

NAME ..... DATE .....

INDEX NO. .... SIGNATURE .....

233/2

CHEMISTRY

PAPER 2

(THEORY)

JULY/AUGUST, 2014

TIME: 2 HOURS.

## MAKINDU DISTRICT INTER – SECONDARY SCHOOLS EXAMINATION

*Kenya Certificate of Secondary Education.*

233/2

CHEMISTRY

PAPER 2

(THEORY)

TIME: 2 HOURS.

### INSTRUCTIONS TO CANDIDATES.

- Write your name and index number in the spaces provided above.
- Sign and write the date of exam in the spaces provided above.
- Answer **ALL** the questions in the spaces provided.
- Mathematical tables and silent electronic calculators may be used.
- All working **MUST** be clearly shown where necessary.
- This paper consists of 12 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

### FOR EXAMINER'S USE ONLY.

Questions	Maximum score	Candidates score
1	13	
2	12	
3	13	
4	10	
5	10	
6	12	
<b>Total score</b>	<b>80</b>	

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233/2  
Chemistry  
Paper 2 (Theory)

Turn over

1. The grid below shows part of the periodic table. Use it to answer the questions that follow. The letters do not represent actual symbols.

				S	U	V
P	R			T		W
Q						

- (a) Which of the elements has the highest atomic radius? Explain (2 Marks)

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 .....

- (b) Identify the most reactive non-metal. Explain (2 Marks)

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 .....

- (c) Give the electron configuration of: (2 Marks)

(i) Element S

.....  
 .....

(ii) Element Q

.....  
 .....

- (d) Compare the atomic radius of P and R. Explain (2 Marks)

.....  
 .....

- (e) Given that the atomic mass of W is 40. Write down the composition of its nucleus. (1 Mark)

.....  
 .....

- (f) Write the formula of the compounds formed between:

(i) Element P and S (1 Mark)

.....  
 .....

(ii) Element R and T (1 Mark)

.....  
 .....

- (g) Give the formula of one stable ion with an electron arrangement of 2.8 which is:

(i) Negatively charged (1 Mark)

.....  
 .....

(ii) Positively charged (1 Mark)

.....  
 .....



(1 Mark)

(iv) Calculate the  $E^{\theta}$  value of the electrochemical cell constructed in (iii) above

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(c) During electrolysis of aqueous copper (II) sulphate using copper electrodes, a current of 0.2 amperes was passed through the cell for 5 hours.

(i) Write an ionic equation for the reaction that took place at the anode (1 Mark)

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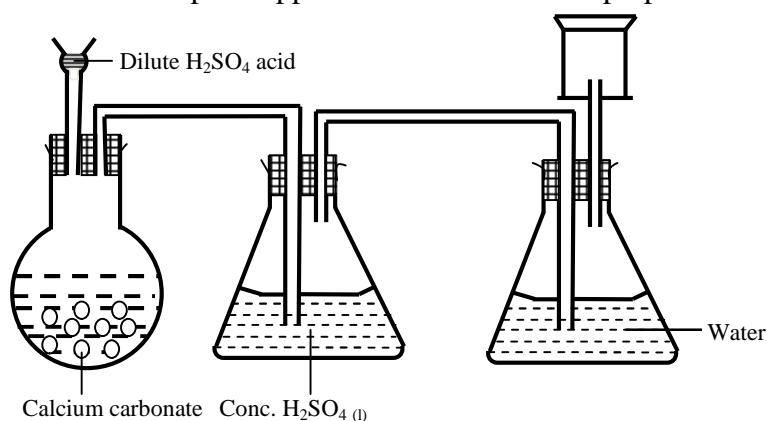
(ii) Determine the change in mass of the anode which occurred as a result of electrolysis. (1 mark)  
(Cu = 63.5, 1 Faraday = 96500C)

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3. A student set up the apparatus shown below to prepare and collect dry carbon (IV) oxide gas.



(a) State a correction for three mistakes in the set up above (3 Marks)

(i) .....

(ii) .....

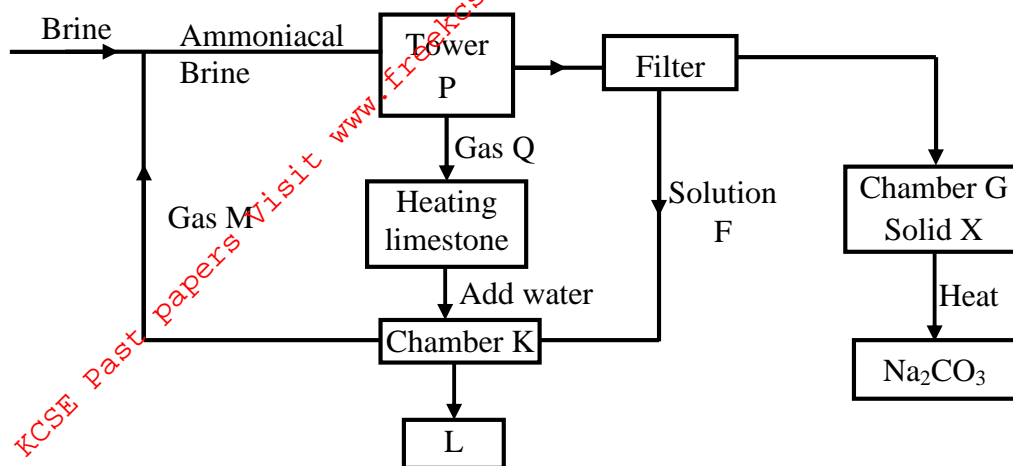
(iii) .....

(b) Give two reasons why carbon (IV) oxide is used as a fire extinguisher (1 Mark)

.....

.....

(c) The flow chart below is for the manufacture of sodium carbonate by the Solvay process. Use it to answer the questions that follow.



(i) Name gas M \_\_\_\_\_ (1 Mark)

Q \_\_\_\_\_

(ii) Name solution F and solid X (1 Mark)

F: \_\_\_\_\_

X: \_\_\_\_\_

(iii) Name the product L formed and give one of its uses (2 Marks)

.....  
 .....

(iv) Write equations of the reactions in (2 Marks)

Tower

.....

Chamber K

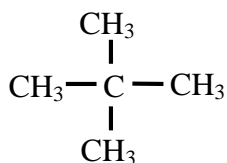
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(v) Name the two raw materials required in the manufacture of sodium carbonate (1 Mark)

.....  
 .....

4. (a) Give the names of the following compounds.

(i) (1 Mark)



.....

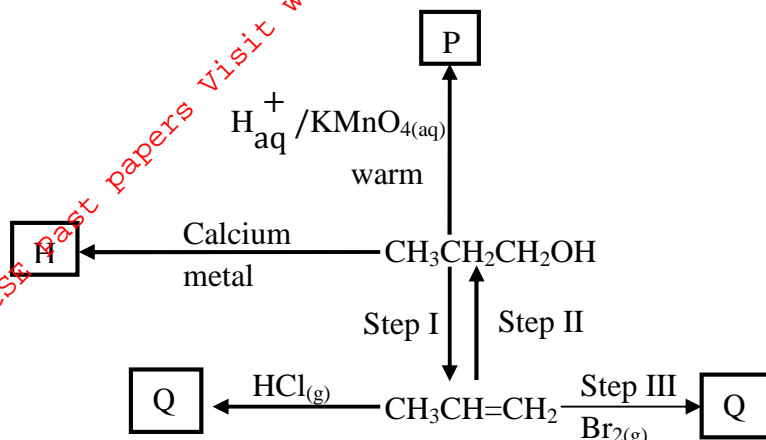
(ii)  $\text{CHC} \equiv \text{CCH}_2\text{CH}_3$  (1 Mark)

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 .....

(b) How would the compounds respond to acidified potassium manganate (VII) solution? (1 Mark)

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 .....  
 .....

(c) Study the scheme below and answer the questions that follow.



(i) Write an equation for the reaction between P and sodium hydroxide (1 Mark)

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 .....

(ii) Draw the structural formula of:

(a) H (1 Mark)

.....  
 .....

(b) P (1 Mark)

.....  
 .....

(iii) Give specific names for the processes taking place in:

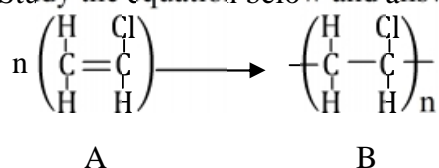
(a) Step II (1 Mark)

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 .....

(b) Step III (1 Mark)

.....  
 .....

