Name: ……

Adm. No.: …… Class ……

CHEMISTRY
2024
TIME: 2 HOURS

GIDEONS ELITE BOYS CENTRE OF EXCELLENCE
DECEMBER SELF-ASSESSMENT EXAMINATIONS
Kenya Certificate of Secondary Education (K.C.S.E.)
FORM 2

INSTRUCTIONS:

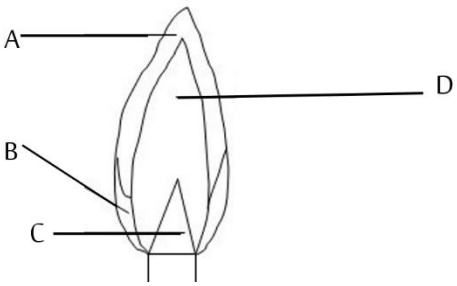
- *Write your **name** and **other details** on the space provided above*
- *Answer **all** the questions in the spaces provided for each question.*
- *All working **must** be clearly shown where necessary.*
- *Mathematical tables and silent non-programmable electronic calculators may be used.*

For Examiners Use Only

Questions	Total marks	Student's score
1 - 20	**80**	

This paper consists of 12 printed pages. Students should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. **Name** the regions of the Bunsen burner flame in the diagram below.



A ……..(½ mark)

B ……..(½ mark)

C ……..(½ mark)

D ……..(½ mark)

2. Using the table below, classify the substances as conductors or non-conductors of electricity. (3 marks)

Substance	**Conductor/Non-Conductor**
Copper	
Rubber	
Aluminium	

3. Salts have many applications in daily life.
   (a) Define a salt. (1 mark)

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   (b) Give four types of salt. (2 marks)

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4. (a) Explain why alkali metals are more reactive than alkaline earth metals in the same period. (2 marks)

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(b) State the trend in boiling points of halogens down the group. (1 mark)

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5. Draw a set-up that can be used to separate water and kerosene mixture. (3 marks)

6. Complete the table below with the properties of acids and bases. (3 marks)

Properties of acids	**Properties of bases**
1.	1.
2.	2.
3.	3.

7. Magnesium reacts with dilute hydrochloric acid to produce a colourless gas Q and a colourless solution R.

(a) Name the colourless gas Q. (1 mark)

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(b) Give the observation made when:

(i) Magnesium is added to hydrochloric acid. (1 mark)

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(ii) Solution R is tested with red and blue litmus papers. (1 mark)

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8. An ion of an element D can be represented as $^{24}_{12}D^{2+}$.

a) Draw the structure of the most stable ion. (2 marks)

b) How does its ionic radius compare with its atomic radius? Explain. (1 mark)

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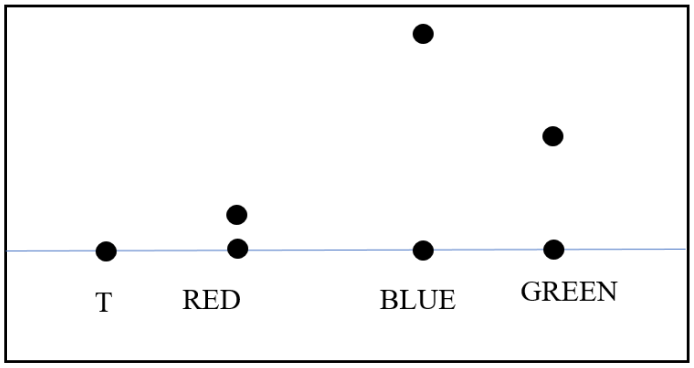
9. The figure below shows a paper chromatography for mixture T, red, blue and green dyes.



(a) Given that mixture **T** contains red and blue dyes only, **show on the diagram** the chromatogram of mixture **T.** (2 marks)

(b) Which dye is most adsorbent on the chromatography paper? (1 mark)

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10. The grid given below represents part of the periodic table. Study it and answer the questions that follow. (The letters do not represent the actual symbols of the elements)

								A
				B				
	C		D			E		
	F							

(i) What name is given to the group of elements to which **C** and **F** belong? (1 mark)

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(ii) Which letter represents the element that is the least reactive? (1 mark)

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(iv) Write the formula of the compound formed when **element D** and oxygen gas react (1 mark)

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(vi) On the grid indicate with a tick the position of **element G** which is in the third period of the periodic table and forms G^{3-} ions. (1 mark)

(v) Compare the atomic radii of elements C and E. Explain. (2 marks)

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(vi) Draw the dot (.) and cross (x) diagram for the compound formed between elements F and E. (2 marks)

11. Substances can be classified as neutral, acids or bases. You are provided with vinegar, lemon juice, sugar solution, soap solution, lime water and potassium hydroxide.

(a) Describe an experiment that can be used to determine the pH values of the substances. (3 marks)

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(b) Give the pH values of each of the substances. (3 marks)

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12. Figure 1 shows a set-up used by a student to prepare dry chlorine gas in the laboratory.

