

233/2

CHEMISTRY

Paper 2

THEORY

Time: 2 hours

**ALLIANCE GIRLS' HIGH SCHOOL
MOCK EXAM**

INSTRUCTIONS TO CANDIDATES

1. Answer **ALL** questions in the spaces provided.
2. Non-programmable, silent calculators and KNEC Mathematical tables may be used.
3. All workings **MUST** be clearly shown.

For Examiner's use only

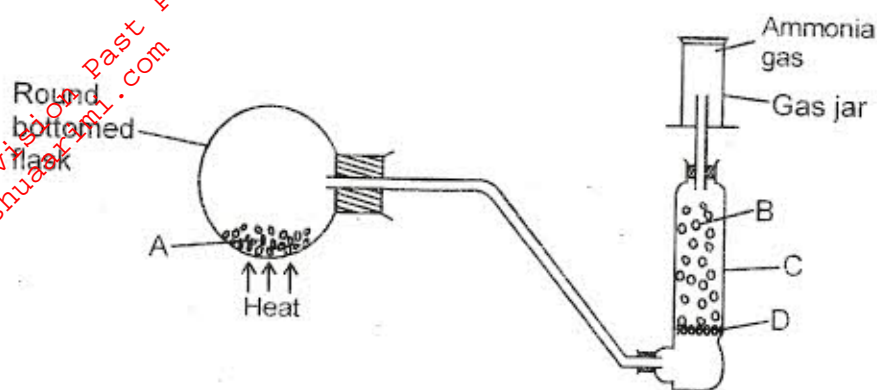
Questions	Maximum Score	Candidates Score
1	15	
2	15	
3	10	
4	15	
5	10	
6	15	
Total Score	80	

This paper consists of 10 printed pages.

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

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- I. The diagram below shows the apparatus used for the preparation of dry ammonia gas in the laboratory.



- (a) (i) Name the parts labelled (2 marks)

A

B

C

D

- (ii) State the method of collection of ammonia gas and explain the reason for this choice. (2 marks)

- (iii) In the preparation of ammonia gas, the common drying agent concentrated sulphuric acid is **not** used. Explain. (2 marks)

- (b) Platinum coil was heated strongly and held over a concentrated solution of ammonia in a beaker. Oxygen gas was then bubbled into the ammonia solution.

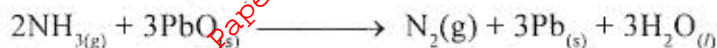
- (i) State what was observed. (1 mark)

- (ii) Explain the observation in (i) above. (2 marks)

- (iii) What is the role of platinum wire? (1 mark)

- (iv) Write equations for the reactions in (ii) above. (2 marks)

(c) Ammonia reacts with lead (II) oxide according to the equation below.



Calculate the volume of ammonia, that would be required to completely react with 25g of lead (II) oxide at room temperature (3 marks)

(Molar volume at r.t.p. = 24.0dm^3)

(Pb = 207, O = 16, N = 14, H = 1)

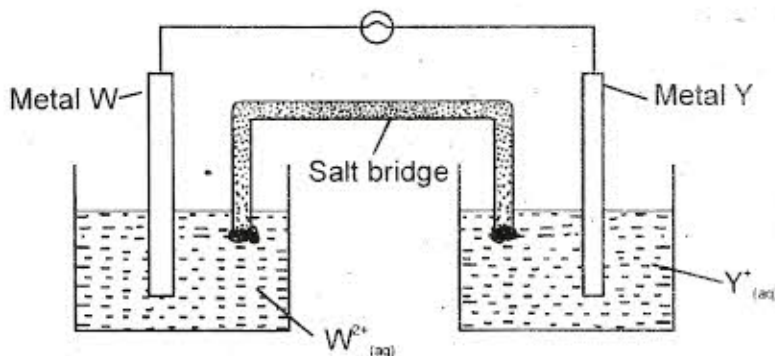
2. The table below gives reduction potential obtained when the half-cells for each of the metals represented by the letters V, W, X, Y and Z were connected to a copper half-cell as reference electrode.

Metal	Electrode Potential (volts)
V	-1.10
W	-0.47
X	0.00
Y	+0.45
Z	+1.16

(a) What is metal X likely to be? Give a reason. (2 marks)

(b) Which of the metals cannot be displaced from the solution of its salt by any other metals in the table above? Give a reason. (2 marks)

(c) Metals W and Y were connected to form a cell as shown in the diagram below.



