

Name: Index No.

Candidate's Sign.

Date:

233/1

CHEMISTRY

Paper 1

TIME: 2 HOURS

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

Chemistry

Paper 1

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:-

- Write your *name* and *index number* in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- Mathematical tables and electronic calculators may be used
- All working **MUST** be clearly shown.

For Examiner's Use Only

Question	Maximum score	Candidate's score
1-26	80	

This paper consists of 11 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing

1. The table below gives information about ions of **P** and **Y**

Ion	P ⁺	Y ²⁻
Electron arrangement	2.8	2.8.8
Number of Neutrons	12	16

a) Write the electrons arrangement for the atom of **Y** (1mk)

b) How many protons are there in the nucleus of (2mks)

(i) **P**.....

(ii) **Y**.....

c) Write the formula of the compound formed when **P** and **Y** reacts (1mk)

2. When hydrated sample of calcium sulphate was heated until all the water was lost. The following data was recorded.

Mass of crucible = 30.296g

Mass of crucible + Hydrated salt = 33.111g

Mass of crucible + Anhydrous salt = 32.781g

Determine the empirical formula of the hydrated salt

(RMM of CuSO₄ = 136 and that of H₂O = 18) (3mks)

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3. When iron and steam are heated in a closed container, a dynamic equilibrium is reached.



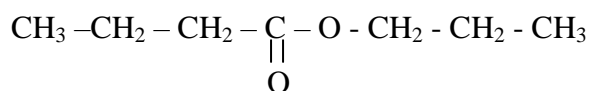
(a) Define the term dynamic equilibrium? (1mk)

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(b) What is the effect on equilibrium if magnesium is added? Explain (2mks)

.....

4. The structure below represents a sweet smelling compound



Give the name of the **two** compounds that can be used to prepare this compound in the laboratory
(2mks)

.....
.....

5. Starting with copper metal describe how a sample of crystals of copper (ii) chloride may be prepared in the laboratory (3mks)

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.....
.....

6. (a) State the Grahams law of diffusion (1mk)

(b) The molar masses of gases **W** and **X** are 16.0 and 44.0 respectively. If the rate of diffusion of **W** through a porous material is $12\text{cm}^3 \text{s}^{-1}$

Calculate the rate of diffusion of **X** through the same material. (2mks)

7. The following are half- cell reactions and their reduction potentials

	E ^θ (volts)
$\text{A}^{2+}_{(\text{aq})} + 2\bar{\text{e}} \longrightarrow \text{A (s)}$	-0.76
$\text{B}^{2+}_{(\text{aq})} + 2\bar{\text{e}} \longrightarrow \text{B (s)}$	-0.13
$\text{C}^{+}_{(\text{aq})} + \bar{\text{e}} \longrightarrow \text{C (s)}$	+0.80
$\text{D}^{2+}_{(\text{aq})} + 2\bar{\text{e}} \longrightarrow \text{D (s)}$	+ 0.30

The letters used do not represent the actual symbols of elements

(a) Write the cell representation for the electrochemical cell that would give the highest e.m.f (1mk)

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(b) State and explain the observation made when a copper rod is placed in a beaker containing silver nitrate solution (2mks)

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.....

8. (a) Name the type of artificial radioactivity represented by each of the following nuclear equations



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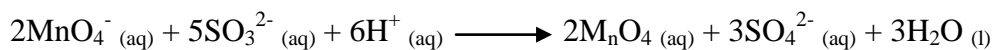


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(b) Give **two** differences between nuclear reactions and chemical reactions (2mks)

.....
.....

