

NAME IDEX NO

Candidates signature

Date

GATUNDU SUB COUNTY FORM FOUR 2014 EVALUATION EXAM

233/1

CHEMISTRY

PAPER 1

(THEORY)

TIME; 2HRS

Instructions;

- Answer all the questions in the space provided
- Mathematical tables or electronic calculators may be used
- All working must be clearly shown where necessary
- Candidates may be penalized for not following instructions in this paper

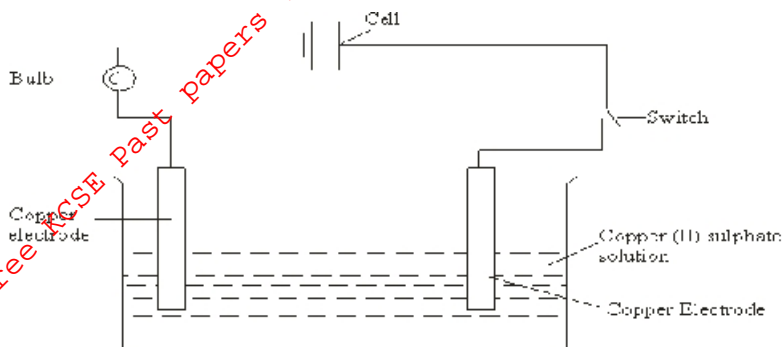
| QUESTION | MAXIMUM SCORE | CANDIDATES SCORE |
|----------|---------------|------------------|
| 1-28 | 80 | |

THIS PAPER CONSISTS OF 13 PRINTED PAGES

1. Describe how you can separate a mixture of solid copper (II) oxide and solid copper (II) nitrate (3marks)

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2. Study the set up below for the electrolysis of copper (II) sulphate solution using copper electrodes.



a. Write ionic equations for the reactions that took place at ;

i. Anode (½ mark)

..... (½ mark)

ii. Cathode (½ mark)

b. State the observation made at each electrode;

i. Anode (½ mark)

..... (½ mark)

ii. Cathode (½ mark)

c. State and explain the observations made on the electrolyte. (1mark)

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3.

i) A beekeeper used to apply little sodium hydrogen carbonate to relieve pain when stung by bees. Explain (2marks)

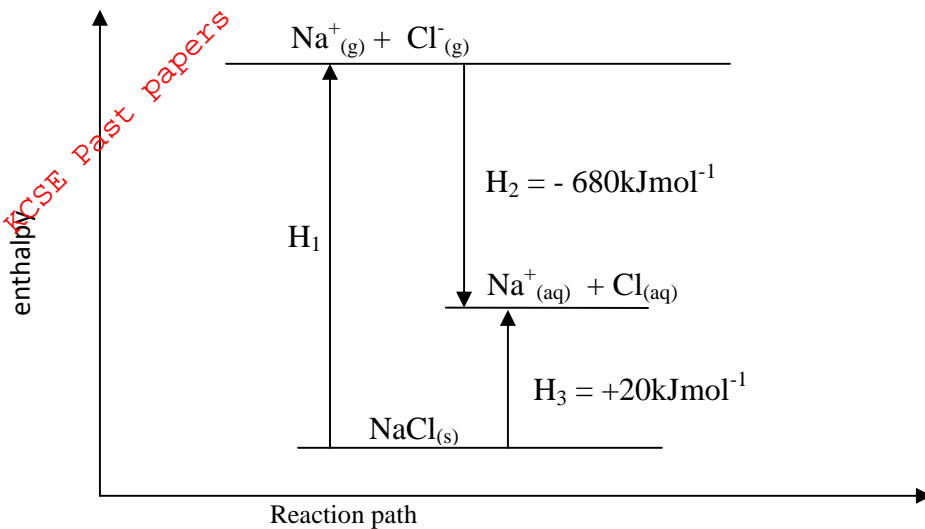
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ii) why would it not be advisable to use sodium hydroxide instead of sodium hydrogen carbonate. (1mk)

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4. Study the diagram below which shows an energy level diagram.



i. Name enthalpy

(1½ mark)

H₁

H₂

H₃

ii. Calculate the H₁ from the energy level diagram

(1½ mark)

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5. