

NAME..... INDEX NO..... CLASS..... SIGN.....

GATUNDU SOUTH SUB-COUNTY
FORM FOUR 2014 EVALUATION EXAM

233/2

CHEMISTRY

PAPER II (THEORY)

JULY/AUGUST 2014

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

- Write your name and index number and class in the spaces provided above.
- Answer ALL questions in the spaces provided.
- Mathematical tables and electronic calculators may be used.
- All working must be clearly shown where necessary.
- Candidates may be penalized for not following the instructions given in this paper.

FOR EXAMINERS USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATES' SCORE
1	13	
2	9	
3	12	
4	10	
5	13	
6	10	
7	13	
TOTAL SCORE	80	

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

Q							R	S
T								U
V								Z

(i) Which element will require the least amount of energy to remove the outermost electron? (1 mark)

.....

(ii) Select the element that has the greatest tendency to form covalent bond (molecule with itself). Explain. (2 marks)

.....

(iii) What is the general name given to the family to which Q, T and V belong? (1 mark)

.....

(iv) An element W has atomic number of 15. Indicate its position on the grid. (1 mark)

.....

(v) The atomic radius of S is smaller than that of Z. Explain. (1 mark)

.....

(vi) Element T is less reactive than V. Explain. (1 mark)

.....

(vii) Write an equation to show the effect of heat on the nitrate of:

a) Potassium (1 mark)

.....

b) Silver

(1 mark)

b) Study the table below and answer the questions that follow.

Substance		A	B	C	D	E	F
Melting point ($^{\circ}\text{C}$)		801	119	139	-5	-101	1356
Boiling point ($^{\circ}\text{C}$)		1410	445	457	54	-36	2860
Electrical conductivity	Solid	Poor	Poor	Good	Poor	Poor	Poor
	liquid	Good	Poor	Good	Poor	Poor	Poor

(i) Select a substance with

a) Giant metallic structure

(1 mark)

b) Simple molecular structure

(1 mark)

c) Substance A and C conduct electric current in liquid state. Explain why the two differ in electrical conductivity in solid state. (2 marks)

2. Oxygen gas is prepared in the laboratory through the catalytic decomposition of hydrogen peroxide.

(i) Define a catalyst.

(1 mark)

(ii) Name the catalyst used in this reaction.

(1 mark)

(iii) Explain how the named catalyst affects the rate of reaction.

(1 mark)

(iv) Write the equation for the reaction that occurs.

(1 mark)

.....
.....
(v) What mass of hydrogen peroxide would be needed to produce 240cm^3 of oxygen gas at r.t.p (Molar gas volume at r.t.p = 24dm^3 H = 1 O = 16). (2 marks)

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.....
.....
.....
b).Oxygen gas was passed over heated copper metal.

(i) State the observation (1 mark)

.....
.....
(ii) State any two uses of oxygen gas. (2 marks)

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.....
3. Use the standard electrode potentials given below to answer the questions that follow.

	E (volts)
(i) $\text{Ag}^+_{(\text{aq})} + \text{e} \longrightarrow \text{Ag}_{(\text{s})}$	+ 0.80
(ii) $\text{Cu}^{2+}_{(\text{aq})} + 2\text{e} \longrightarrow \text{Cu}_{(\text{s})}$	+ 0.34
(iii) $\text{Pb}^{2+} + 2\text{e} \longrightarrow \text{Pb}_{(\text{s})}$	-0.13
(iv) $\text{Zn}^{2+} + 2\text{e} \longrightarrow \text{Zn}_{(\text{s})}$	-0.76

(a) Select two half cells which when combined give the lowest e.m.f. (1 mark)