9. When SO_2 (g) is bubbled through acidified KMnO_4 solution, the reaction takes place according to the following equation.



a. Calculate the oxidation numbers of manganese in

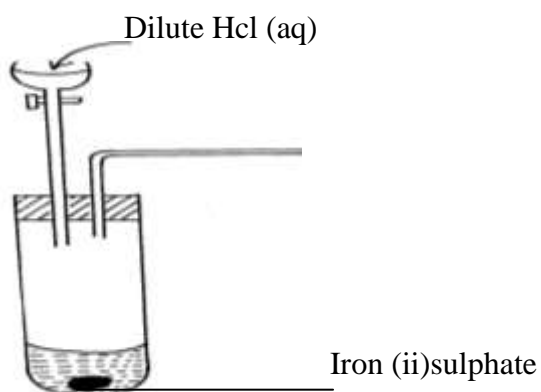
(i) MnO_4^- (1mk)

(ii) MnSO_4 (1mk)

(b) During the reaction was manganese oxidized or reduced? Explain. (1mk)

.....

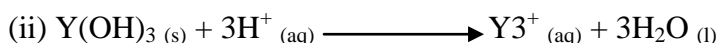
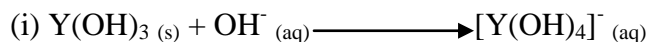
10. The diagram below is part of a set up used in the laboratory for the preparation of a gas.



Complete the diagram to show how a dry sample of the gas can be collected (3mks)

11. 15 cm^3 of ethanoic acid was dissolved in water to make 500 cm^3 of solution.
 Calculate the concentration of the solution in moles per litre (C=12, H= 1, O= 16, density of ethanoic acid is 1.05 g/ cm^3) (3mks)

12. A compound whose general formula is Y(OH)_3 reacts as shown by the equations below.



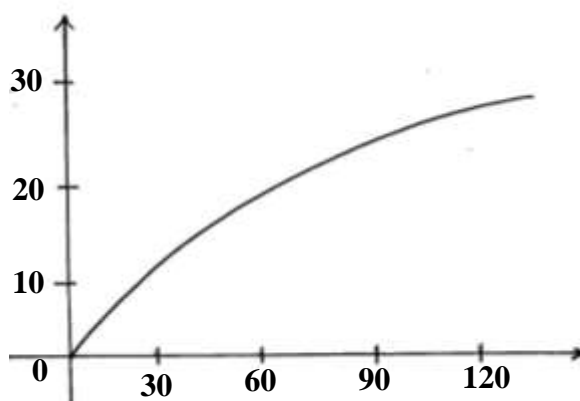
- (a) What name is given to compounds which behave like Y(OH)_3 in the two reactions? (1mk)

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- (b) Name **two** elements whose hydroxides behave like that of **Y** (2mks)

.....

13. A Certain mass of a metal reacted with excess dilute hydrochloric acid at 25°C . The volume was recorded after every 30secs. The results were presented as shown below.



- (a) Name **one** piece of apparatus that may be used to measure the volume of the gas liberated. (1mk)

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- (b)(i) On the same axis, sketch the curve that would be obtained if the experiment was repeated at 35°C (1mk)

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- (ii) Explain the shape of your curve in b(i) above (1mk)

.....

14. A piece of cover slip was weighed before and after a student made a circle on it using a pencil lid of pure graphite. The masses were as shown below;

Mass of cover slip before - 1.804g

Mass after drawing the circle - 1.9053g

Determine the number of carbon atoms used to draw the circle. ($C = 12$, $L = 6.00 \times 10^{23}$) (3mks)

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15. Dacron is a synthetic fibre formed by polymerization reaction between a dicarboxylic acid and a diol (alcohol with two functional groups)



Dicarboxylic Acid,

ethan -1, 2- diol

(a) Show how polymerization between the two occur. (2mks)

.....

(b) Name the type of polymerization involved in forming Dacron (1mk)

.....

16. Use the table below to answer the questions that follow. (The letters are not the actual symbols of the elements)

Element	Atomic number	M.P ⁰ c
A	19	63.7
B	11	97.8
C	17	- 101
D	13	660
J	14	1410

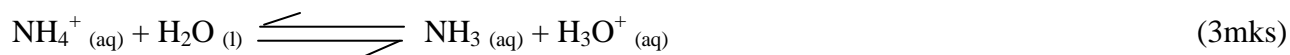
(i). Identify an element that exist as a gas at room temperature .Explain. (2mks)

.....

