233/1
CHEMISTRY
PAPER 1
THEORY
Time: 2 hours

PRECIOUS BLOOD SCHOOL
MOCK EXAM

INSTRUCTIONS TO CANDIDATES

1. *Answer **ALL** the questions in the spaces provided.*
2. *Mathematical tables and silent electronic calculators may be used.*
3. *All working **MUST** be clearly shown where necessary.*

For Examiner's use only

Question	Maximum Score	Candidate's score
1 - 29	80	

This paper consists of 7 printed pages.

Candidates should check the question paper to ensure that all the pages are printed as indicated and that no questions are missing.

SECTION I (50 marks)

Answer **All** *questions in this section*

1. A mixture of magnesium powder and copper powder were reacted with dilute sulphuric acid. The solution was then filtered.
Name:
(a) (i) The residue (1 mark)

(ii) The filterate (1 mark)

(b) Write an ionic equation for the reaction that takes place. (1 mark)

2. Explain why it's necessary to close the air hole when a bunsen burner flame is not in use during experiments. (2 marks)

3. A white powder Q is heated, a colourless gas is formed and brown fumes evolved. The resulting solid R is white when cold and yellow when hot. NaOH is added to the resulting solid and a white ppt is formed which dissolves in excess of NaOH to form colourless solution P.
(a) Identify:
(i) Powder Q (1 mark)

(ii) Solid R (1 mark)

(b) Give a reason why solid R reacts with NaOH. (1 mark)

(c) Write an equation of the reaction leading to the formation of:
(i) Colourless solution P (1 mark)

(ii) The brown fumes and the colourless gas. (1 mark)

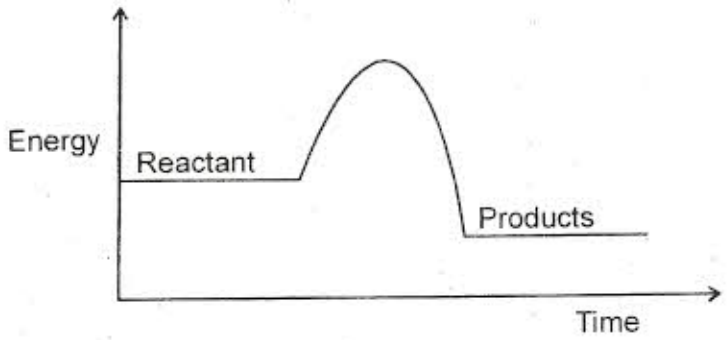
4. Liquid S and T mix in equal proportions.
(i) Name the suitable method of separation that would be used to separate the two liquids. (1 mark)

(ii) What property makes it possible to separate the two liquids S and T? (1 mark)

5. Draw a set up that can be used to separate a mixture of Sodium Chloride and Iodine. (3 marks)

6. (a) State any two factors determining the value of activation energy. (2 marks)

(b) The energy level diagram for the reaction.
$2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$ is given below.



(i) State two ways of increasing the yield of $SO_{3(g)}$. (2 marks)

(ii) On the same axis, draw the curve that would be obtained if a catalyst was used. (1 mark)

7. (a) Name the organic compound formed when $CH_3CH_2\underset{\underset{OH}{|}}{C}HCH_3$ is heated with concentrated Sulphuric (VI) acid at 180°c (1 mark)

(b) What type of reaction takes place? (1 mark)

(c) Write down the structured formulae of isomers of Pentane. (2 marks)

8. Study the following scheme and answer the questions that follow.

$$^{214}_{83}Bi \xrightarrow{I} {}^{210}_{81}Ti \xrightarrow{II} {}^{210}_{82}Pb$$

(i) Identify the particles emitted at
I (1 mark)
II (1 mark)

(b) Write down the nuclear reactions involved in;

I (1 mark)

II (1 mark)

(c) An isotope M has a half life of 2.5 hours. What percentage of a given mass will be left after 10 hours? (2 marks)

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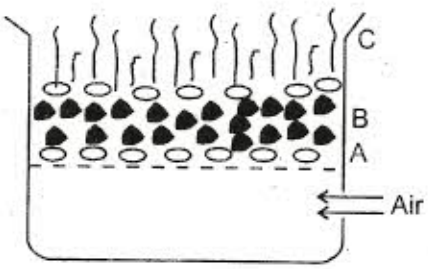
9. The diagram below represents a burning Jiko. Study it and answer questions that follow.



(a) Give equations for the reaction that takes place in section:

A (1 mark)

B (1 mark)

(b) Name two substances that can be used to prepare the gas produced in section B in the laboratory. (1 mark)

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(c) Explain why carbon II oxide is more dangerous than hydrogen sulphide. (2 marks)

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10. When chlorine gas is bubbled through water, a faint yellow solution is formed. The solution is chlorine water.