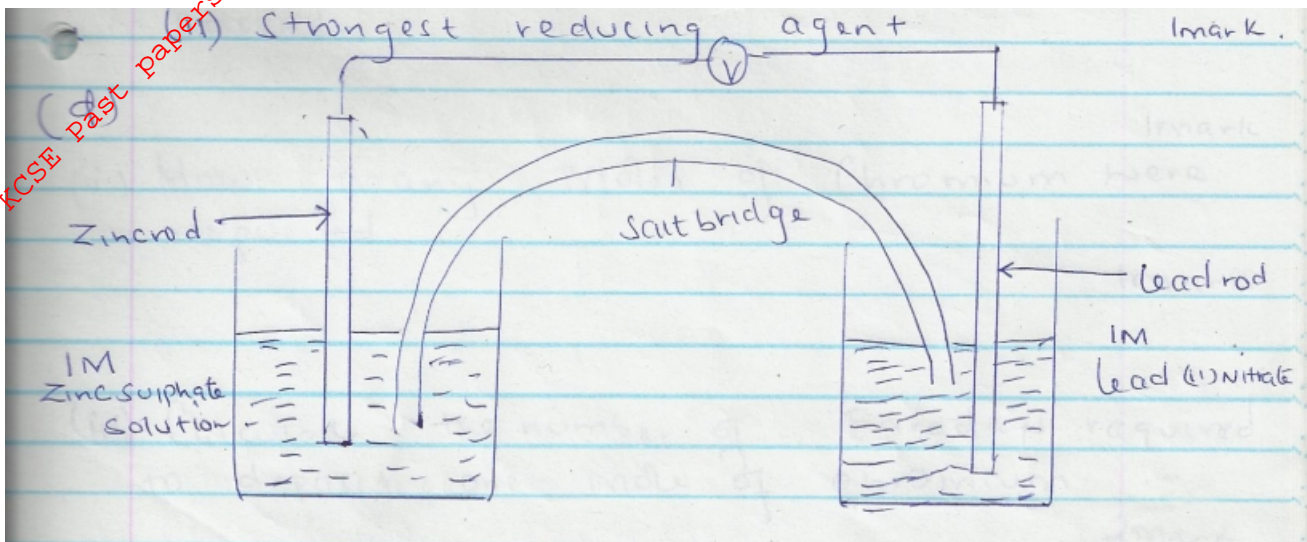
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(b) Calculate the e.m.f of the cell formed by combining the two half cells in (a) above. (1 mark)

.....
.....
(c) Select the
(i) Strongest oxidizing agent (1 mark)

(ii) Strongest reducing agent (1 mark)

.....
.....

d)



(i) Write the half equation for the half cell in which oxidation occurs. (1 mark)

.....
.....

(ii) Write the overall cell equation. (1 mark)

.....
.....

(iii) Give two functions of salt bridge. (2 marks)

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.....

e) A current of 0.75 amperes was passed through the solution for one hour and four minutes. The mass of chromium deposited on the electrode was 0.52g. (1 Faraday = 96500c Cr = 52)

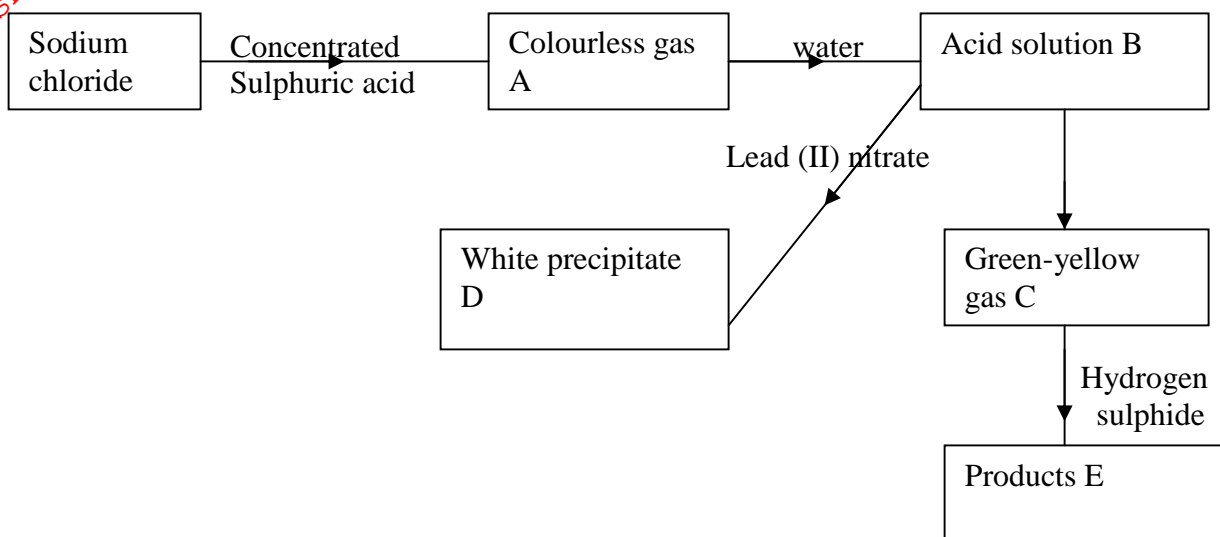
(i) Calculate the quantity of electricity passed. (1 mark)

.....
.....