(ii) Using dots (.) and crosses(x) draw the bonding formed when element T and C react to form a compound. (2mks)

.....

17. In the equation below, identify the species that act as an acid. Explain



.....
.....
.....

18. Chlorine and iodine are elements in the same periodic table. Chlorine gas is yellow while aqueous iodine is brown.

(a) What observation would be made if chlorine gas were bubbled through aqueous sodium iodide?

Explain using an ionic equation (2mks)

.....
.....

(b) Under certain conditions, chlorine and iodine react to give iodine trichloride. ($\text{ICl}_3 (\text{s})$). What type of bonding exist in iodine trichloride? Explain (2mks)

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.....

19. When a few drops of ammonia solution were added to a colourless solution **W**, a white precipitate was observed. On addition of more ammonia solution, the white precipitate dissolved,

(a) Name the white precipitate. (1mk)

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(b) Write an ionic equation for the formation of the white precipitate. (1mk)

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(c) Write the formula of the complex compound formed when the white precipitate dissolves. (1mk)

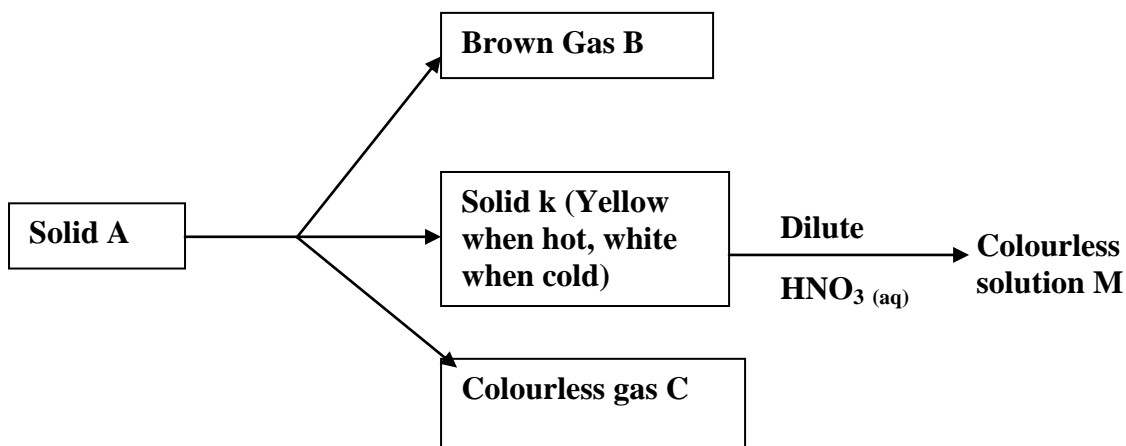
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20. Draw the structure of the following organic compounds

(a) pent - 2 - yne (1mk)

(b) Propylmethanoate (1mk)

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



(a) Identify gases

(2mks)

(i) B.....

(ii) C.....

(b) Identify ions likely to be present in solid A

(1mks)

.....
.....

22. (a) Name any **two** substances recycled in solvey process.

(2mks)

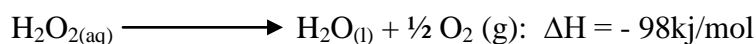
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(b) Using an equation, explain how sodium carbonate is used to soften hard water.

(1mk)

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.....

