

Name:ADM.....Stream.....Index No.....

School:Candidate's Sign.Date:

233/1
CHEMISTRY
PAPER 1
AUGUST 2021
TIME: 2 HOURS

BURAMU 2 JOINT EXAMINATION 2021

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

Chemistry
Paper 1

INSTRUCTIONS TO THE CANDIDATES:-

- Write your **name, admission number, index number** and **school** in the spaces provided.
- Answer *all* the questions in the spaces provided.
- Mathematical tables and electronic calculators may be used
- All working **MUST** be clearly shown where necessary.

For Examiner's Use Only

Question	Maximum score	Candidate's score
1-28	80	

1. Two elements R and Q have their ionic configuration 2.8 and 2.8.8. They are found in group six and group 1 respectively in the periodic table. Write down the electronic configuration of their neutral atoms.

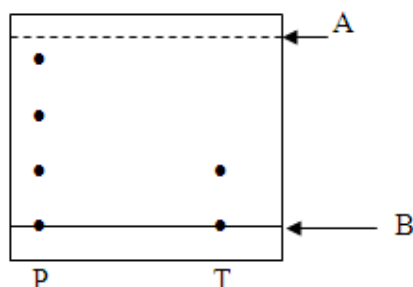
(i) Q _____ (1 mark)

R _____ (1 mark)

(ii) Give the formula of the compound formed when R and Q combine. (1 mark)

(iii) The compound in (ii) above was dissolved in water. What would be the effect on a blue litmus paper dipped into resulting solution? Explain. (1 mark)

2. The following is a chromatogram showing the results obtained after separating two substances P and T.



(a) Name lines :

A _____ (½ mark)

B _____ (½ mark)

(b) Name a possible solvent which can be used in the above process. (1 mark)

(c) Which of the two substances is pure? (1 mark)

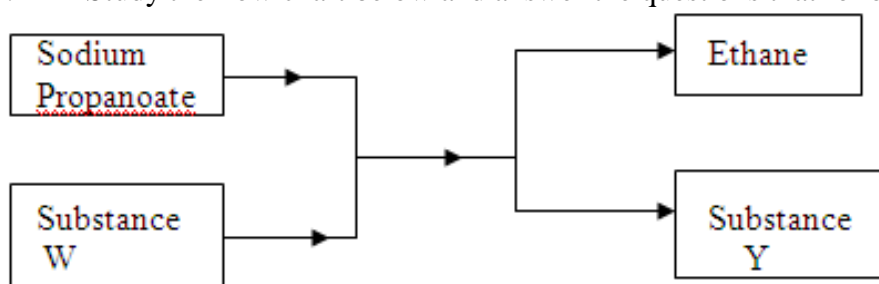
3. An oxide of metal M contains 59% of metal M and 41% oxygen. Given that the relative formula mass of the oxide is 78, determine its relative molecular formula. (3 marks)

4. The table shows the relative atomic masses and the percentage abundance of the isotopes L_1 and L_2 of the element L.

Isotope	Relative atomic mass	% abundance
L_1	62.93	69.09
L_2	64.93	30.91

Calculate the R.A.M of element L. (2 marks)

5. Study the flow chart below and answer the questions that follow.

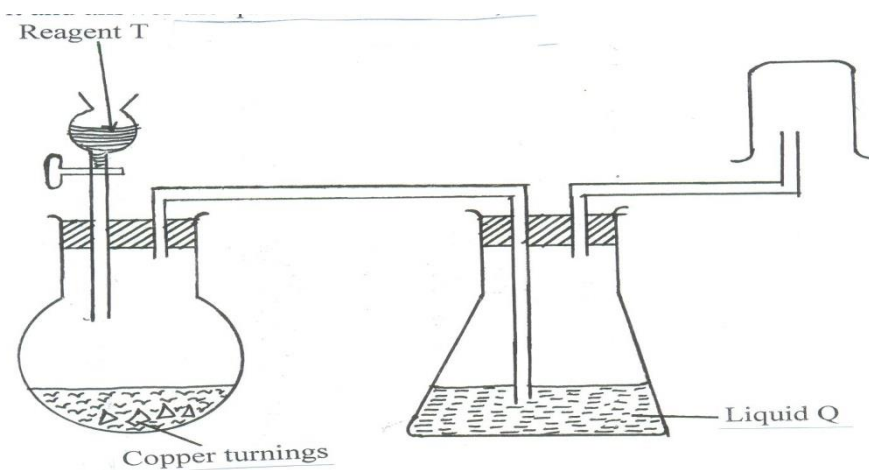


Name substances:

