EXAMINATION NO.: _____

THE MALAWI NATIONAL EXAMINATIONS BOARD

2019 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

Carolyn Binali

CHEMISTRY

Subject Number: M038/I

Thursday, 27 June **Time Allowed: (2 hours)**
8:00 – 10:00 am

PAPER I

THEORY

(100 marks)

Instructions

1. **This paper contains 12 printed pages. Please check.**
2. Fill in your **Examination Number** at the top of each page.
3. This paper contains **two** sections, **A** and **B**. In **Section A** there are **ten** short answer questions while in **Section B** there are **three** restricted essay questions.
4. Answer all the **thirteen** questions in the spaces provided.
5. Use of electronic calculators is allowed.
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page, **tick** against the number of the question you have answered.

Question Number	Tick if answered	Do not write in these columns	
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Section A (70 marks)

Answer **all** the questions in this section.

1. a. State the difference between "accuracy" and "precision".

_____

_____

_____

_____

(2 marks)

b. **Figure 1** is a diagram of a container with molecular models in various positions. The models are supposed to be at the centre of the container.

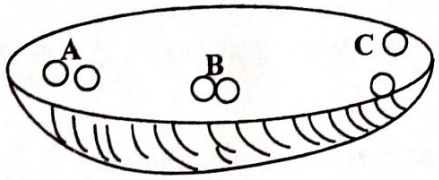


Figure 1

Using letters **A**, **B** and **C**, identify the molecular models that have-

(i) good precision but poor accuracy

_____ **(1 mark)**

(ii) both poor precision and accuracy

_____ **(1 mark)**

(iii) both good precision and accuracy.

_____ **(1 mark)**

c. In an experiment, 136g of gaseous ammonia (NH_3) reacted with excess oxygen (O_2) to produce nitric acid (HNO_3) and water (H_2O).

(i) Write a balanced equation for the reaction.

(3 marks)

Continued/…

(continued)

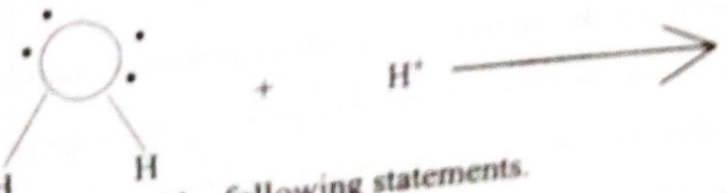
(ii) How much nitric acid (HNO_3) could be produced from this reaction?
(RAM: N=14, H = 1, O = 16)

(3 marks)

a. Work out the number of nitrogen atoms in 8 molecules of urea $CO(NH_2)_7$.

(2 marks)

b. Complete the equation and label the dative bond.



(2 marks)

c. Explain each of the following statements.

(i) Ionic compounds are soluble in water.

(3 marks)

(ii) Graphite conducts electricity.

(3 marks)

(continued)

d. Explain how a polar bond is formed.

(4 marks)

3. a. Give any **one** use of electron configuration.

(1 mark)

b. (i) Why is nitrogen gas inert at room temperature?

(2 marks)

(ii) Explain any **one** way in which inertness of nitrogen is important.

(3 marks)

Continued

c. The Table below shows electron configuration and relative abundance of isotopes of an element.

Isotope	Electron configuration	Relative Abundance
X – 28	2 – 8 – 4	8/10
X – 29	2 – 8 – 4	1/10
X – 30	2 – 8 – 4	1/10

(i) To which group of the periodic table does element **X** belong?

_____

(1 mark)

(ii) Element **X** reacts with element **Y** whose valency is 2.
Write the chemical formula of the product.

(2 marks)

4. a. A hydrocarbon contains 85.7% carbon and 14.3% hydrogen by mass. Write the molecular formula of the hydrocarbon if its relative formula mass is 56. (RAM: C=12, H=1)

(7marks)

Continued

4. (continued)

b. Why is burning of plastics **not** recommended as a method of disposal?

_____

_____

_____

(2 marks)

5. **Figure 2** is a graph showing results of experiments **A** and **B** on one of the factors affecting rate of reaction.