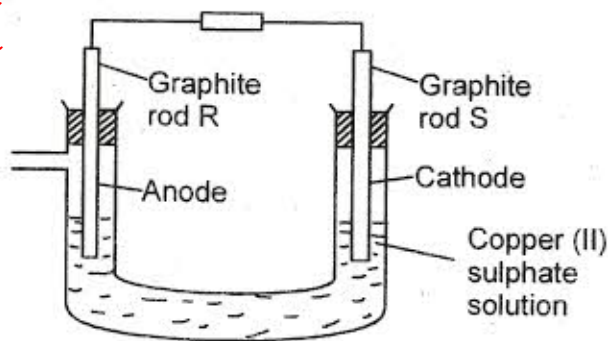
(i) Write the equations for the half-cell reactions that occur at:

I Metal W electrode (1 mark)

II Metal Y electrode (1 mark)

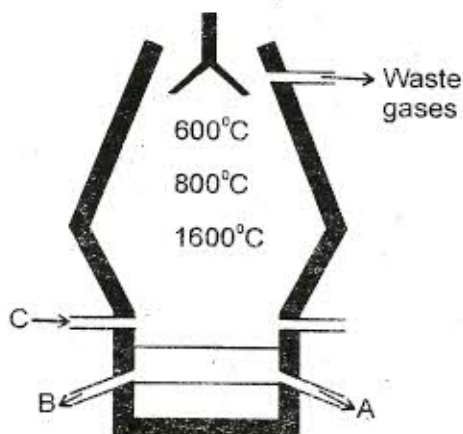
(ii) If the salt bridge is filled with saturated potassium nitrate solution, how does it help to complete the circuit? (2 marks)

- (d) When the electric current is passed through copper (II) sulphate solution for several hours as shown in the diagram below, a gas which relights a glowing splint is produced at electrode R.



- (i) Which of the electrodes is the cathode? Give a reason. (2 marks)
- (ii) Write an equation for the formation of the gas at electrode R. (1 mark)
- (iii) Apart from the observation made at electrode R, state and explain two other observations that would be made in the above cell. (4 marks)

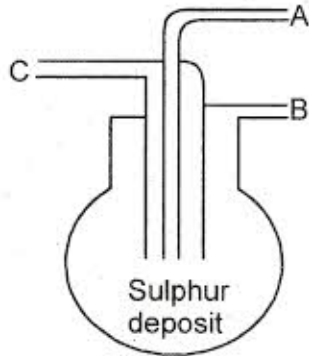
3. The diagram below shows the production of iron in the blast furnace.



- (a) Name the substances represented by;
- A..... (½ mark)
- B..... (½ mark)
- C..... (½ mark)
- (b) List down the raw materials in the process. (1½ mark)
- (c) (i) Name two gases present in the waste gases. (1 mark)
- (ii) Give one use of any one of the waste gas in the process. (1 mark)
- (d) Calcium carbonate is mixed with the iron ore. Give one use of the calcium carbonate. (1 mark)

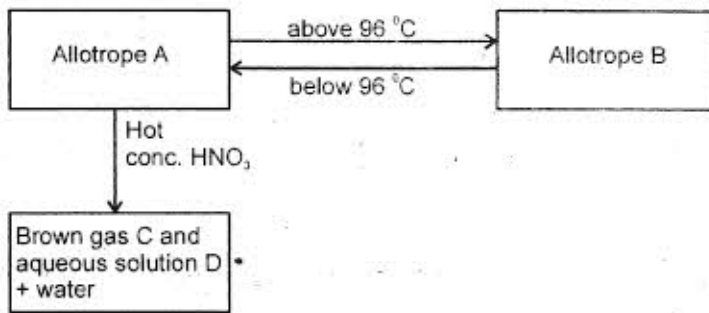
- (e) Write down equations for the main reactions in the regions with approximate temperatures of:
- (i) 1600°C (1 mark)
 - (ii) 800°C (1 mark)
 - (iii) 500°C (1 mark)
- (f) The iron produced contains 5% carbon. How can the percentage of carbon be reduced? (1 mark)

4. The diagram below shows the process of extraction of sulphur by frash process.



- (a) Name the materials which pass through the pipes (3 marks)
- A.....
- B.....
- C.....

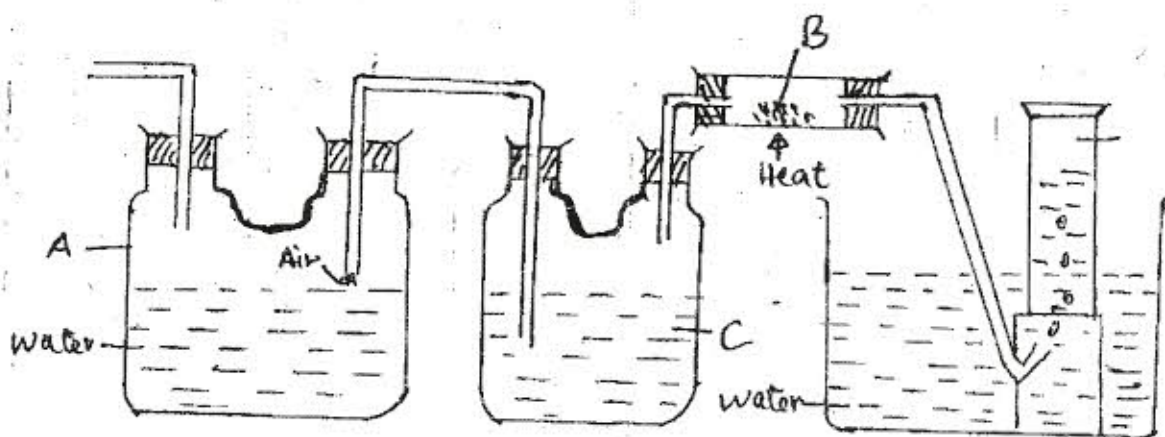
II. The flow chart below describes some chemical properties of allotropes of sulphur. Use it to answer the questions that follow.