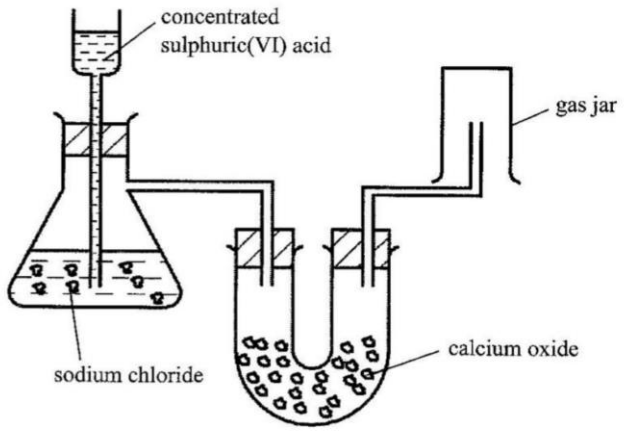

Figure 1

(a) Identify three mistakes in the set-up and give a reason for each. (3 marks)

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13. You are provided with the following: thermometer, boiling tube, beaker, Bunsen burner, pure substance **X** whose boiling point is about 80°C, water and any other apparatus that may be required. Draw a labelled diagram of the set-up that can be used to determine the melting point of **X**. (3 marks)

14. The graph in **Figure 2** was obtained when a certain substance was heated and its temperature recorded at regular intervals.

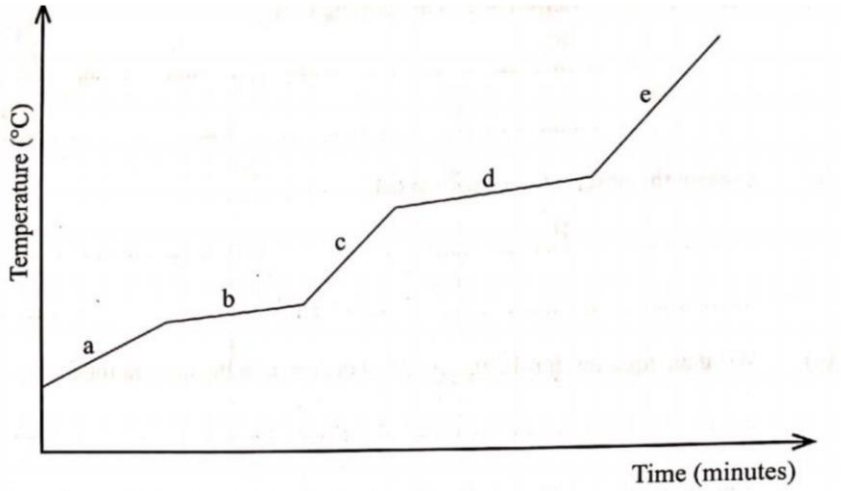

Figure 2

(a) Is the substance pure or impure? (1 mark)

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(b) Give a reason for your answer in (a) above. (1 mark)

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15. Describe how the magnesium chloride can be prepared in the laboratory starting with magnesium ribbon. (3 marks)

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16. Using reagents provided only, explain how you could prepare solid Zinc carbonate.

- Zinc powder (3 marks)
- Nitric (V) acid (dilute)
- Distilled water
- Solid sodium carbonate

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17. Letters in the table below represent certain elements. Atomic numbers of the elements are given. (The letters are not the actual symbols of the elements.)

Element	G	E	H	F
Atomic number	9	10	11	12

(a) Select an element which is:

(i) A noble gas (1 mark)

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(ii) An alkali metal (1 mark)

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(b) Select **two** elements which are in the same period. Give a reason (1 mark)

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(c) Select the element with the largest atomic radius. (1 mark)

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18. The grid below shows part of the periodic table. Study it and answer the questions that follow. The letters are not the actual symbols of the elements.

			A			B	C	D
E	F						J	
							G	
H								

(a) Give the name of the family to which element D belongs. (1 mark)

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(b) Identify an element which forms a stable trivalent cation (1 mark)

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(c) Give the formula of:

(i) The compound formed between A and B (1 mark)

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(ii) The sulphate of F (1 mark)

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(d) Using dot(.) and cross(x) diagram, show the bonding in a molecule of **B.**

(2 marks)

(e) Compare the atomic radii of elements **C** and **J**. Explain. (2 marks)

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(f) Select the element that has the lowest ionization energy. Explain. (1 mark)

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(g) Identify element **G**. (1 mark)

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(h) Compare the boiling points of elements **G** and **E**.

(2 marks)

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19. Study the table below and answer the questions that follow.

(The letters are not the actual symbols of the elements)

Element	**B**	**C**	**D**	**E**	**F**
Atomic number	18	5	3	5	20
Mass number	40	10	7	11	40

(i) Which two letters represent the same elements? Give reason. (2 marks)

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(ii) Give the number of neutrons in an atom of element **D.** (Show your working) (1 mark)

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20. Study the table below and answer the questions that follow.

substance	**M.pt °C**	**B.pt °C**	**Electrical conductivity in solid state**	**Electrical conductivity in molten state**
J	365	463	Poor	Poor
K	1323	2773	Good	Good
L	1046	1680	Poor	Good
M	2156	2776	Poor	Poor

(a) Place J, K, L and M in the appropriate categories from the following:

i. Metallic solid _____ (1 mark)

ii. Giant covalent structure solid _____ (1 mark)

iii. Ionic solid _____ (1 mark)

iv. Simple molecular solid_____ (1 mark)

(b) Which substance can be used to make overhead cables? (1 mark)

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