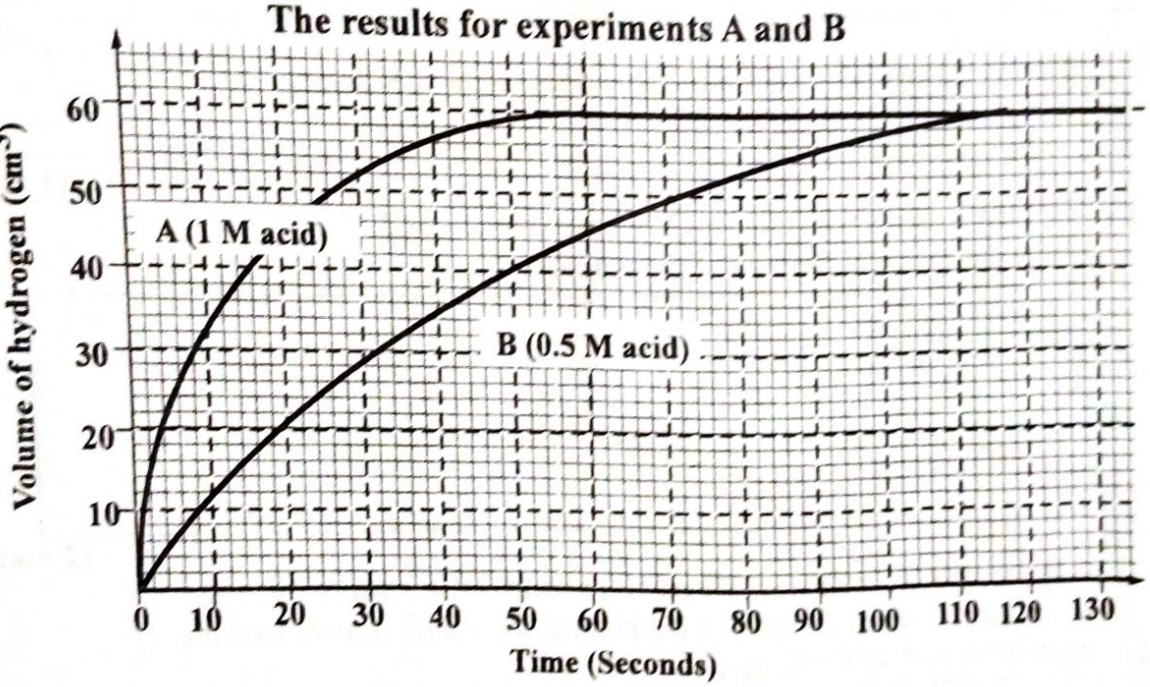


Figure 2

Adapted from Complete Chemistry by Rose pp 122

a. State the factor affecting the rate of reaction which was being investigated.

_____

_____

(1 mark)

b. Which reaction is faster than the other?

_____

(1 mark)

c. Give a reason for the answer in **5.b**.

_____

_____

(1 mark)

Continued/..

6. Aluminium reacts with chlorine gas according to the following equation:

$2Al(s) + 3\ Cl_2(g) \rightarrow 2\ AlCl_3(s)$

a. Write oxidation and reduction half reactions

Oxidation: _____ **(2 marks)**

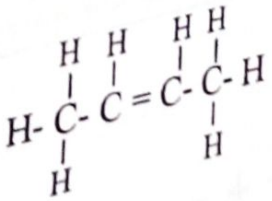
Reduction: _____ **(2 marks)**

b. Calculate the volume of 8M KNO_3 stock solution to be diluted to 400ml so that the final concentration is 0.2M.

(3 marks)

7. **Figure 3** shows different structures of an organic compound.

A.



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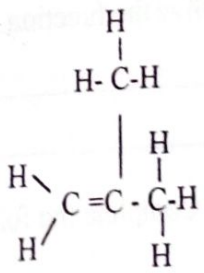
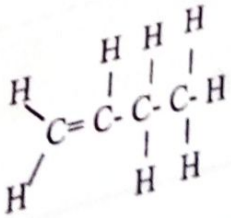


C.



D.