- (a) Identify (4 marks)
- (i) Allotrope A
 - (ii) Allotrope B.....
 - (iii) Brown gas C.....
 - (iv) Aqueous solution D

- (b) Write a balanced chemical equation for the reaction between allotrope A and hot concentrated nitric (V) acid. (1 mark)
- (c) Allotrope A is mixed with iron filings and heated.
- (i) State the observation made. (1 mark)
- (ii) Name the product formed. (1 mark)
- (iii) Write a balanced equation of the reaction. (1 mark)
- (d) Explain the observation made if concentrated sulphuric (VI) acid is added to :-
- (i) Cane sugar (2 marks)
- (ii) Copper (II) sulphate crystals. (2 marks)
- (e) State two industrial uses of sulphuric acid. (2 marks)

5. The diagram below represents a set-up that was used to obtain nitrogen from the air. Study it and answer the questions that follow.



- (a) (i) Label the following. (2 marks)
- A
- B
- C
- (ii) What is the purpose of A, B and C? (3 marks)
- (iii) Write an equation for the reaction taking place in the combustion tube. (1 mark)

(iv) Name two impurities present in nitrogen obtained using this method. (1 mark)

(v) A burning piece of magnesium was inserted into a gas jar of nitrogen. State what was observed and write an equation for the reaction. (2 marks)

(vi) Nitrogen is an unreactive gas. Explain. (1 mark)

6. The table below shows some properties of chlorine, bromine and iodine.

Element	Formula	Colour and state at room temperature	Solubility in water
Chlorine	Cl_2	(i)	Soluble
Bromine	Br_2	Brown liquid	(ii)
Iodine	I_2	(iii)	Slightly soluble

(a) Complete the table by giving the missing information in (i), (ii) and (iii). (3 marks)

(b) Chlorine gas is prepared by reacting concentrated hydrochloric acid with manganese (IV) oxide.

(i) Write an equation for the reaction between concentrated hydrochloric acid and manganese (iv) oxide. (1 mark)

(ii) What is the role of manganese (iv) oxide in this reaction. (2 marks)

(c) (i) Iron (II) chloride reacts with chlorine gas to form substance E. Identify substance E. (1 mark)

(ii) During the reaction in c(i) above, 6.30g of iron (II) chloride were converted to 8.06g of substance E. Calculate the volume of chlorine gas used. ($Cl = 35.5$, Molar gas volume at room temperature = 24000cm^3 , $Fe = 56$) (3 marks)

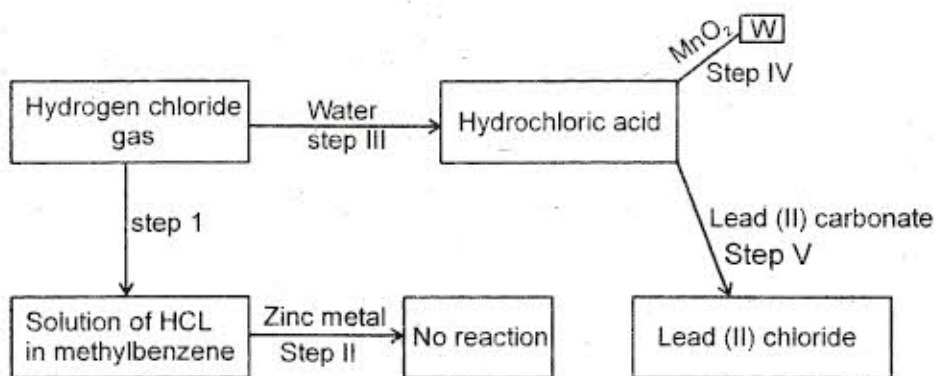
- (d) Draw and name the structure of compound formed when excess chlorine gas is reacted with ethene gas. (2 marks)

Structure:

Name:

- I Give one industrial use of chlorine. (1 mark)

- II Study the flow chart below and answer the questions that follow.



- (i) Write the equation for the formation of substance W. (1 mark)

- (ii) Explain why step (v) is not suitable for the preparation of lead (II) chloride. (1 mark)

- (iii) Explain why the solution HCl in methylbenzene will not react with zinc metal in Step (ii). (1 mark)