(i) Write the equation leading to formation of chlorine water. (1 mark)

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(ii) Briefly describe the bleaching action of chlorine. (3 marks)

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(iii) How does the bleaching action of chlorine differ from that of sulphur IV oxide? (2 marks)

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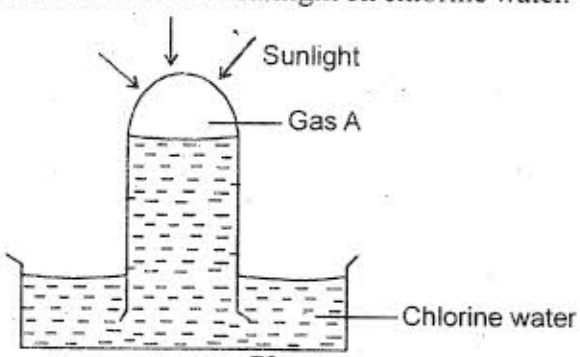
(iv) The diagram below shows the effect of sunlight on chlorine water.



(a) Identify gas A. (1 mark)

(b) Write an equation to show the formation of gas A. (1 mark)

11. 9.42g of an organic acid RCOOH is dissolved in $600cm^3$. $25cm^3$ of this solution was found to require $21.5cm^3$ of 0.207M KOH solution for complete neutralization (C=12.0, O=16.0, H = 1.0) (3 marks)

(i) Determine the formula mass of the acid. (3 marks)

(ii) Hence the value of R. (1 mark)

12. Copper (II) sulphate reacts with barium chloride according to the equation below.

$$CuSO_{4(aq)} + BaCl_{2(aq)} \rightarrow CuCl_{2(aq)} + BaSO_4(s), \Delta H = 17.7kJmol^{-}$$

Calculate the temperature change when $900cm^3$ of 1M $CuSO_4$ were added to $600cm^3$ of 1M $BaCl_2$ (Assume heat capacity of solution is 4.2 $Jg^{-1}K^{-1}$ and density is $1g/cm^3$) (3 marks)

13. A fixed mass of a gas occupies $140cm^3$ at a temperature of 22^0C and 740 mmHg pressure. Calculate the volume at s.t.p. (2 marks)

14. Phosphorous is situated immediately below nitrogen in the Periodic table. Give two physical differences between the two elements. (2 marks)

15. Explain why hydrogen is discouraged in filling observation balloons. (2 marks)

16. A steel bar was to be electroplated with silver to improve its appearance and prevent corrosion. Draw a sketch of a setup that could be used to electroplate the steel bar. (3 marks)

17. If air is bubbled through water, pH changes gradually from 7 - 5·7 Explain this observation. (2 marks)

18. An experiment to establish an equilibrium between chromate and dichromate ions is shown below.

$$\underset{\text{Yellow}}{2CrO_4^{2-}(aq) + 2H^+_{(aq)}} \rightleftharpoons \underset{\text{Orange}}{Cr_2O_7^{2-}{}_{(aq)} + H_2O_{(l)}}$$

(a) What would be observed if NaOH is added to the system? (1 mark)

(b) Explain your observation in (a) above. (2 marks)

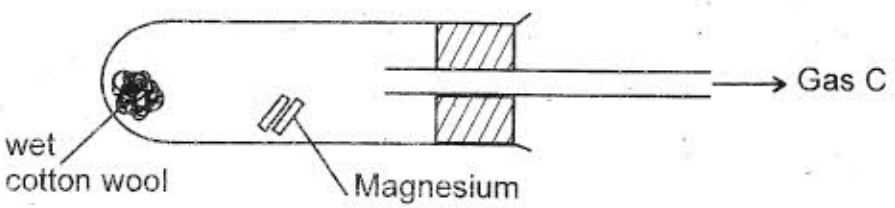
19. The fractional distillation of liquid air usually produces Nitrogen and Oxygen, as major products.

(i) Write the equation for the reaction that takes place in order to remove CO_2 from air before it is turned into liquid. (2 marks)

(ii) Describe how nitrogen gas is obtained from air (N_2 = -196°C, O_2 = -183°C) (2 marks)

20. Both methane and diamond have covalent bonds. Explain why methane is a gas whereas diamond is a solid at room temperature. (2 marks)

21. The diagram below shows how magnesium reacts with steam.



(i) Gas C would not be produced as is in the set-up but when certain condition is introduced, it's produced. Identify the condition which was omitted in the set up. (1 mark)

(ii) Describe how gas C is produced after the mistake was corrected in the above set up. (1 mark)

(iii) Why is it not advisable to use potassium in place of magnesium? (1 mark)

22. When lead (II) carbonate is reacted with dilute sulphuric (VI) acid, the reaction stops after sometime. Explain.

23. Determine the oxidation number of

(a) Manganese in $KMnO_4$ (1 mark)

(b) Sulphur in Na_2SO_3 (1 mark)

24. Explain why the melting point of halogens increase down the group. (2 marks)