(i) W _____ (1 mark)

(ii) Y _____ (1 mark)

6. The set up below was used by a student to prepare sulphur (IV) oxide gas in the laboratory. Study it and answer the questions that follow;



(a) Name: (i) Reagent T _____ (1 mark)

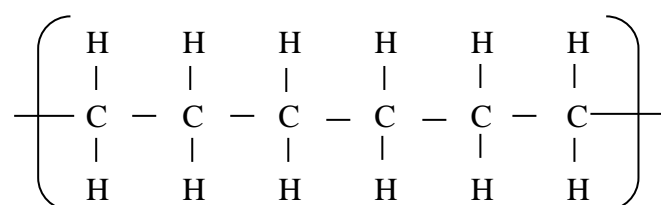
(ii) Liquid Q _____ (1 mark)

(b) State one mistake in the set-up. (1 mark)

(c) What observation is made when sulphur (IV) oxide is passed through potassium chromate solution? (1 mark)

7. Distinguish between a co-ordinate bond and a covalent bond. (2marks)

8. A student in form 4 was provided with the following polymer.



(a) Name the polymer _____ (1 mark)

(b) Draw the structure of the monomer. (1 mark)

(c) Name the type of reaction that take place during the formation of the polymer. (1 mark)

9. Describe an experimental procedure that can be used to separate water and oil. (2marks)

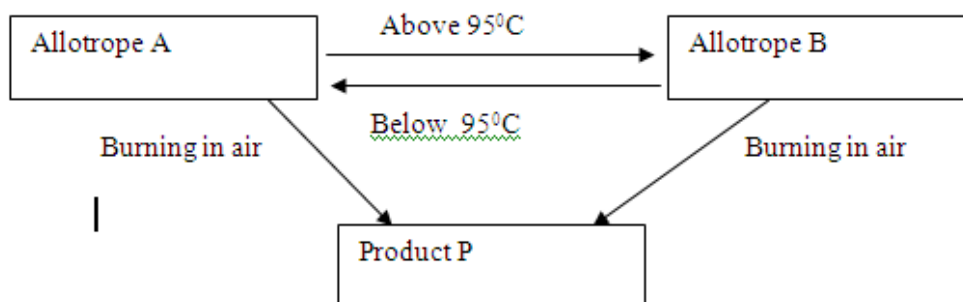
10. Write equations to show the effect of heat on each of the following.

(a) Sodium hydrogen carbonate. (1 mark)

(b) Silver nitrate (1 mark)

(c) Anhydrous iron (II) sulphate (1 mark)

11. The flow chart below shows some properties of two allotropes of element P.



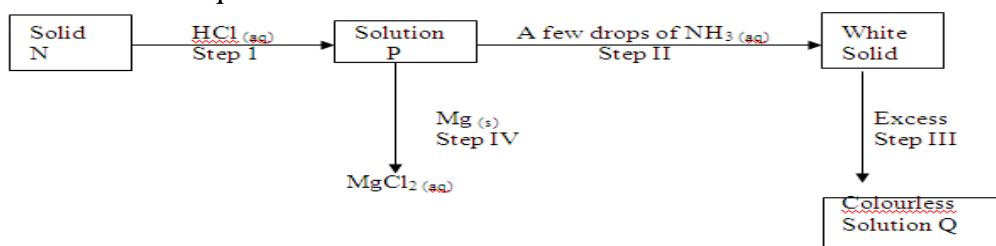
i) Name the allotrope A. (1 mark)

ii) Write an equation to show formation of product P. (1 mark)

iii) What does 95°C represent? (1 mark)