(d) Study the equation below and answer the questions that follow:



(i) What type of reaction is represented by the equation. (1 Mark)

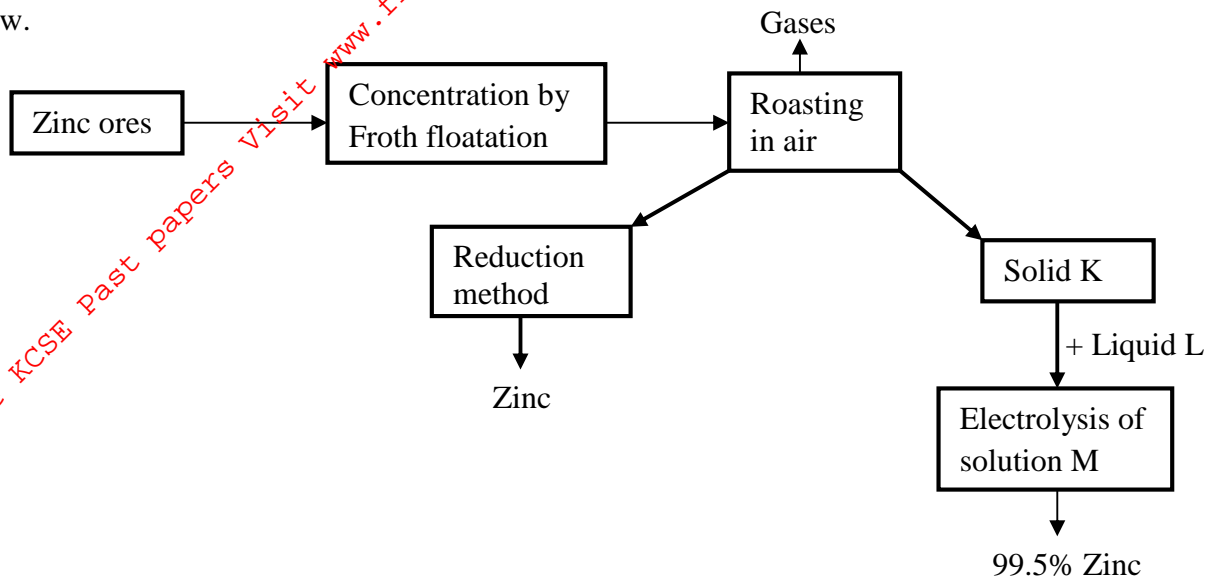
.....  
 .....

(ii) Give the name of the product, substance B formed

(1 Mark)

.....  
 .....

5. Study the following reaction scheme for the extraction of zinc metal and then answer the questions that follow.



(a) (i) Name two chief ores from which zinc can be extracted (2 Marks)

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 .....

(ii) Write the equations for the reaction that take place at the roasting chamber. (2 Marks)

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 .....

(b) (i) Name the reducing agents used in the reduction chamber. (1 Mark)

.....  
 .....

(ii) Write the equations for the reduction process to obtain zinc (2 Marks)

.....  
 .....

(c) Identify the following: (3 Marks)

Solid K \_\_\_\_\_

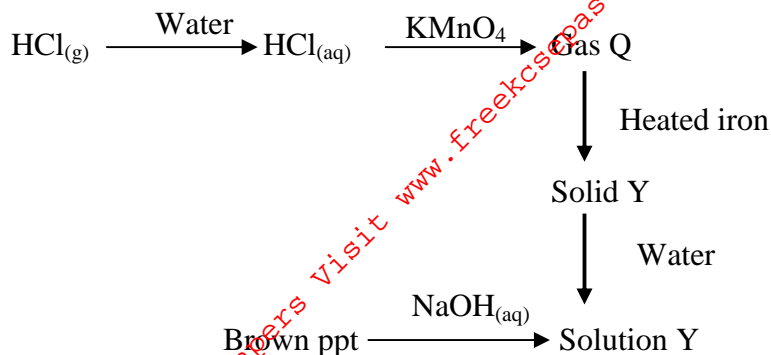
Liquid L \_\_\_\_\_

Solution M \_\_\_\_\_

(d) State two uses of zinc metal (1 Mark)

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 .....

6. (i) Study the flow chart below and answer the questions that follow.

