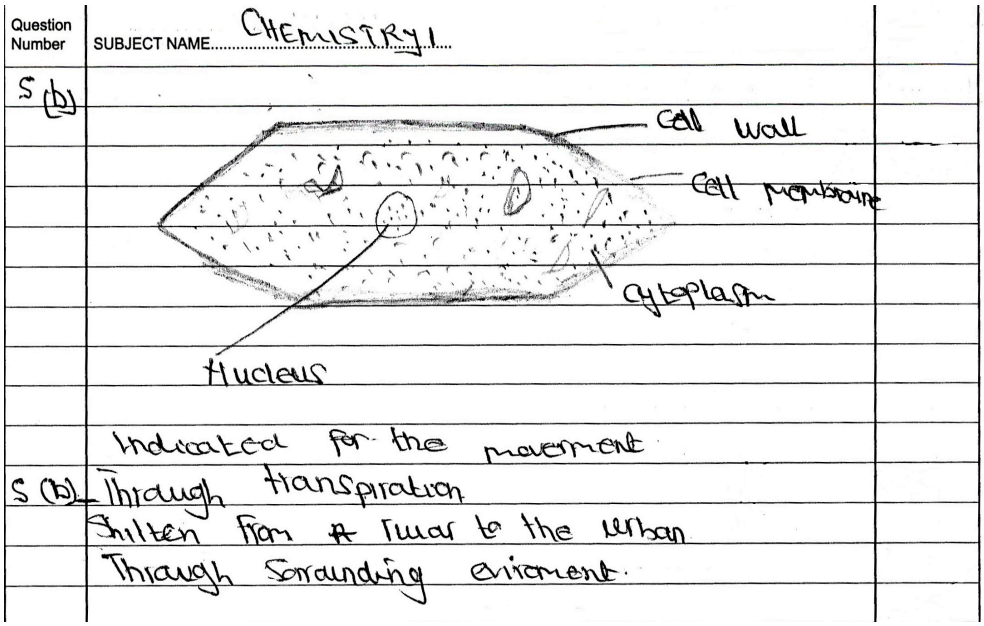


In extract 5.1, the candidate presented correct ionic equation for the reactions which took place at the electrodes and gave a reason why the solution becomes alkaline. In 5 (b), the candidate managed to draw an electrolytic cell indicating the directions of the movement of ions.

The candidates who scored low marks were unable to write the ionic equation of the reactions taking place at the electrodes. They were also unable to draw a diagram of electrolytic cell for the electrolysis of sodium hydroxide solution with platinum electrodes. Others misunderstood the demand of the question resulting into drawing plant cell instead of electrolytic cell, see extract 5.2.

The candidates who failed to indicate the direction of movement of ions and to give explanation why the remaining solution was alkaline all lacked the knowledge about the concept of electrolysis. Those who wrongly labeled the cathode and anode lacked knowledge about the relationship between the battery terminals and electrodes.

Extract 5.2



In extract 5.2, the candidate presented a plant cell instead of an electrolytic cell, this implies that, the candidate had not ever learned or heard about electrolytic cell or she/he did not understand the requirement of the question. In addition to that, the candidate wrote irrelevant points in part 5(b) which was not the correct response.

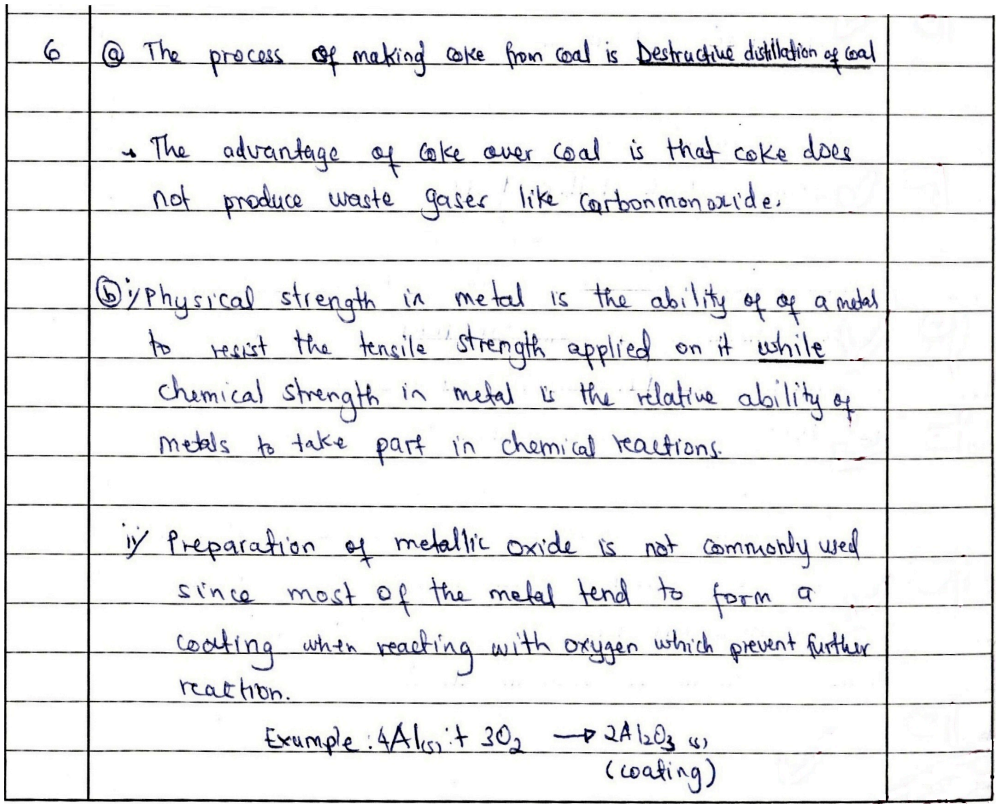
2.2.4 Question 6: Fuels & Energy, Properties of Metals, Compounds of Metals

In part (a), the candidates were required to give the name of the process of making coke from coal and to write one property which makes coke a better fuel than coal. In part (b) they were also required to state the difference between physical and chemical strength of metals and to explain why the preparation of metallic oxides by direct method is not intensively used.

The question was attempted by 68.2 percent of the candidates, out of which 74 percent scored a zero mark, while only 1.6 percent scored above 3 marks. The percent of those who scored all the 6 marks was only 0.2.

The candidates who scored high marks were able to give the name of the process of making coke from coal and to write property which makes coke a better fuel than coal. They also presented correctly the difference between physical and chemical strength of metals and managed to explain why the preparation of metallic oxides by direct method is not intensively used, see extract 6.1.

Extract 6.1


6 @ The process of making coke from coal is Destructive distillation of coal

→ The advantage of coke over coal is that coke does not produce waste gases like carbonmonoxide.

(b) i/ Physical strength in metal is the ability of a metal to resist the tensile strength applied on it while chemical strength in metal is the relative ability of metals to take part in chemical reactions.

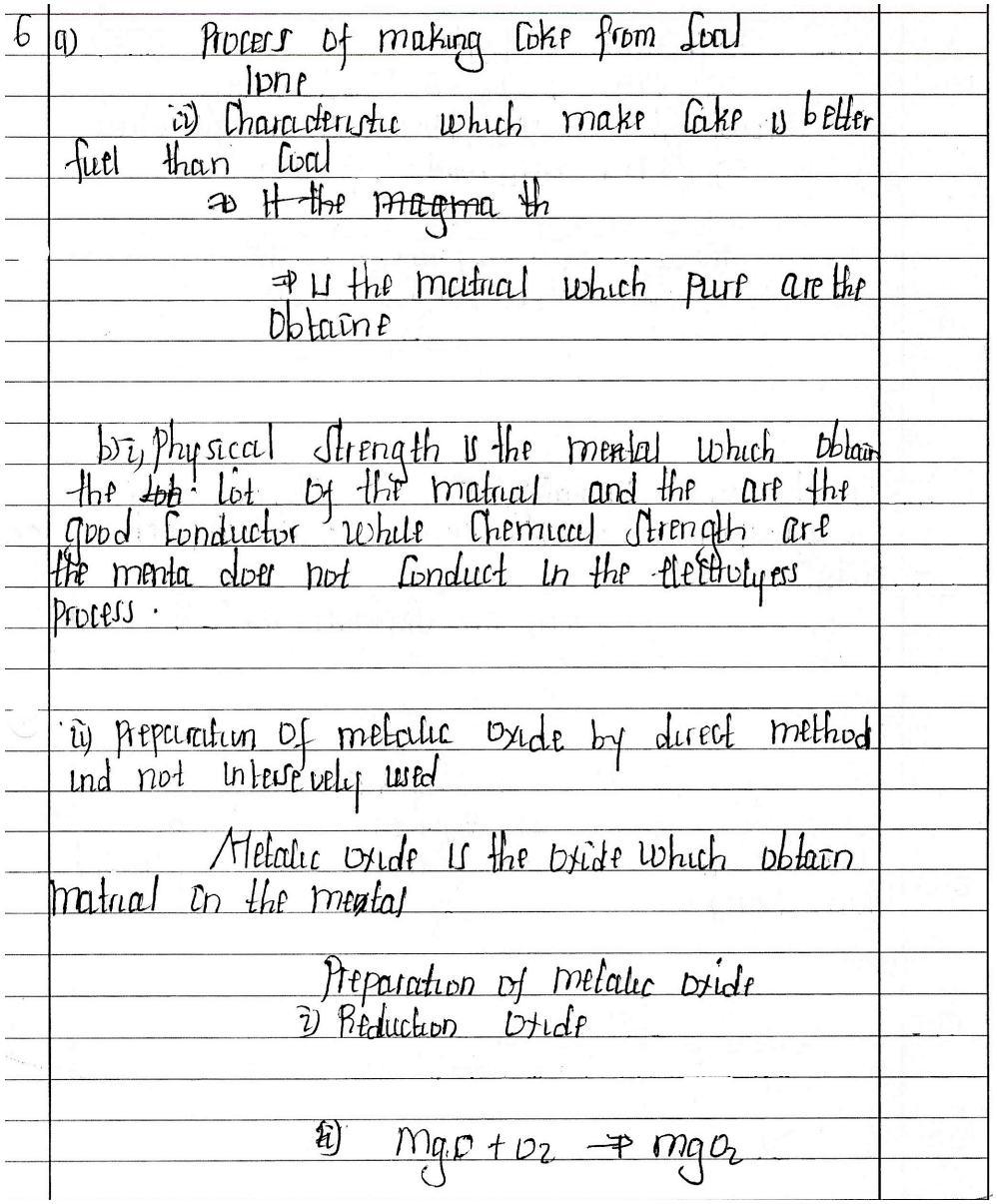
ii/ Preparation of metallic oxide is not commonly used since most of the metal tend to form a coating when reacting with oxygen which prevent further reaction.