12. Starting from calcium carbonate, describe how a solid sample of calcium sulphate can be prepared. (3 marks)

13. The scheme below shows some reaction sequence starting with solid N. Study it and answer the questions that follow.



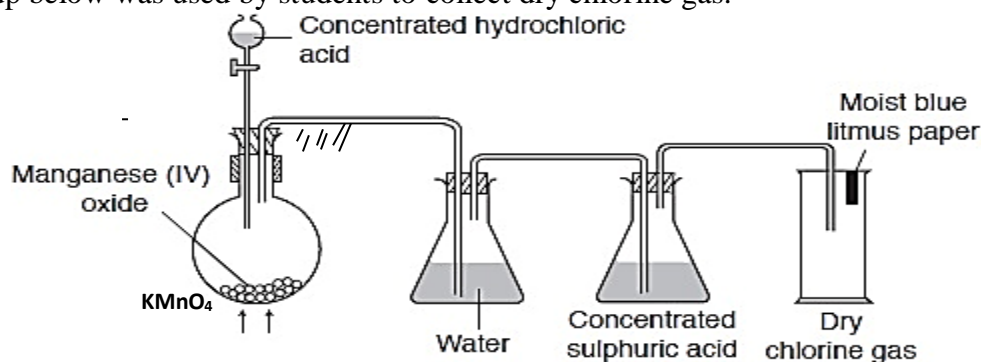
(a) Write the formula of the complex ion in solution Q. (1 mark)

(b) Write an equation for the reaction in step (IV). (1 mark)

14. (a) State the Charles' law. (1 mark)

(b) A certain mass of gas occupies 146dm^3 at 291K and 98.31kPa . What will be its temperature if its volume is reduced to 133dm^3 at 101.325kPa ? (2 marks)

15. The set up below was used by students to collect dry chlorine gas.

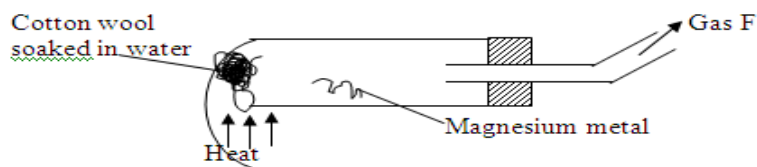


a. Give the function of water in the set up (1mks)

b) Write an equation for the reaction that produces chlorine gas (1 mark)

c) Give another reagent that can be used in the place of potassium manganate. (1 mark)

16. A student used the set up shown in the diagram in order to study the reaction of some metals with steam. The experiment was carried out for ten minutes.



(a) What observation would be made if gas F is ignited? (1 mark)

(b) State the precaution to be taken during the experiment. Explain why. (2 marks)

17. Study the information in the table below and answer the questions that follow.

(The letters do not represent the actual symbols of the elements)

Element	Electronic configuration	Ionization energy Kj/mol)
P	2.2	1800
Q	2.8.2	1450
R	2.8.8.2	1150

(a) What is the general name given to the group in which elements **P**, **Q** and **R** belong?

(1 mark)

(b) Explain why **P** has the highest ionization energy

(1 mark)

(c) Write a balanced chemical equation for the reaction between element **Q** and water

(1 mark)

18. The table below shows the electrical conductivity of substance **A**, **B** and **C**

Substance	Solid state	Molten state	Aqueous solution
A	Conducts	Conducts	Not soluble
B	Doesn't conduct	Conducts	Conducts
C	Doesn't conduct	Doesn't conduct	Not soluble

(a) Which one of the substance is likely to be plastic?