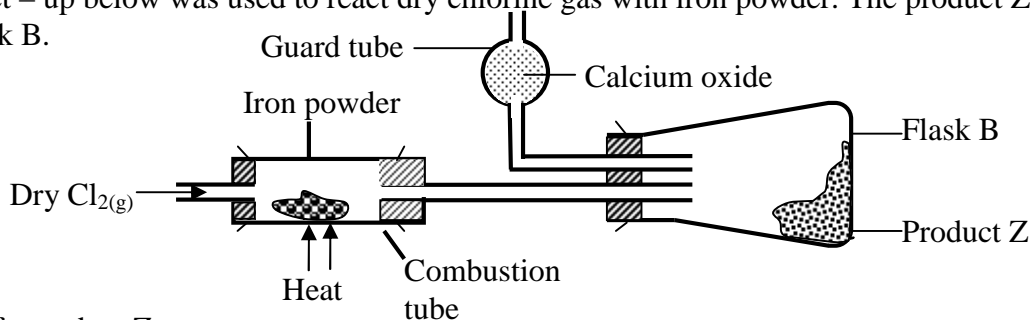


(a) Identify (i) Solid Y (½Mark)

(ii) Gas Q (½ Mark)

(b) Write an equation for the formation of the precipitate (1 Mark)

(ii) The set – up below was used to react dry chlorine gas with iron powder. The product Z was collected in flask B.



(a) Identify product Z. (1 Mark)

(b) What property of product Z makes it possible to be collected as shown in the diagram (1 Mark)

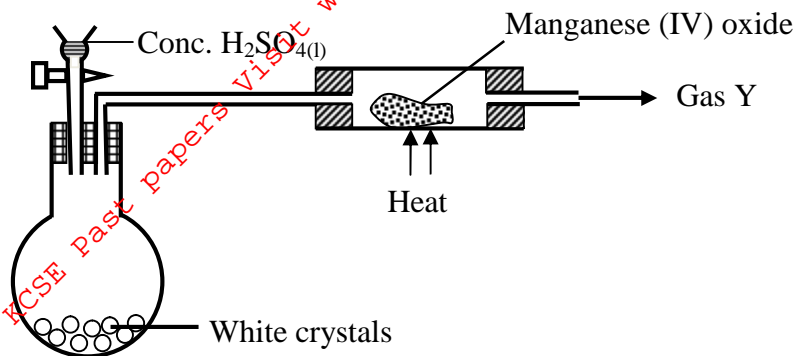
(c) Explain why calcium oxide would be preferred to calcium (II) chloride in the guard tube. (1 Mark)

(d) The total mass of product Z formed was found to be 0.5g. Calculate the volume of chlorine gas that reacted with iron. (Fe = 56, Cl = 35.5, M.G.V at 298k = 24000cm<sup>3</sup>) (3 Marks)



(iii) Concentrated sulphuric (VI) acid was added to white crystals as shown. The colourless gas P formed was passed over heated manganese (IV) oxide and a gas Y which bleached litmus paper was produced.

The experiment was repeated using powdered metal 2 instead of manganese (IV) oxide. This time a gas R which burned in air with a blue flame was formed.



(a) (i) Name gases

Y \_\_\_\_\_ (½ Mark)

R \_\_\_\_\_ (½ Mark)

(ii) What type of chemical reaction occurred between gas P and manganese (IV) oxide (1 Mark?)

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 .....

(iv) State two observations made when acidified potassium manganate (VII) solution is reacted with hydrogen sulphide. (2Marks)

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7. (a) Name each of the processes described below which takes place when salts are exposed to air for sometime.

(i) Anhydrous copper (II) sulphate becomes wet. (1 Mark)

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 .....

(ii) Common table salt forms an aqueous solution (1 Mark)

.....  
 .....

(iii) Fresh crystals of sodium carbonate  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  becomes covered with white powder of formula  $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$  (2 Marks)

.....  
 .....

(b) Write the formula of the complex ion formed in each of the reactions described below.

(i) Zinc metal dissolves in hot alkaline solution (1Mark)

.....  
.....

(ii) Copper hydroxide dissolves in excess ammonia solution (1Mark)

.....  
.....

(c) A hydrated salt has the following composition by mass. Iron 20.2%, Oxygen 23%, Sulphur 11.5% and water 45.3%. Its relative formula mass is 278

(i) Determine the formula of the hydrated salt. (3Marks)

(Fe = 56, S = 32, O = 16, H = 1)

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(ii) 6.9g of the hydrated salt was dissolved in distilled water and the total volume made to 250cm<sup>3</sup> of solution. Calculate the concentration of the salt solution in moles per litre. (2Marks)

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(d) Describe how a solid sample of lead (II) chloride can be prepared using the following reagents:- dilute nitric acid, dilute hydrochloric acid and lead carbonate. (3 Marks)

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