23. Hydrogen peroxide decomposes according to the equation given below;



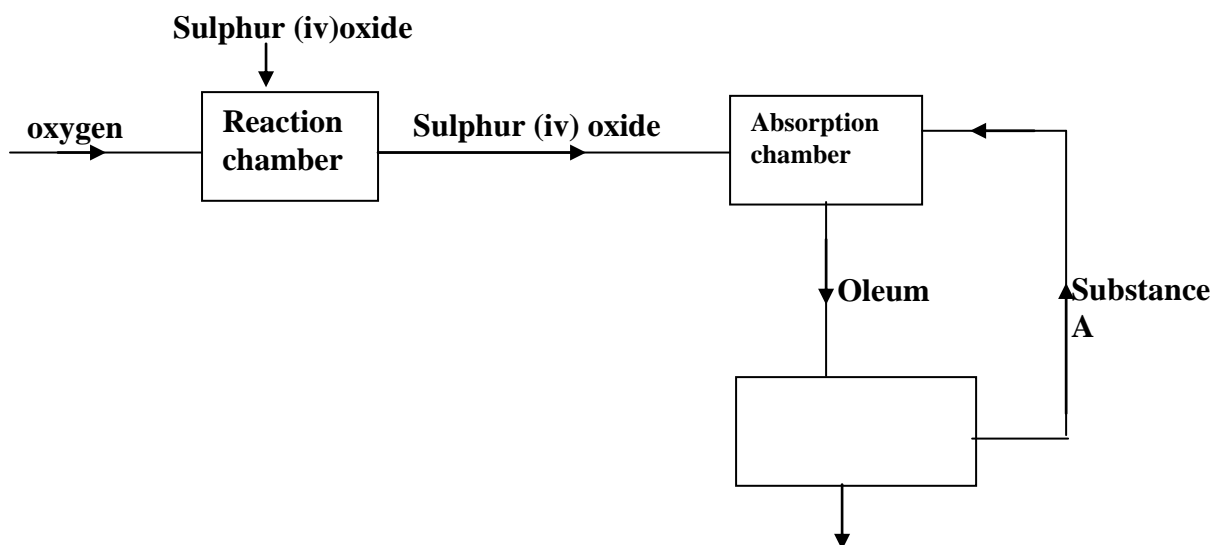
8.5g of hydrogen peroxide contained in 100cm³ of solution with water were completely decomposed.

Determine the rise in temperature due to this decomposition. (specific heat capacity of water = 4.2Jg⁻¹k⁻¹, density of water = 1g/cm³, O= 16, H=1)

(3mks)

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24. The flow chart below shows some of the processes involved in large scale production of sulphuric (vi) acid. Use it to answer the questions that follow.



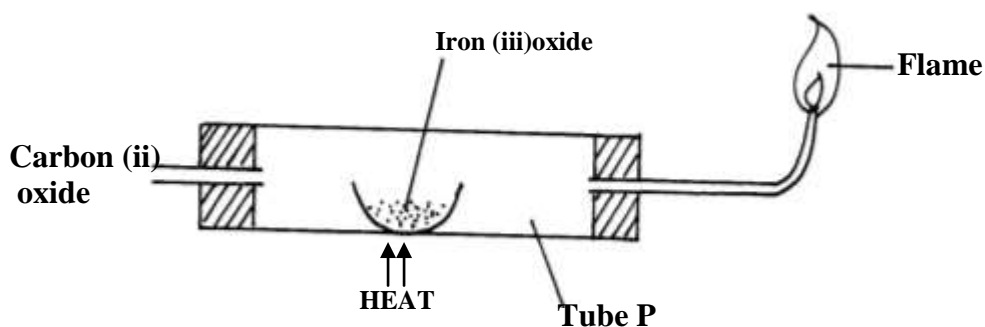
(a) Describe how oxygen is obtained from air on large scale. (3mks)

.....

(b) Name substance A. (1mk)

.....

25. Carbon (ii)oxide gas was passed over heated iron (iii) oxide as shown below



a) Give one observation made in tube **P** (1mk)

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.....

b) Write an equation for the reaction which takes place in test tube **P** (1mk)

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.....

26. (a) Define a flame (1mk)

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.....

(b) Name the type of a flame produced by the Bunsen burner when the air hole is closed. (1mk)

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