Example: $4Al_{(s)} + 3O_2 \rightarrow 2Al_2O_{3(s)}$ (coating)

Extract 6.1 shows that, the candidate was able to give answers which were expected. The candidate gives the name of the process of making coke from coal and wrote property which makes coke a better fuel than coal. She/he also presented correctly the difference between physical and chemical strength of metals and managed to explain why the preparation of metallic oxides by direct method is not intensively used.

The candidates who scored low marks failed to distinguish physical strength from chemical strength, while others gave the difference between physical and chemical changes instead of physical and chemical strength. Others presented irrelevant response on part (a) of the questions as illustrated in extract 6.2. This indicates lack of knowledge on the differences between the arrangement of atoms and arrangement of electrons and their effects on the properties of a given element.

Extract 6.2


6 a) Process of making Coke from Coal
Ipne
ii) Characteristic which make Coke is better fuel than Coal
⇒ If the magma th
⇒ is the matrial which pure are the Obtaine
b) i) Physical Strength is the mental which Obtain the ~~Ob~~ lot of the matrial and the are the good Conductor while Chemical Strength are the menta does not Conduct in the electrolyes process.
ii) Preparation of metalic oxide by direct method and not intensively used
Metalic oxide is the oxide which obtain matrial on the mental
Preparation of metalic oxide
i) Reduction oxide
ii) $Mg + O_2 \rightarrow MgO_2$

In extract 6.2 the candidate failed to name the process of making coke from coal and to write one property which makes coke a better fuel than coal. In part (b), the candidate failed to distinguish physical and chemical strength of metals and to explain why the preparation of metallic oxides by direct method is not intensively used and gave wrong chemical equation for preparation of magnesium oxide.

2.2.5 Question 7: Acids, Bases and Salts, Mole Concept and Related Calculations

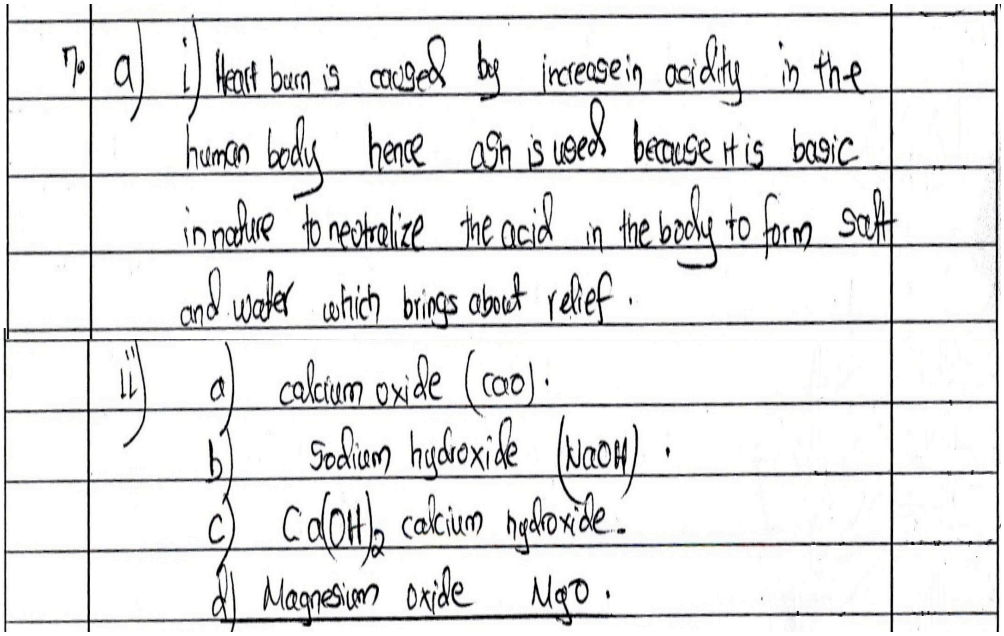
The candidates were required to mention characteristic which makes the ashes to be useful for stooping heart burn. They were also required to mention four compounds found in the laboratory which shows the same characteristics as ashes. Finally, they were required to calculate the number of molecules present in 11.2 litres of carbon dioxide at STP.

The question was attempted by 77.2 percent of candidates, out of which 46.4 scored a zero mark, only 13.6 percent scored above 3 marks of which 2.4 percent scored all the 6 marks.

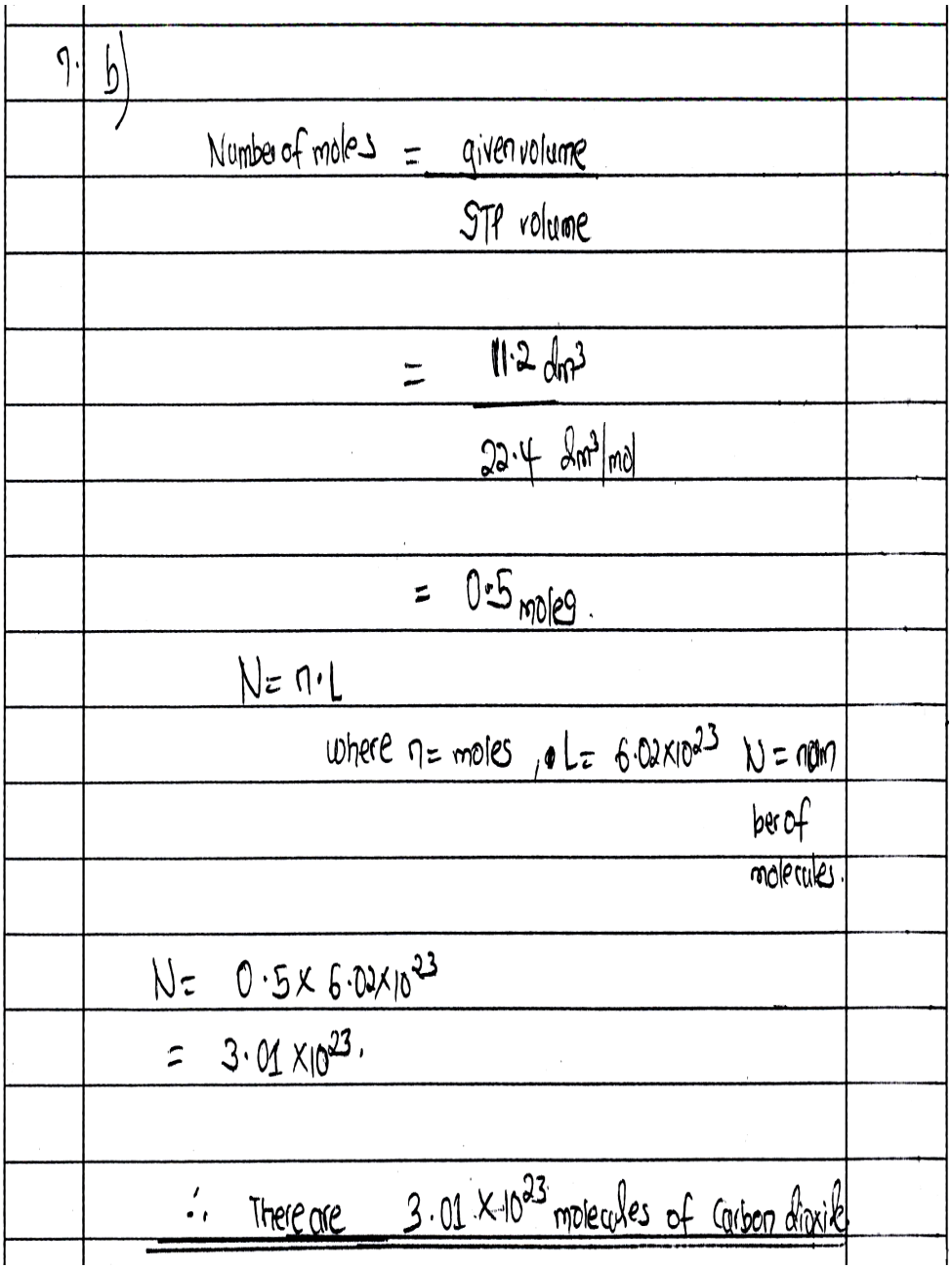
Candidates who scored all the marks gave satisfactory responses in all parts of the question. One example is illustrated in extract 7.1.