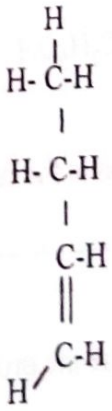


Figure 3

a. *Identify conformers.* **(1 mark)**

b. ***Which of these structures has the lowest boiling point?*** **(1 mark)**

Continued/...

tinued)

c. Give a reason for the answer in **7(b)**.

_____

_____

_____

_____

(2 marks)

8. a. Ethene (C_2H_4) and water (H_2O) react to form ethanol (C_2H_5OH) according to the following chemical equation.

$$C_2H_4 + H_2O \rightleftharpoons C_2H_5OH \quad (H_2SO_4)$$

(i) Name the type of reaction in the equation.

_____ **(1 mark)**

(ii) Give the function of H_2SO_4 in the reaction.

_____

_____ **(1 mark)**

b. (i) Complete the following equation:

$$C_2H_5OH \xrightarrow{Cr_2O_7^{2-}} \text{----------} + \text{----------}$$

(2 marks)

(ii) What is the function of $Cr_2O_7^{2-}$ in the reaction?

_____ **(1 mark)**

(iii) Name the products in the equation.

_____

_____ **(2 marks)**

Continued...

Why is argon gas obtained before oxygen gas during separation of air into its component gases?

(1 mark)

Describe how carbon dioxide is removed from air.

(2 marks)

a. Mention any **one** type of wastes based on degradability.

(1 mark)

b. Explain how burning of fuel causes global warming.

(2 marks)

SECTION B (30 marks)

Answer **all** the questions in this section.

11. a. Why is the boiling point of hexanoic acid **higher** than that of hexanol?

b. With the aid of chemical equations, explain how ozone layer is depleted. **(3 marks)**

(7 marks)

Continued

12. Describe the process of soap making.

13. With the aid of a well labelled diagram, describe how copper can be refined using **electrolysis**. In your description, include half equations at the cathode and anode.

(10 marks)

END OF QUESTION PAPER

NB: This paper contains 12 printed pages.

EXAMINATION NO.: _____

THE MALAWI NATIONAL EXAMINATIONS BOARD

2017 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

Carolyn Biraki

BIOLOGY

Subject Number: M022/I

Tuesday, 27 June

Time Allowed: 2 h 30 mins
8:00 – 10:30 am

PAPER I

(100 marks)

Theory

Instructions

1. **This paper contains 12 printed pages. Please check.**
2. Before you begin, **fill** in your **Examination Number** at the top of the question paper and on all other sheets.
3. This paper contains sections **A**, **B** and **C**. Answer **all** questions in all the sections. Some can be answered quickly, but others require considerable thought and may take longer.
4. Write your answers on the question paper in the spaces provided. The maximum number of marks for each answer is indicated against each question.
5. In the table provided on this page, **tick** against the question number you have answered.
6. You should hand in your question paper to the invigilator when time is called to stop writing.

Question Number	Tick if answered	Do not write in these columns	
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Gynaecologist

Section A (20 marks)

Answer **all** questions in this section.

1. a. Give any **one** importance of gaseous exchange in living organisms.

It helps in the releasing of dangerous and useless gases

(1 mark)

b. Explain the reason for increase in volume of chest cavity during inhalation.

(2 marks)

c. State **two** causes of the increase in volume of the human chest cavity.

(2 marks)

2. a. State any **one** function of plant hormones.

(1 mark)

b. Explain the effect of high auxin concentration on each of the following plant parts:

(i) shoot tip

(2 marks)

(ii) root tip

(2 marks)

Continued ..

3. **Figure 1** is a diagram showing a cell undergoing mitosis. Use it to answer questions that follow:

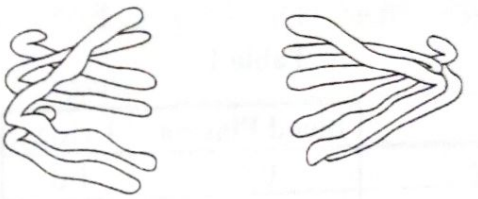


Figure 1

a. (i) Name the stage of mitosis shown.

_____ **(1 mark)**

(ii) Give a reason for your answer in **a (i)** .

_____

_____ **(2 marks)**

b. How many chromosomes are in the cell?

_____ **(1 mark)**

4. a. State any **two** types of skeletons.

Endoskeleton

Exoskeleton **(2 marks)**

b. Why do insects moult?

_____ **(1 mark)**

c. State any **one** function of cartilage.

The cartilage prevents bones from rubbing against each other **(1 mark)**

Continued/...

5. **Table 1** shows the percentage composition of substances taken from a sample of blood plasma and urine. Use it to answer questions that follow:

Table 1

	Blood Plasma	Urine
Glucose	0.1	1.0
Urea	0.03	2.0
Mineral salts	0.4	0.6
Water	93	94
Protein	7.0	0

a. Name **one** substance that is absent in urine.

_____ **(1 mark)**

b. State **one** evidence that shows the sample was taken from a person suffering from diabetes.

_____

_____ **(1 mark)**

Section B (60 marks)

Answer **all** the questions in this section.

6. a. Give any **one** problem that can lead to kidney failure.

_____

_____ **(1 mark)**

b. State the permanent treatment that can be given to an individual with a kidney failure.

_____ **(1 mark)**

c. Name any **one** excretory product from the human body.

_____ **(1 mark)**

Continued/...

6. (Continued)

d. In which region of the kidney is each of the following located?

(i) Bowman's capsule: _____

(ii) Loop of Henlé: _____

(2 marks)

7. A black rabbit was mated to a white rabbit. All the offsprings were black. Four pairs of these offsprings **X**, **Y**, **Z**, **N** were mated. The results of their offsprings are given below in **Table 2**.

Table 2

Pairs	Number of black offspring	Number of white offspring
X	8	2
Y	7	1
Z	6	3
N	6	3
Total		

a. Complete the table. **(2 marks)**

b. (i) What is the ratio of black young rabbit to white?

(2 marks)

(ii) Which allele for colour is dominant? **(1 mark)**

(iii) State the genotypes of the parents. **(2 marks)**

c. Give any **two** evidences of evolution. **(2 marks)**

Continued/...

8. a. Name the organelle in which mutation takes place in the human body.

(1 mark)

b. State any **two** effects of cancerous cells in the human body.

(2 marks)

c. (i) Give any **two** reasons for blood transfusion.

For saving peoples lives
For personal satisfaction

(2 marks)

(ii) Explain the reason for considering syphilis before donating blood.

Because the patient receiving the blood may end up getting infected by syphilis

(2 marks)

(iii) Explain the reason for a universal recipient to receive blood from any donor.

(2 marks)

9. **Table 3** shows the heights of form one students. Use it to answer the questions that follow:

Table 3

Student	H	I	J	K	L	M	N	O	P	Q
Height (cm)	110	100	140	135	120	142	140	116	115	125

a. Find the mean height.

Mean = $\frac{\text{Sum of scores}}{\text{No of scores}} = \frac{1243}{10} = 124.3$

$\frac{110+100+140+135+120+142+140+116+115+125}{10}$ ∴ Mean H = 124.3

(3 marks)

Continued/...

9. **(Continued)**

b. Find the mode.

Mode = Most occuring score

Mode = 140

(1 mark)

10. **Figure 2** shows a diagram of two potted seedlings placed in a cardboard box with an opening on one side. **N** is on rotating clinostat while **M** is stationed. Use it to answer the questions that follow:

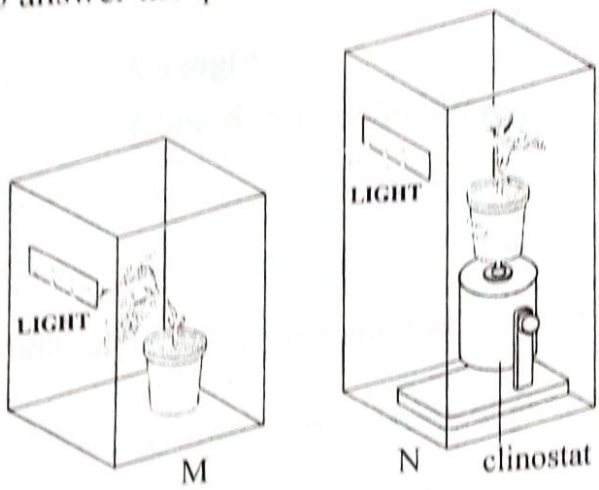


Figure 2

a. Explain **one** reason for including set-up **N** in this experiment.

_____

_____

(2 marks)

b. Describe the results of the experiment in set-up **M**.

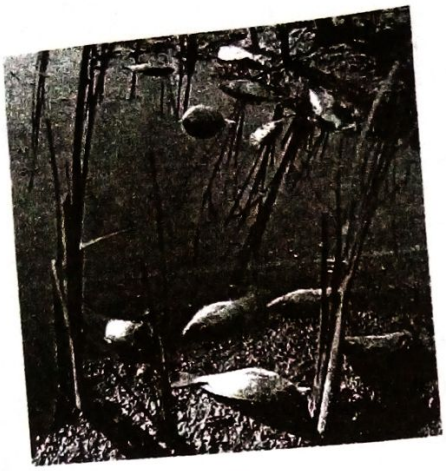
_____

_____

(2 marks)

2017

11. **Figure 3** shows **two** different types of pollution on the environment. Use them to answer questions that follow:



X

Y

Figure 3

a. Identify the types of pollution in **X** and **Y**.

X: Water pollution **(1 mark)**

Y: Air pollution **(1 mark)**

b. State **one** effect of pollution as observed in diagram **X**.

Decreasing of the country's economy **(1 mark)**

c. State the cause of pollution as observed in diagram **Y**.

Smoke and fumes from Industries **(1 mark)**

12. In a certain school students rushed back to class after hearing the ringing of the bell at the end of break time. Use this information to answer the questions that follow:

a. Identify the following:

(i) stimulus

change of

(ii) receptor

These are Organs which transports reactions

Continued...

a. **(Continued)**

(iii) response

This refers to the reaction one gives after change in stimulus

(3 marks)

b. (i) What type of reflex action was demonstrated by the students?

_____

(1 mark)

(ii) Which reflex centre controls the action demonstrated by the students?

_____

(1 mark)

c. Define the following terms:

(i) neurone

_____

(1 mark)

(ii) synapse

_____

(1 mark)

13. **Figure 4** is a diagram showing a cross section of a bird wing. Use it to answer the questions that follow:

Figure 4

a. Explain **two** ways in which this shape of the wing helps the bird to fly efficiently.

The wing is hollow to make the bird light in weight for efficient movement.

Due to presence of pector muscles the wings are attached to the birds body fully efficiently.

(4 marks)

Continued/...

13. (Continued)

b. (i) What happens to the wing feathers during up stroke?

The wing feathers are flapped up **(1 mark)**

(ii) Give a reason for your answer in **b (i)**.

Because during upstroke the pectoralis minor contracts, pulling the wings upwards. **(2 marks)**

c. Give **two** ways in which birds overcome gravitational force.

(2 marks)

d. During which stroke does the bird gain height?

During the ~~Upstroke~~ Soaring flight **(1 mark)**

14. a. State any **one** function of each of the following parts of a leaf:

(i) vascular bundles

Vascular bundles transport water and mineral salts within the leaf. **(1 mark)**

(ii) stomates

The stomates help in gaseous exchange during photosynthesis. **(1 mark)**

b. Explain any **one** way in which each of the following leaf structures is adapted for photosynthesis:

(i) cuticle The cuticle is transparent to allow sunlight to penetrade through the leaf. **(2 marks)**

(ii) lamina The thin lamina helps the diffusion of gases to be fast. **(2 marks)**

c. Give **one** function of each of the following organelles:

(i) mitochondria produce energy for the cell. **(1 mark)**

(ii) chloroplast produce and store chlorophyll. **(1 mark)**

Continued/...

Section C (20 marks)

Essay Questions

Answer **all** questions in this section.

5. Explain **five** impacts of human activities on freshwater and tropical savanna woodland ecosystem. Your answer should be in an essay form.

16. Describe an experiment that could be carried out to show that developing fruits contain enzymes that could act on starch. Your answer should include procedure, expected results and conclusion in an essay form.