CANDIDATE NAME: _____FORM 4___

NORTHERN EDUCATION DIVISION

2020 MSCE MOCK EXAMINATIONS

CHEMISTRY

PAPER I

(100 Marks)

WEDNESDAY, 25th March 2020

Subject number: M038/II
Time Allowed: 2 hours
14:00hrs – 16:00hrs

INSTRUCTIONS:

a) Write your official name and class on top of every page.

b) The paper contain two sections; **A** and **B**, on **10** printed pages. Please check.

c) In section **A,** there are **10** short answer questions. While in section **B,** there are **3** descriptive questions.

d) Answer all the questions in the spaces provided.

e) Maximum number of marks for each answer is indicated against each question.

f) Use of electronic calculators is allowed.

g) In the table provided on this page, **tick** against the number of the question you have answered.

h) Hand in your paper to invigilator when time is called to stop writing.

Question Number	Tick if Answered	Do not write in this column
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

CANDIDATE NAME: _____FORM 4___

Section A (70 Marks)

1. **a.** Name **any one** branch of chemistry.

_____

1mark

b. Name **any one** career in chemistry.

_____

1mark

c. In terms of **composition**, what is the similarity between **methane** and **ethene?**

_____

_____

1mark

d. Explain **any one** use of chemistry in everyday life.

_____

_____

_____

2marks

e. State **any two** characteristic of matter.

_____

_____

2marks

2. It is advisable that teaching and learning of chemistry should be done in a laboratory.

a. State **any two** conditions that qualify a building or place to be a laboratory.

_____

_____

2marks

b. Consider the following laboratory safety symbols, labelled **X** and **Y**:

X.  Y. 

i. What safety measure would you observe when handling a substance with a safety symbol labelled **X**?

_____

1mark

ii. What is the meaning of the laboratory safety symbol labelled **Y**?

_____

1mark

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3. a. Give **any one** difference between fundamental units and derived units?

_____

_____

_____

_____

2marks

b. Express **26.94cm** in metres. Leave your answer in scientific notation.

3marks

c. Solve **684.026 – 24.1**. Leave your answer to correct number of significant figures.

2marks

4. A student slowly mixes salt into **25cm^3** of water until no more salt dissolves.

a. Why are the extra salt particles unable to dissolve?

_____

_____

1mark

b. What should the student do to make the extra salt particles dissolve in this volume of water?

_____

_____

_____ **1mark**

5. a. $^{a}_{b}\mathbf{X}$ is a nuclear notation for atoms. What does letter **b** represent?

_____

1mark

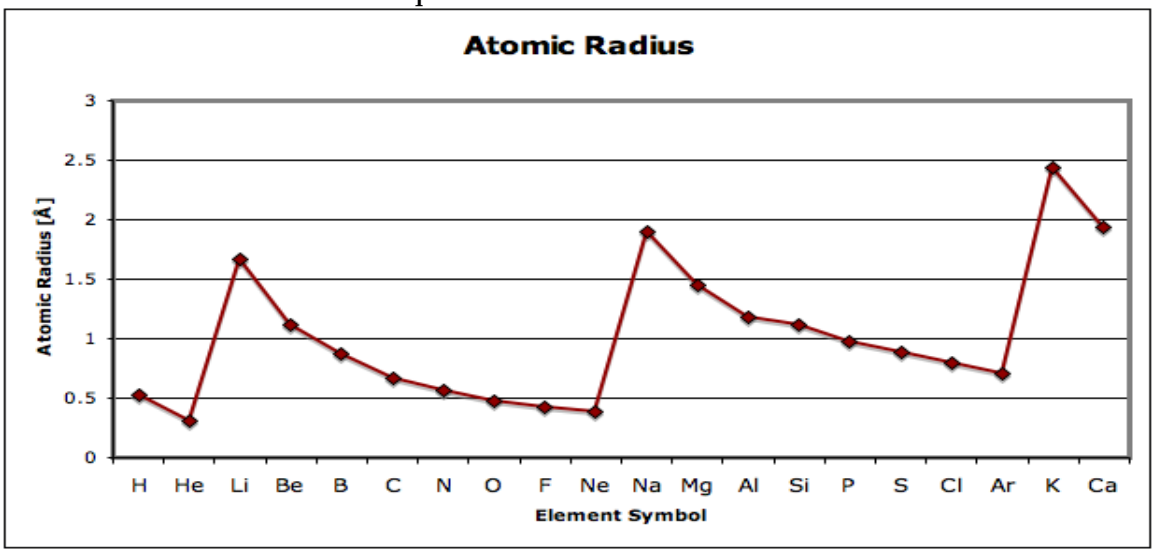
b. During ordinary chemical reactions, mass is conserved. What does the phrase **mass is conserved** mean?

_____

_____

1mark

c. The following diagram is a graph that is showing atomic radii of different elements. Use it to answer questions that follows:



i. Write the electron configuration of element **Al**.

_____

1mark

ii. To which group of the periodic table does element **Al** belong?

_____

1mark

iii. Explain for your answer to question **5.c.ii.**

_____

_____

2marks

iv. In terms of atomic radius, compare reactivity of Potassium (K) and Sodium (Na).

_____

_____

_____

2marks

6. a. Draw **any two** possible carbon skeletons for isomers of pentanone, $\mathbf{C_5H_{10}O}$.

2marks

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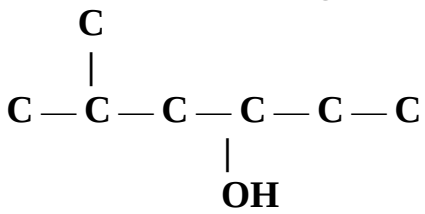
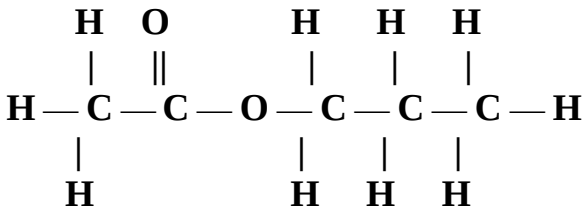
b. Give names to the following structures of organic compounds:

i.



_____**1mark**

ii.

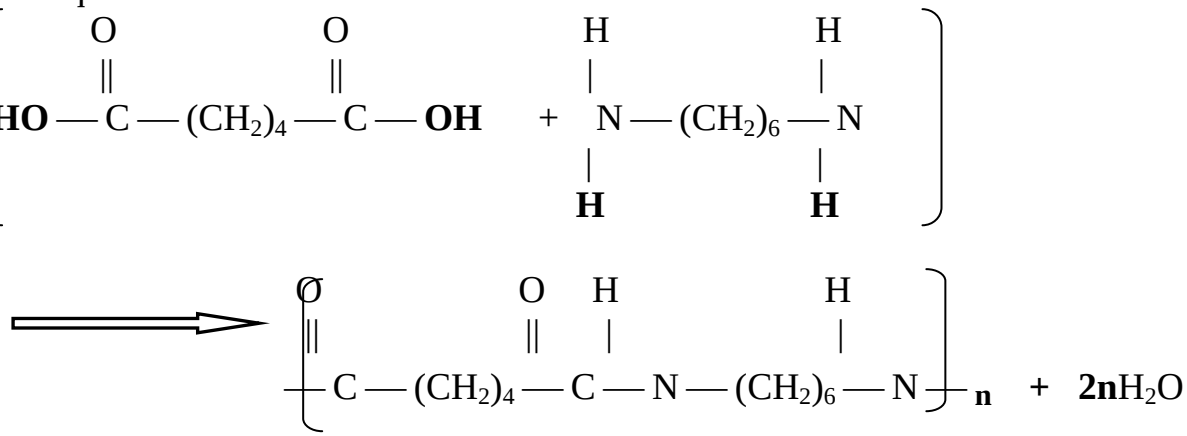


_____**1mark**

iii. **$CH_2=C(CH_3)CH_2C(CH_3)_3$**

_____**1mark**

c. The following chemical equation illustrates a polymerisation reaction. Use it to answer questions that follows:



i. Name the type of polymerisation being demonstrated in the equation.

_____

1mark

ii. Give a reason for your answer to question **6.c.i.**

_____

_____

1mark

7. a. Explain the difference between strength of an acid and concentration of an acid.

_____

_____

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_____

2marks

b. According to Bronsted-Lowry theory, what is a base?

_____

_____

1mark

c. Identify conjugate acid-base pairs in:
$CO_3^{2-}{}_{(aq)} + H_2O_{(l)} \rightarrow HCO_3^-{}_{(aq)} + OH^-{}_{(aq)}$.

_____

_____

2marks

d. Use dots and crosses to draw structural formula for hydronium ion **(H_3O^+)**.

2marks

e. pH of a soil sample was found to be **5.1**. A soil chemist recommended the addition of calcium oxide in the soil. With aid of a chemical equation, briefry explain the function of the calcium oxide in the soil.

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_____

4marks

8. Letters **A, B, C and D** represent elements. Use the E^0 values given to answer the questions that follow:

Electrode reaction				E^0 (V)
$A^{2+}{}_{(aq)}$	+ $2e^-$	→	$A_{(s)}$	-2.90
$B^{2+}{}_{(aq)}$	+ 2e-	→	$B_{(s)}$	-2.38
$C^+{}_{(aq)}$	+ e^-	→	½ $C_{2\ (g)}$	0.00
$D^{2+}{}_{(aq)}$	+ $2e^-$	→	$D_{(s)}$	+0.34

a. Write the line notation of the cell obtained when **A** and **D** are used.

_____

2marks

b. Calculate electromotive force (emf) for the cell in **8.a.**

3marks

9. The following table is showing some bond energies. Use it to answer questions that follows:

BOND TYPE	**BOND DISSOCIATION ENERGY (KJ/MOL)**
C – H	414
C – C	346
O = O	497
C = O	749
O – H	461

a. Calculate enthalpy change for the reaction below:

$$\mathbf{C_3H_{8(g)} + 5O_{2(g)} \rightarrow 3CO_{2(g)} + 4H_2O_{(l)}}$$

5marks

b. Is the reaction exothermic or endothermic? Give a reason.

_____

_____

2marks

c. Draw an energy level diagram for the reaction.

4marks

CANDIDATE NAME: _____FORM 4___

10.a. Calculate percentage of water of crystallization in hydrated sodium carbonate (Na_2CO_3).$10H_2O$. **Hint:** use the following **RAMs;** Na = 23, C = 12, O = 16 and H = 1.

3marks

b. When **12.35 g** of copper (II) carbonate was heated in a crucible, **7.0 g** of copper (II) oxide was produced. Calculate percentage **yield** of copper (II) oxide in following the equation: $CuCO_{3(s)} \rightarrow CuO_{(s)} + CO_{2(g)}$.
Hint: use the following **RAMs;** C = 12, O = 16, Cu = 63.5.

5 marks

Section B (30 Marks)

11. In the laboratory, labels fell off from bottles containing pent-1-ene, propanone, heptane and ethanal. Construct a flow diagram that could be followed to identify the organic compounds.

10marks

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12. Elemental sulphur exists in two main allotropes; rhombic and monoclinic sulphur

a. Define the term **allotropy**.

_____

_____

_____

1mark

b. Elemental sulphur melts at113°C to form a less viscous liquid. At 200°C, liquid sulphur becomes more viscous. At 400°C, liquid sulphur becomes less viscous. At 445°C liquid sulphur boils into gases. Provide an explanation for this trend.

_____

_____

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_____

4marks

c. With aid of chemical equations, describe **any** negative effect of elemental sulphur on quality of water.

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5marks

CANDIDATE NAME: _____FORM 4___

13. With the aid of a well labelled diagram(s), describe an experiment that can carried out to determine conditions necessary for rusting.

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10marks

END OF QUESTION PAPER

NB: This Paper Contains 10 Printed Pages