Candidates with average credit had problems with part (b) which involved calculation, indicating that they had poor background in mathematics.

Extract 7.1


7. a) i) Heart burn is caused by increase in acidity in the human body hence ash is used because it is basic in nature to neutralize the acid in the body to form salt and water which brings about relief.

ii) a) calcium oxide (CaO).
b) Sodium hydroxide (NaOH).
c) $Ca(OH)_2$ calcium hydroxide.
d) Magnesium oxide MgO.



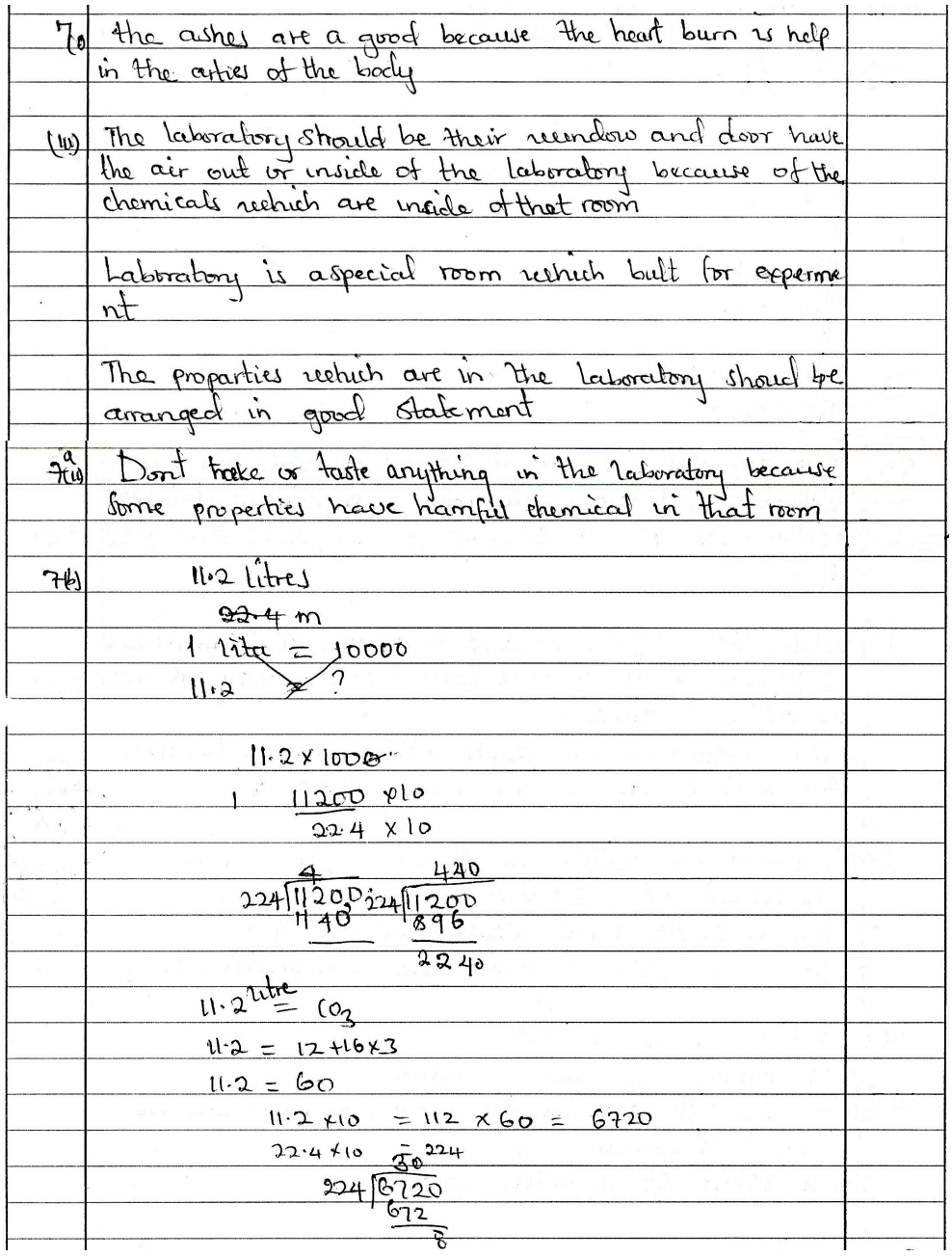
In extract 7.1, the candidate mentioned correctly the characteristic which makes the ashes to be used for heart burn relief. She/he was able to list four compounds which shows the same characteristics as ashes. Eventually, in 7(b), the candidate managed to calculate the number of molecules present in 11.2 litres of carbon dioxide at STP.

Some of the candidates who performed poorly in this question did not understand the meaning of "heart burn". Others failed to provide the compounds with similar characteristics with wood ashes. This indicates that they did not know the chemical composition of wood ashes; hence they could not mention the basic oxides such as K_2O, Na_2O, CaO and MgO which

are found in the laboratory. In addition, there were some candidates who did not understand the demand of the question. They gave definition of laboratory and some of the laboratory rules contrary to the requirement of the question.

It was also noted that, others had no clear understanding of the Avogadro's constant and chemical entities present in one mole of gas which occupies a volume of 22.4 litre at STP. As a result, they failed to establish the relationship between moles, molecules and volume. In addition, others, had confusion between the word mole and molecules, hence used them interchangeably. In so doing they gave wrong calculation of molecules as required in part (b) of the question, this indicates that they lacked mathematical skills. Extract 7.2 illustrates the case.

Extract 7.2



Extract 7.2 shows an example of the poor responses. The candidate failed to state the characteristic which makes the ashes to be used for heart burn relief. He/she defined laboratory and gave the characteristics of the laboratory which were not the demand of the question. In 7(b), the candidate failed to calculate the number of molecules present in 11.2 litres of carbon dioxide at STP.

2.2.6 Question 8: Compounds of Metals and their Uses

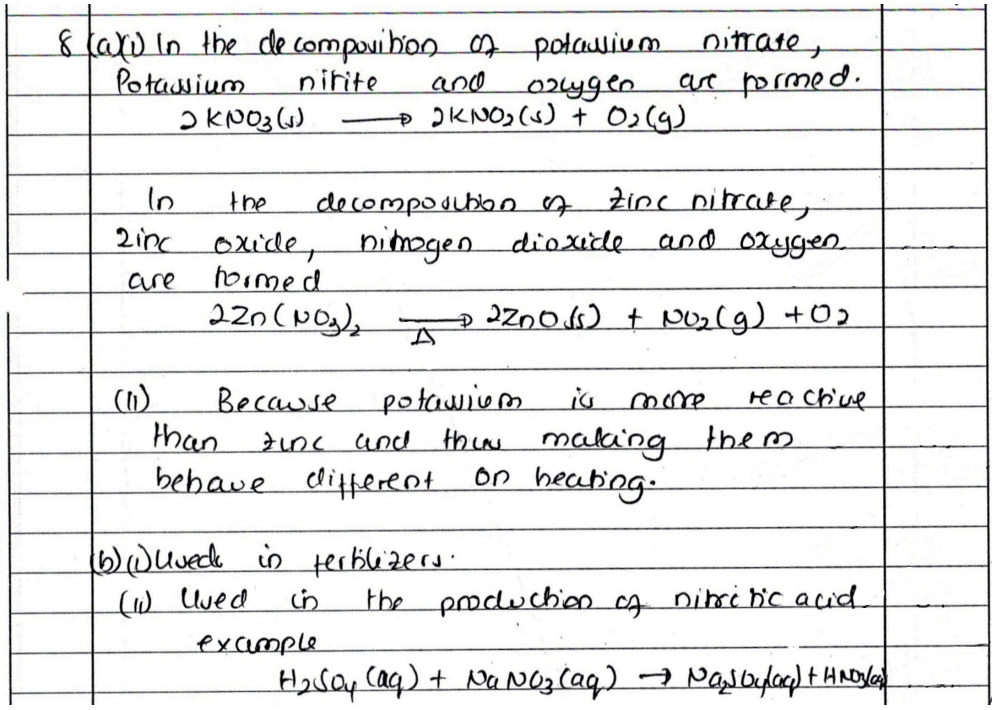
The question required the candidate in part (a) to name the products formed when nitrates of potassium and zinc decompose by heat. They were also

required to explain why the nitrates of zinc and potassium behave differently on heating. In part (b) they were required to mention two uses of sodium nitrate.