(ii) How many moles of chromium were deposited? (1 mark)

.....
.....
(iii) Calculate the number of Faradays required to deposit one mole of chromium. (2 marks)

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.....
.....
4. The diagram below summarizes the results of a series of chemical reaction.



i) Name gas A (1 mark)

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.....
(ii) State how gas A can be tested. (1 mark)

.....
.....
(iii) Write the chemical equation for the formation of gas A. (1 mark)

.....
.....
(iv) What effect would solution B have on phenolphthalein indicator? (1 mark)

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.....
(v) Name reagent used to convert B to C. (1 mark)

(vi) Identify

(a) White precipitate D (1 mark)

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.....

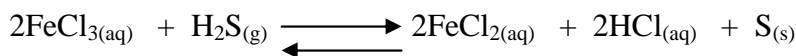
(b) Products E (1 mark)

.....
.....

(vii) Write ionic equation for the formation of white precipitate D. (1 mark)

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.....

(b) In a closed system, aqueous iron (iii) chloride reacts with hydrogen sulphide gas as shown in the equation below.



State and explain the observation that would be made if dilute hydrochloric is added to the system at equilibrium. (2 marks)

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5. a) Name the following compounds.

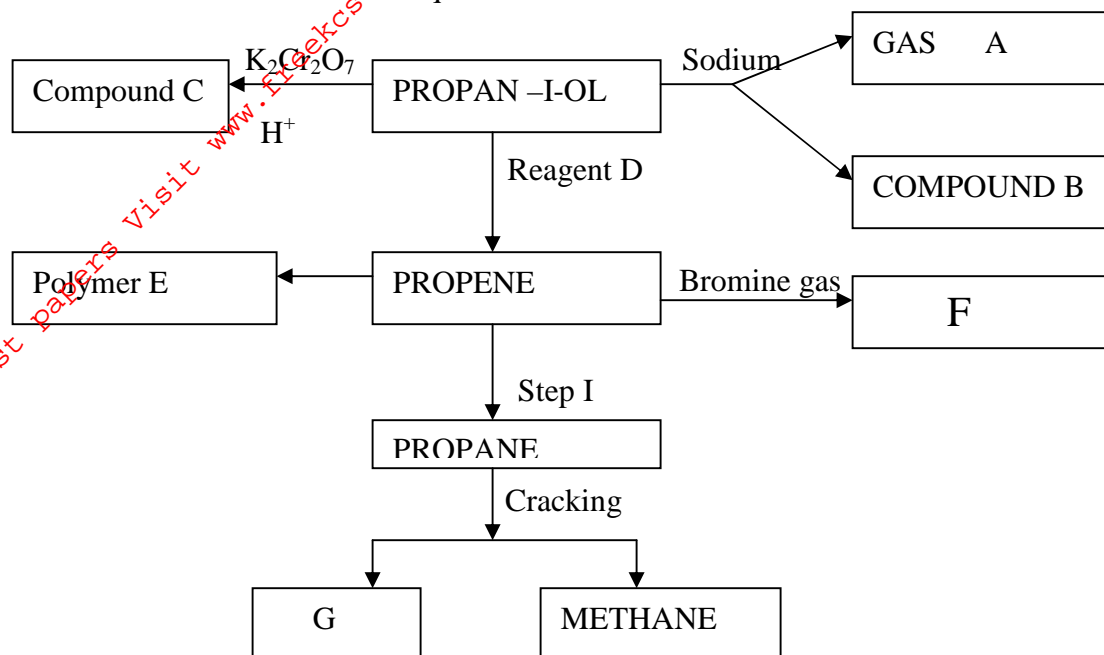
(i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ _____ (1 mark)

(ii) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{COOH}$ _____ (1 mark)

(iii) $\text{CH}_3\text{CH}_2\text{C}(\text{O})\text{C}(\text{O})\text{CH}_2\text{CH}_3$ _____ (1 mark)

(iv) $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$ _____ (1 mark)

B. Study the scheme below and answer the questions that follow.



(i) Identify the products.
 B _____ (1 mark)

F _____ (1 mark)

(ii) Name compounds
 C _____ (1 mark)

E _____ (1 mark)

(iii) State the conditions in step I (1 mark)

.....

(iv) Write the equation for the reaction leading to the formation of methane. (1 mark)

.....