(1 mark)

(b) Which of the substances is likely to be sodium chloride? Explain

(1 mark)

(c) Give the type of structure and bonding that is present in substance **A** (1 mark)

19. Draw a set up that can be used to prepare and collect oxygen gas using hydrogen peroxide and manganese (iv) oxide (3marks)

(a) State the relationship between pressure and temperature that can be deduced from the graph. (1 mark)

(b) Using kinetic theory, explain the relationship. (2 marks)

20. The table below shows the P^H values of solutions J to N

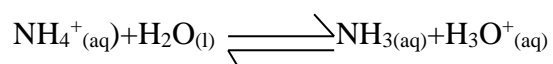
Solution	J	K	L	M	N
P ^H	5	13	2	10	7

b) Which solution.

i) Contains the largest concentration of hydroxide ions? (1mark)

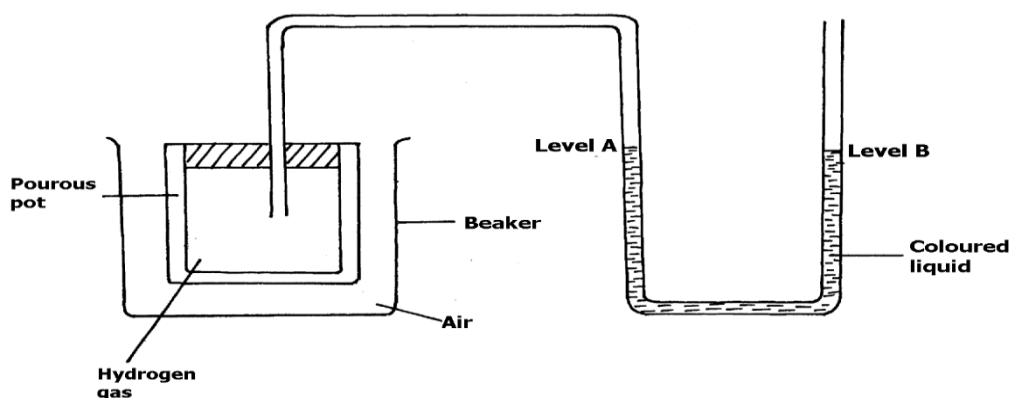
ii) Is likely to be a solution of acetic acid? (1mark)

b) In the equation below, identify the reagent that acts as an acid in the forward reaction. Give a reason. (2marks)



21. State and explain what would be observed when hydrogen gas is passed over heated copper (II) oxide in a combustion tube. (3marks)

22.. The set- up below was used to investigate the rate of diffusion of different gases.



a) Explain why a coloured liquid is used in this experiment. (1 mark)

b) State and explain the observation made after 20 minutes. (2marks)

23. Study the information in the table below and answer the questions that follow.

Salt	Solubility (g/100g water)	
	At 30°C	at 70°C
CuSO ₄	28	38
AgNO ₃	79	98

A mixture containing 36g of CuSO₄ and 78g of AgNO₃ in 100g of water at 70°C was cooled to 30°C.

(a) Which salt crystallized out? Give a reason. (2 marks)

(b) Calculate the mass of the salt that crystallized. (1 mark)

24. (a) Name two cations that are present in hard water. (1 mark)

(b) State two advantages of hard water. (2 marks)

25. Concentrated nitric (V) acid was added to iron (II) sulphate acidified with dilute sulphuric (VI) acid and the mixture heated. The solution turned from pale green to yellow with evolution of a brown gas.

Explain the observation. (2 marks)

26. (a) What are acid-base indicators? (1 mark)

(b) Give two acid-base indicators and state the colour changes in acid and base solutions. (2 marks)

<u>Name of indicator</u>	<u>Colour in acid</u>	<u>Colour in base</u>
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(i) _____

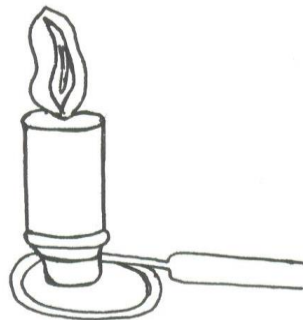
(ii) _____

27. Calcium oxide can be used to dry ammonia gas.

(a) Explain why calcium oxide is NOT used to dry hydrogen chloride gas. (2 marks)

(b) Name one drying agent for hydrogen chloride gas. (1 mark)

28. The diagram below shows a Bunsen burner.



(a) Explain why it is advisable to Put off a non-luminous flame when not in use (1 mark)

(b) When lighting a Bunsen burner, it is advisable to strike the lighter before switching on the gas, explain why. (1 mark)