The question was attempted by 68.7 percent of the candidates, out of which 97 percent scored below 3 out of 6 marks, of which 72.9 percent scored a zero mark. Only 0.1 percent scored all 6 marks, indicating a general poor performance in the question.

The candidates who scored high marks were able to name the products formed when nitrates of potassium and zinc decompose by heat. They were also able to explain why the nitrates of zinc and potassium behave differently on heating. In addition they mentioned the uses of sodium nitrate. Extract 8.1 illustrate the case.

Extract 8.1


8 (a)(i) In the decomposition of potassium nitrate, Potassium nitrite and oxygen are formed.
$2KNO_3(s) \longrightarrow 2KNO_2(s) + O_2(g)$

In the decomposition of zinc nitrate, zinc oxide, nitrogen dioxide and oxygen are formed
$2Zn(NO_3)_2 \xrightarrow{\Delta} 2ZnO(s) + NO_2(g) + O_2$

(ii) Because potassium is more reactive than zinc and thus making them behave different on heating.

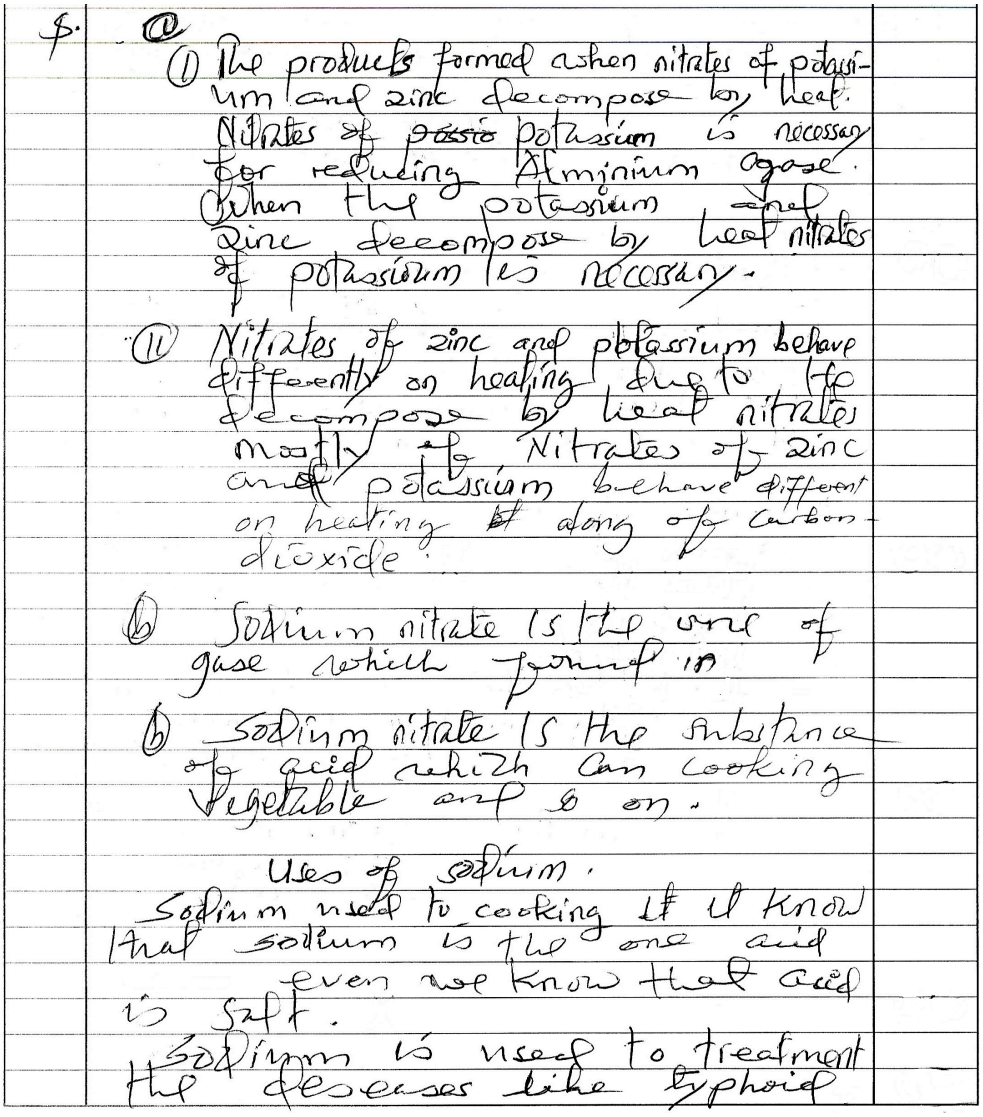
(b)(i) Used in fertilizers.
(ii) Used in the production of nitric acid.
example
$H_2SO_4(aq) + NaNO_3(aq) \rightarrow Na_2SO_4(aq) + HNO_3(aq)$

In extract 8.1, the candidate presented correctly the products formed when nitrates of potassium and zinc decompose by heat. She/he also gave correct explanation why the nitrates of zinc and potassium behave differently on heating based on the reactivity of metals. In part 8 (b), the candidate mentioned two uses of sodium nitrate.

However, most of the candidates who performed poorly in this question wrote the chemical equation and formulae of the products instead of the names of the products (a) (i). In (a) (ii), they failed to apply the knowledge of electrochemical series on the decomposition of potassium and zinc nitrates. This implies that, they had a little knowledge about the position of metals in

the electrochemical series or reactivity series of metals. Extract 8.2 is given as example.

Extract 8.2



(i) The products formed when nitrates of potassium and zinc decompose by heat. Nitrates of ~~potassio~~ potassium is necessary for reducing Aluminium agase. When the potassium and zinc decompose by heat nitrates of potassium is necessary.

(ii) Nitrates of zinc and potassium behave differently on heating due to the decompose by heat nitrates mostly the Nitrates of zinc and potassium behave different on heating the dong of carbon-dioxide.

(b) Sodium nitrate is the use of gase which formed in

(b) Sodium nitrate is the substance of acid which can cooking vegetable and so on.

Uses of sodium.
Sodium used to cooking if u know that sodium is the one acid even we know that acid is salt.
Sodium is used to treatment the deseases like typhoid

In extract 8.2, the candidate tried to answer the question but gave explanations which does not relate to the task of the question.

2.2.7 Question 9: Chemical Kinetics, Acids and Bases

Candidates were given the graph of rate of reaction against concentration of hydrochloric and ethanoic acid; both reacted with magnesium ribbon.

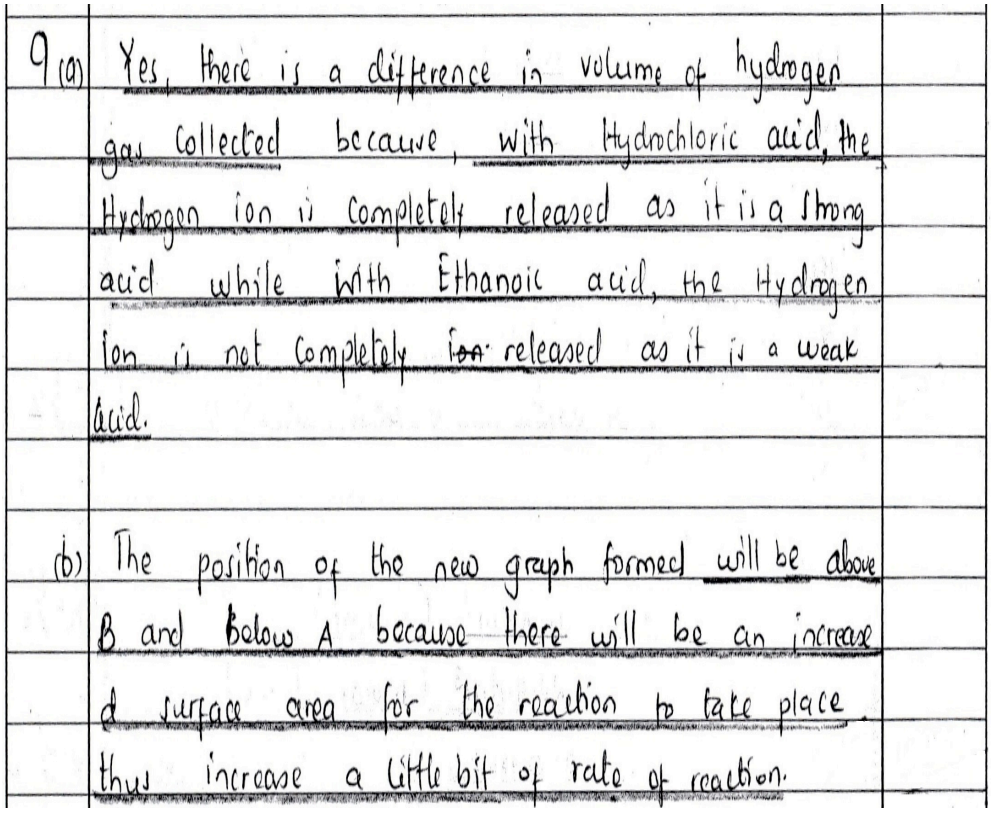
In part (a) the candidates were required to state, whether there is a difference in volumes of hydrogen gas collected at the same conditions if the given experiments were carried out within the same time. In part (b) they were required to suggest by giving reason(s) if the position of the new graph

plotted when the same mass, volume and concentration of powered magnesium and ethanoic acid are allowed to react will be above, between or below graphs A and B.