(v) State one industrial use of methane. (1 mark)

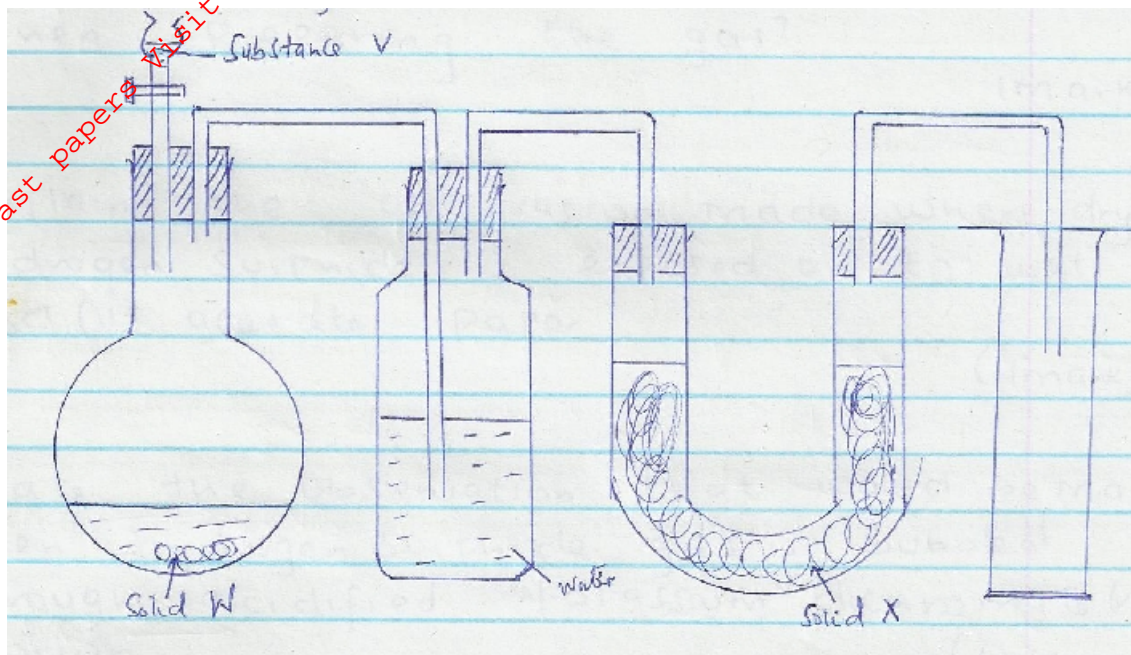
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(vi) Identify reagent D. (1 mark)

.....

(vii) Name the type of reaction in step I (1 mark)

6. The apparatus below was used for preparation of hydrogen sulphide gas in the laboratory.



a) Name

(i) Substance V _____ (1 mark)

(ii) Solid W _____ (1 mark)

(iii) Solid X _____ (1 mark)

b) Write an equation for the preparation of hydrogen sulphide. (1 mark)

.....
.....

c) What property of the gas enables it to be collected by the method shown in the diagram? (1 mark)

.....
.....

d) What is the purpose of the water in the second flask? (1 mark)

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.....

e) What precaution should be taken when preparing the gas? (1 mark)

.....
.....

f) Explain the observation made when dry hydrogen sulphide is exposed on to wet lead (ii) acetate paper. (1 mark)

g) State the observation that would be made when hydrogen sulphide gas is bubbled through acidified potassium dichromate (vi) solution. (1 mark)

h) Explain why it is not advisable to dispose off hydrogen sulphide gas by burning. (1 mark)

7. In an experiment to determine the rate of reaction, 0.2M hydrochloric acid was added to calcium carbonate powder in a conical flask. The volume of the gas evolved was recorded at regular intervals of 10 minutes. The results were tabulated as below:

Time (min)	0	10	20	30	40	50	60	70	80
Volume of gas cm ³	0	17	38	78	153	153	153	153	153

a) Draw a graph of volume of gas on the Y- axis and time on X-axis. (3 marks)

(i) On the same graph sketch the graph if:

I. 1M hydrochloric acid was used. (1 mark)

II. Calcium carbonate in mable chips form were used. (1 mark)

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

c) (i) Why did the reaction begin slowly and then proceed much faster after sometime. (2 marks)

(ii) Why did the volume remain constant after the 40th minute? (1 mark)

d) Calculate the rate of reaction during the first 40 minutes. (2 marks)

e) Calculate the mass of the gas evolved (C=12 O=16 1 mole of gas occupies 22.4dm³)

(2 marks)

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