This question was the least attempted of all. It was attempted by 55 percent of the candidates, out of which 60.7 percent scored a zero mark; and 37 percent scored between 1 and 3 out of 6 marks. Only 2.1 percent of the candidates scored above 3 marks, of which 0.1 percent scored all 6 marks.

Very few candidates (0.1%) who performed well in this question gave correct answers. They were able to state, whether there is a difference in volumes of hydrogen gas collected at the same conditions. Also suggested the reason(s) for position of the new graph plotted when the same mass, volume and concentration of powered magnesium and ethanoic acid are allowed to react. Extract 9.1 is given as an example.

Extracts 9.1

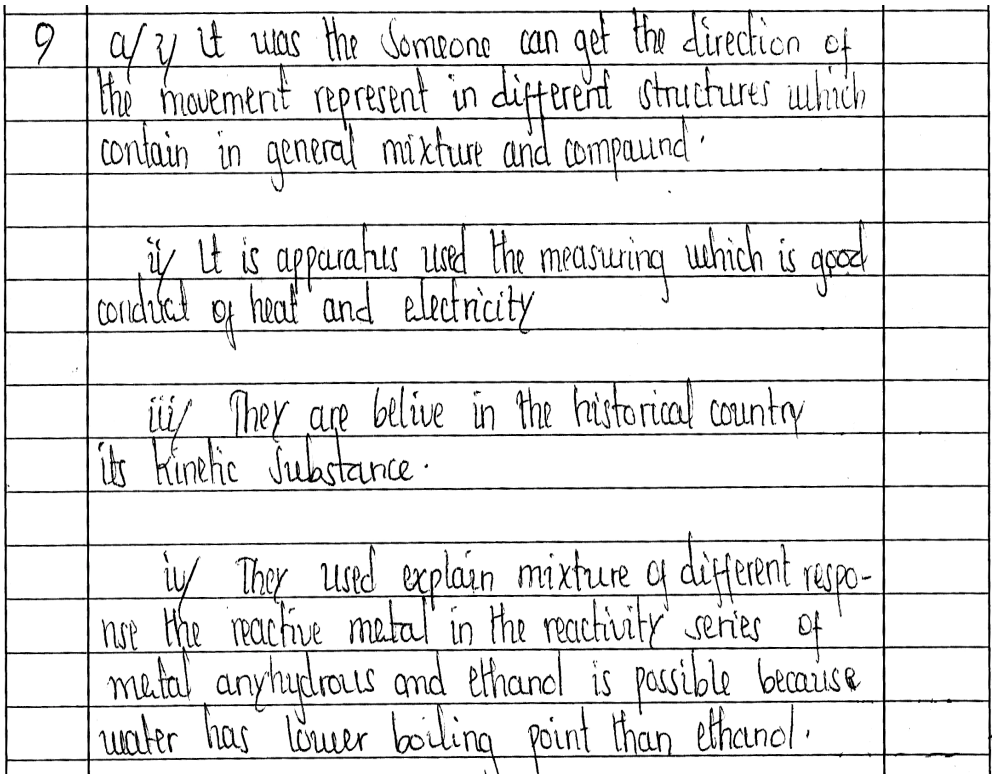

9 (a) Yes, there is a difference in volume of hydrogen gas collected because, with Hydrochloric acid, the Hydrogen ion is completely released as it is a strong acid while with Ethanoic acid, the Hydrogen ion is not completely ~~ion~~ released as it is a weak acid.

(b) The position of the new graph formed will be above B and below A because there will be an increased surface area for the reaction to take place thus increase a little bit of rate of reaction.

In extract 9.1, the candidate presented the answer precisely according to the requirement of the question. For example, in 9 (a), she/he managed to pin point the concept of weak and strong acid in the production of hydrogen gas. In 9 (b), the candidate was able to identify the effect of powdered magnesium which increase the rate of chemical reaction hence awarded all the 6 marks.

Candidates who scored low marks in this question were not able to explain if there is a difference in volume of hydrogen collected, and suggest the position of the new graph. This indicates that candidates had poor knowledge about strong and weak acids in solution. Others failed to recognize the effect of change in particle size of magnesium to the rate of chemical reaction. For this reason, they gave incorrect argument as shown in extract 9.2.

Extract 9.2



Extract 9.2 shows an example of the candidate's answers which do not relate to the question.

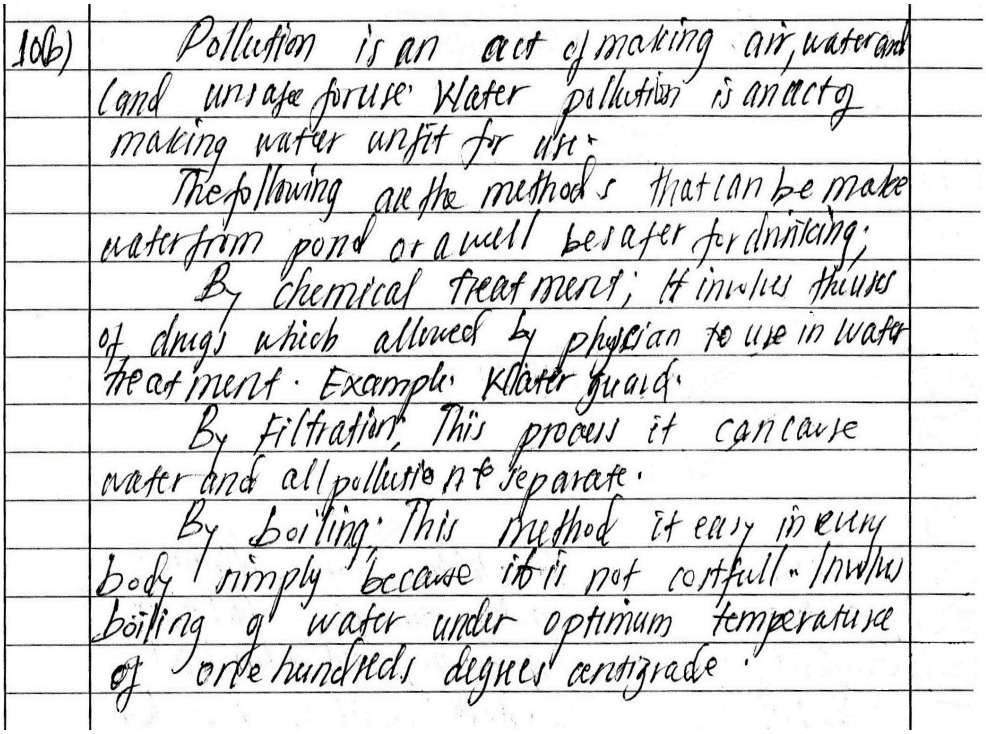
2.2.8 Question 10: Pollution

The question in part (a) required the candidates to name three gases which should not be produced in order to prevent the destruction of ozone layer. They were also required to list and explain three effects of ozone layer depletion. In part (b) they were required to state three methods used to make water from a pond or a well to be safe for drinking.

The question was attempted by 87.4 percent of the candidates, out of which 23 percent scored a zero mark. The percentage of the candidates who scored marks above 3 out of 6 marks was 12.4. Only 47 candidates scored all 6 marks.

Candidates who performed better were able to name all the gases that affect ozone layer and listed correctly the effects of ozone layer depletion. Extract 10.1 shows a sample of the good response.

Extract 10.1

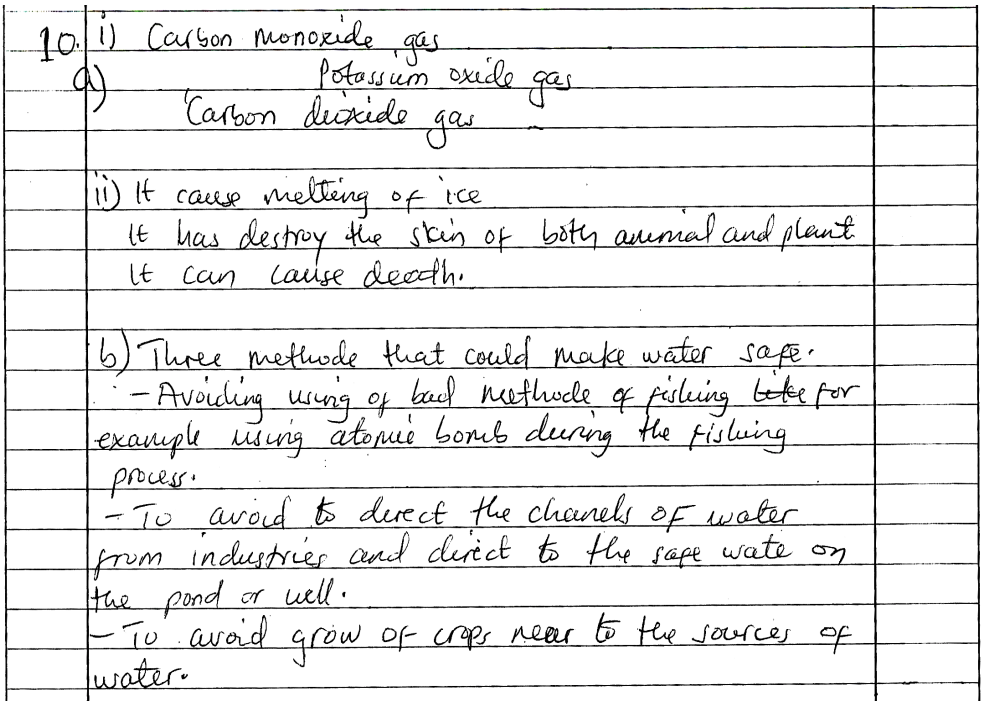

10b) Pollution is an act of making air, water and land unsafe for use. Water pollution is an act of making water unfit for use.
The following are the methods that can be make water from pond or a well be safe for drinking;
By chemical treatment; It involves the use of drugs which allowed by physician to use in water treatment. Example. Klorer guard.
By Filtration; This process it can cause water and all pollutants to separate.
By boiling; This method it easy in every body simply because it is not costfull. Involves boiling of water under optimum temperature of one hundreds degrees centigrade.

In Extract 10.1, the candidate gave correct answers in part (b) by giving proper explanations on the methods that could make water from a pond or a well to be safe for drinking.

However, candidates who had an average score in this question were able to provide good responses in part (a) of the question but failed to make it in part (b). This was attributed by the fact that the concept of ozone layer depression is a cross cutting phenomenon studied in various subjects.

The candidates who scored poorly in this question failed to name three gases which should not be produced in order to prevent the destruction of ozone layer. They did not list and explain three effects of ozone layer depletion. In part (b) some of the candidates mentioned remedial measures for water pollution instead of methods for water treatment. This implies that, the candidates did not understand the requirement of the question, extract 10.2 illustrates the case.

Extract 10.2


10. a) i) Carbon monoxide gas
Potassium oxide gas
Carbon dioxide gas

ii) It cause melting of ice
It has destroy the skin of both animal and plant
It can cause death.

b) Three methode that could make water safe.
- Avoiding using of bad methode of fishing like for example using atomic bomb during the fishing process.
- To avoid to direct the chanels of water from industries and direct to the safe wate on the pond or well.
- To avoid grow of crops near to the sources of water.

Extract 10.2 indicates an example of the candidate's poor response. In 10 (a) (i), the candidate failed to state the gases responsible for ozone layer destruction. In 10 (b), the candidate mentioned remedial measures for water pollution instead of methods for water treatment.

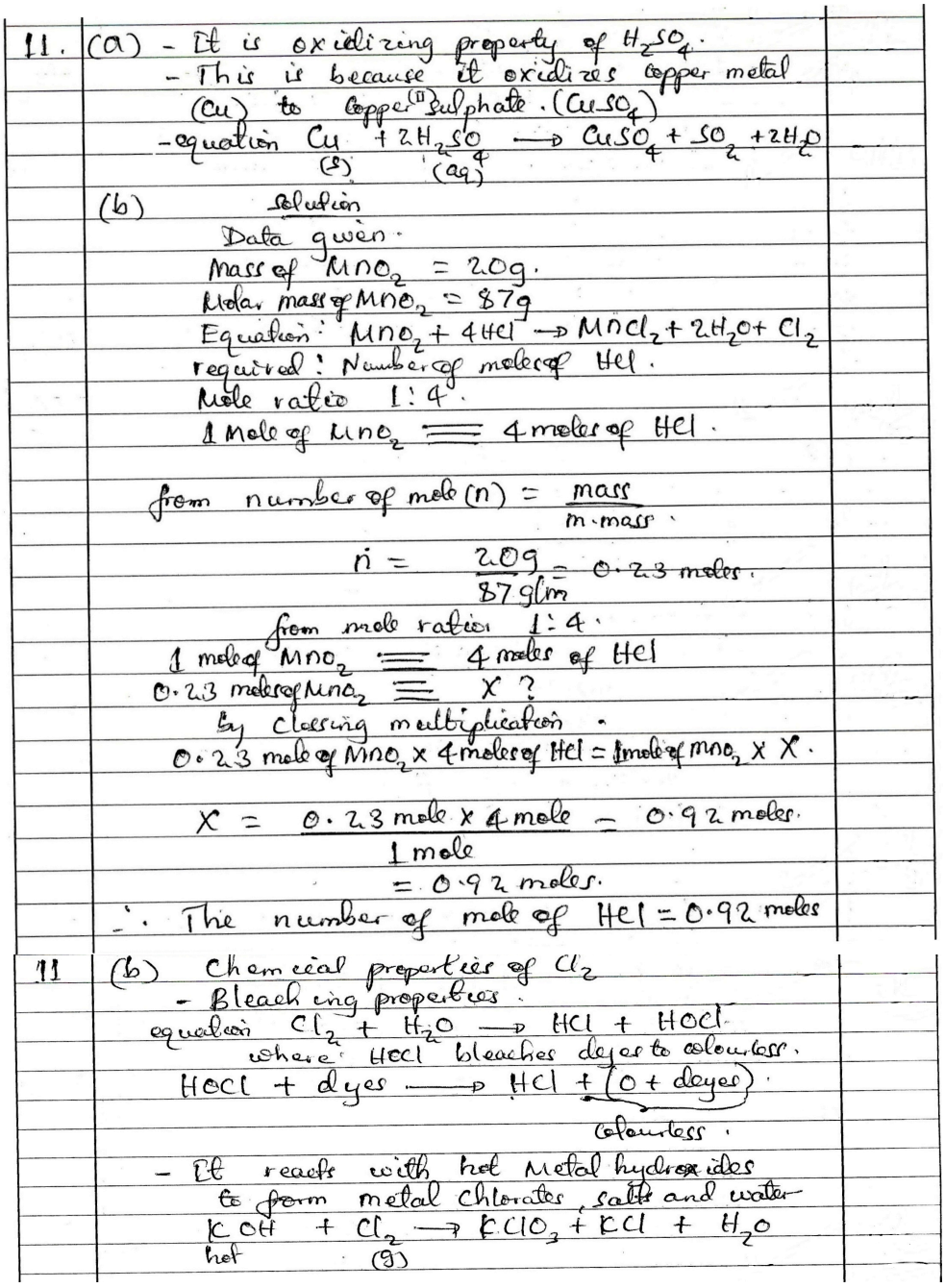
2.2.9 Question 11: Non-metals and their Compounds

In part (a), the candidates were required to state property in which concentrated sulphuric is grouped when it reacts with copper metal and write the equation of the reaction involved. In part (b), they were required to calculate the number of moles of HCl needed to react with 20g of MnO_2; and list two main properties of chlorine gas.

Many candidates (65.7%) attempted the question, out of which only 2.3 percent scored above 3 out of 6 marks, while only 39 candidates scored all the 6 marks. A high percentage of the candidates (97.7%) had a score of 3 marks and below, of which 53.4 percent scored a zero mark implying that, many candidates' performed poor in this question.

A few candidates who performed well were able to identify the property of concentrated sulphuric acid and wrote the correct balanced chemical equation. They were also able to calculate the moles of HCl needed to react with 20g MnO_2 correctly as illustrated in extract 11.1.

Extract 11.1

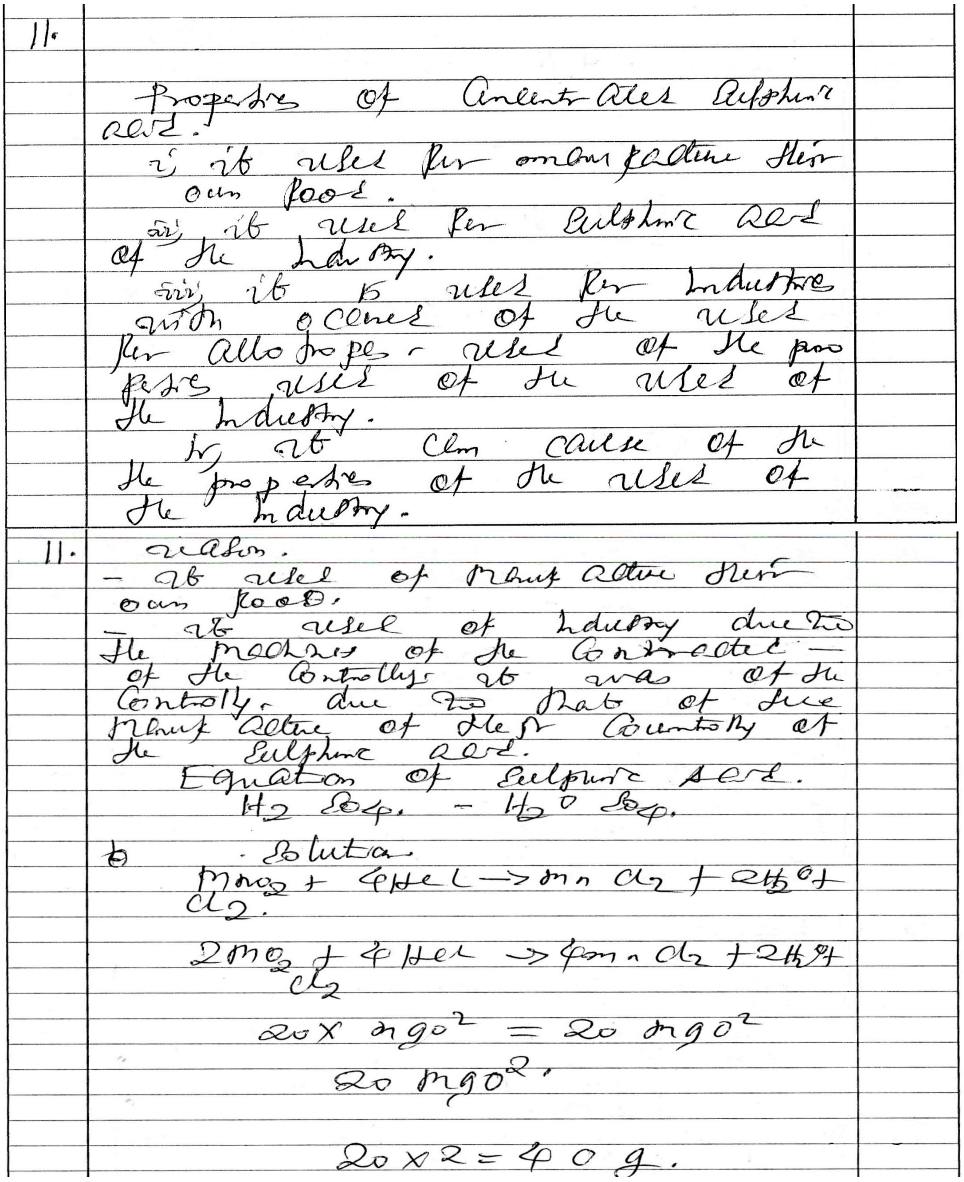


Extract 11.1 is an example of a well presented answer of a candidates who scored all 6 marks.

The candidates who performed poorly failed to calculate the moles of HCl needed. They also mentioned physical properties of concentrated sulphuric acid instead of chemical properties and failed to identify the responsible property. This was attributed by poor knowledge on the calculations

involving mole concept and stoichiometric coefficients. Extract 11.2 represents the candidates' poor responses for the question.

Extract 11.2



In Extract 11.2, the candidate failed to state the property in which concentrated sulphuric is grouped when it reacts with copper metal. In part (b) the procedure for calculating the number of moles of HCl was wrong. This implies that the candidate had poor understanding on mole concept and the related calculations.

2.3 SECTION C: ESSAY QUESTIONS

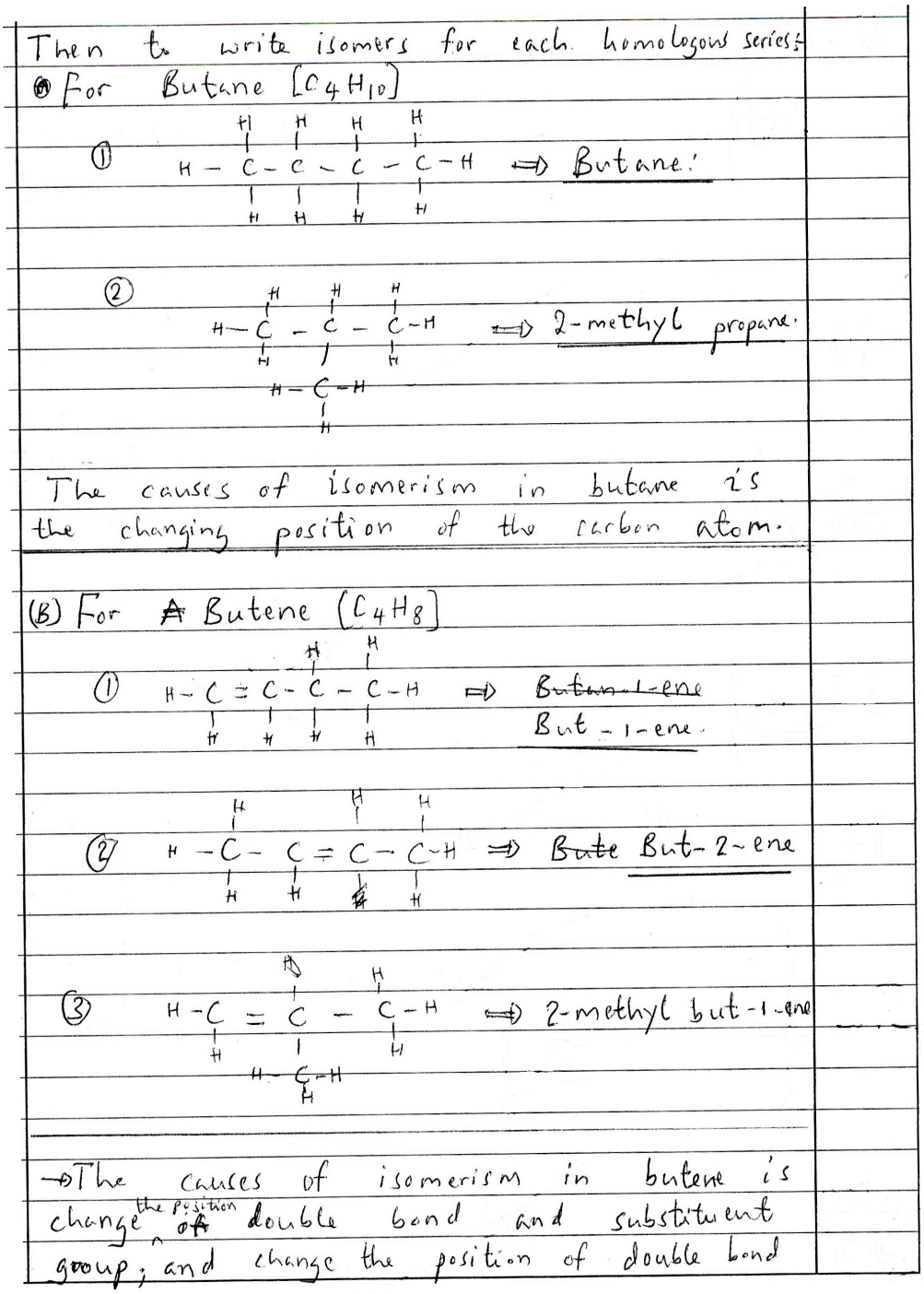
2.3.1 Question 12: Organic Chemistry (Hydrocarbons)

The candidates were required to give the name of homologous series; molecular formula and structural formula for different isomers of the compound formed by each homologous series of the hydrocarbon C_4H_n, and indicate the cause of isomerism in each case.

The question was attempted by 57.6 percent of the candidates, out of which 91.6 percent scored below half the allocated marks (6.5). About 31.3 percent scored a zero mark. The percentage of the candidates who scored full marks was only 0.1 percent. This indicates the poor performance in this question.

The few candidates who performed well managed to give the names of the homologous series, molecular formula and structural formula for different isomers. They were also able to point out the causes of isomerism in each case to indicate a good understanding of the subtopic concerning hydrocarbons. Extract 12.1 illustrates the case.

Extract 12.1



Extract 12.1 is a sample of a good response in which the candidate presented correctly the names, structure formula and the isomers in each case. In 12 (a) the candidate wrote the causes of isomerism in butane being the changing position of the carbon atom instead of the arrangement of carbon skeleton and position of double bond. However this response was awarded average score due to the wrong explanation in part (b).

The candidates who performed poorly in this question failed to give the names of the homologous series, molecular formula and structural formula for different isomers. They also failed to point the causes of isomerism in each case. Poor performance in this question might have been caused by lack of knowledge on the concept of homologous series and isomerism. Extract 12.2 shows a sample of the candidate's poor answer.

Extract 12.2

12 Isomerism is the process which to provide the same numbers into the creation numbers to provide the intruction among the people and many people can cause the isomerism in the state through the ~~to~~ isomerism. The following are the causes of the isomerism.

pollutant, due to feed theat in the ~~a~~ iron the ~~a~~ iron am maintain the destruction of ozon lay through ~~the~~ the disturbance and to create the solubility among the member and to provide the interinisity among the metal and to maintain and to provide the metal.

Ozon layer, through the ~~to~~ isomerism can provide the creation among the ~~created~~ metals and to maintain the interinisity among the created in our metals.

Destruction of mining actual activities, in the metal can polluted in the disturbance in our commonesty among the member and to create implementation among the ~~iso~~ isomerism and pollute water pollution in ~~our~~ metals and can provide through the pollutant among the ~~the~~ our metals.

Destruction of iron, through the metals can provide the isomerism through to create the ozon layer in the metals and can provide the many materials in the solubility among the member and to created in our metals and to provide the isomerism in the metal

Destruction of methaly in the isomerism, through to provide the isomerism among the creation in our community and to provide the creation in our societies and can maintain the ~~see~~ preparation of metals

Destruction of methane, due to feed theat many people can cause the methane and to destroy — the volcanism or volcanic in our community among the Member and can maintain through the fluctuation the community and can provide the reactivity

Distarbance of metals, due to the metal can under the magma and can cause the solubility — in the causes and to maintain the sexuality through provides in our ~~our~~ compound in the solubility.

Extract 12.2 shows an example of the response in which the candidate failed to give the name of homologous series, molecular formula and structural formula for different isomers of the compound formed by each homologous. The candidate also failed to indicate the cause of isomerism. Above all, the candidates hard a poor language commands.

2.3.2 Question 13: Extraction of Metals

The candidates were required to describe four common stages for the extraction of metals. They were also required to state with justification, if the extraction of gold follows all the four stages.

The question was attempted by 55.7 percent of candidates, out of which 33.5 percent scored a zero mark. On the other hand, only 4 candidates scored all 13 marks, it indicates general poor performance in this question.

The candidates who scored high marks demonstrated a clear understanding on the extraction of metals, as they provided clear and correct description of all four stages involved in extraction of metals; they also provided fertile reason to support their response. Extract 13.1 shows a sample of the candidate's good response.

Extraction 13.1

13. four Common stages for the extraction of metals.

(i) Mining and Concentration of ore:

In this stage metal will be extracted/mined, and broken down into small particles. This particles mixed with water in order to remove earth/ore impurities by FROTH FLOTATION.

(ii) Roasting of sulphide to oxide.

In this stage metal sulphide roasted by oxide to form metal oxide. This is take place as following example

$$Cu_2S + O_2 \longrightarrow CuO + SO_2$$

(iii) Reduction of oxide from metal

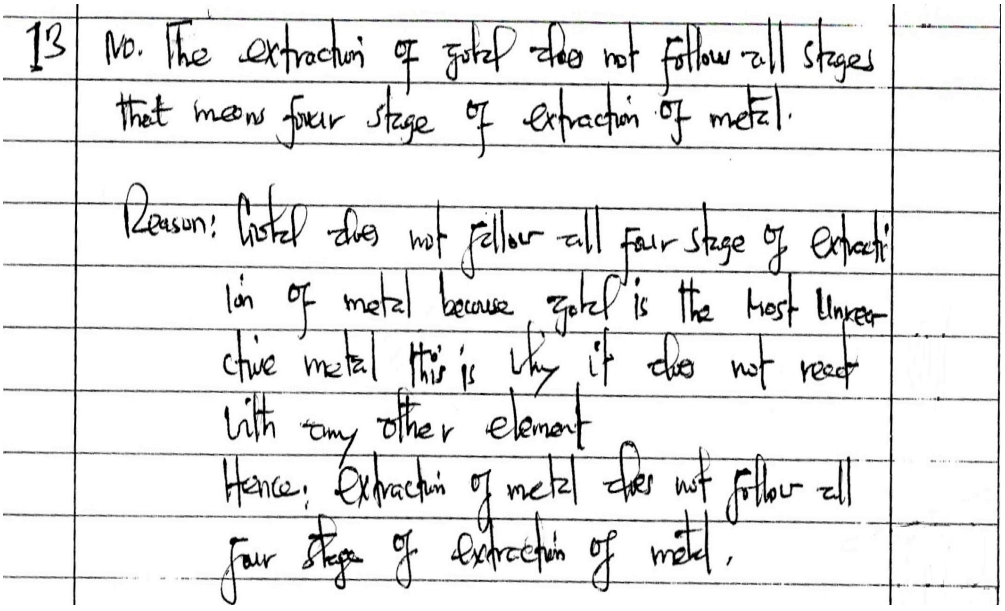
In this stage the metal oxide removed from their oxide by using carbon, Because all metal below Zinc can be removed from their oxide by Carbon.

Such as $CuO + C \longrightarrow CO_2 + Cu_{(s)}$

Hence pure metal can be formed as show copper metal above

(iv) Refining and purification of metal

This is take place by using the method that are Electrolysis method and Reduction methods. All metal at the top of electrochemical series use the methods of electrolysis and Reduction method used in metal located below at electrochemical series.


13 No. The extraction of gold does not follow all stages that means four stage of extraction of metal.

Reason: Gold does not follow all four stage of extraction of metal because gold is the most Unreactive metal this is why it does not react with any other element

Hence, Extraction of metal does not follow all four stage of extraction of metal.

In extract 13.1, the candidate presented accurate answers according to the requirement of the question. The candidate described clearly the four common stages for the extraction of metals and has attempted to give a reason of gold not following all the four stages.

The candidates who scored low marks failed to provide description in all the four stages involved in the extraction of metals. Others failed to give fertile reason to support their response on the last part of the question. While others could not recognize that, some metals do not follow all the four stages involved in the extraction of metals. Extraction 13.2 illustrates the candidate's poor response.

Extraction 13.2

B. Extraction of metals: this is the process which using of stone age. this process on that time present than gold. so thi process on this time is very absent because high number of people can make the gold at every time.

the following are the four comon stat which Extration of metals are Used

i) On Stage of ston ages: that process are cet very carre than gold the people or person who have Used that process on that times is gold So for this time must be cotinous that process are very poor than gold adition of that is absent by because the globalization is very stable and high number of people can educat due to this world due to proses of Etration metals.

ii) The middle stage ages: that process can mus be conduct the high nabe of people than stone anges due to the following the middle stage ages the people whoo are educat in the some country is very poor lik Tanganyika Country and the gobalization is very poor.

iii) To Used the capital income at very bad: that because the extration of metal are very high on that time due to poor gold on the world.

IV) on that time of etration of metals gold on people that issu is very feless the golf on that time is metals and people can used the metals than gold this proses of using methal can

Extract 13.2 represent the candidate's response in which the candidate misunderstood the question, resulting in describing the stages of evolution of technology in history instead of the four stages of extraction of metals in chemistry.

3.0 CONCLUSION

The performance in this paper was not satisfactory since majority of the candidates (91%) scored grade D and F. The few candidates (9%) managed to get grade A and B.

The average percentage of the candidates who scored half of the allocated marks was only 5.3 percent while 83.9 percent scored below the allocated marks.

The analysis on individual questions clearly indicates that many candidates had poor performance in many questions especially those demanded explanations and supporting reasons or balancing equations, such questions were 5, 7, 8, 9 and 11.

The analysis further reveals that most candidates presented poor responses due to poor language command as it was demonstrated in questions which demanded candidate's explanation or description. Candidates also experienced difficulties in attempting questions which required practical experience as seen in question 3, 8 and 9.

Moreover, candidates encountered difficulties in responding to questions related to classroom knowledge and daily life applications as it was observed in question 3 (b), 7 (a) and 10(b). This shows that candidates had low competence as they failed to transform the knowledge of the subject into real life experience.

Insufficient coverage of the subject matter content during teaching and learning as well as the lack of proper revision during preparation for examinations is likely to be source of such poor performance.

4.0 RECOMMENDATIONS

Based on the analysis and the conclusion made in the performance of candidates in this examination, the following recommendations are made;

(i) Students should continuously be encouraged to revise all topics across the current syllabus in their normal study time and during preparation for examinations.

(ii) Teachers should put special emphasis on facilitating basic concepts, involving rules, principles, law and application of theoretical knowledge of subject in daily life situation in competency based environment.

(iii) Schools should ensure that laboratory demonstrations and/or practicals are properly performed so as to foster students understanding of chemistry and other science subject.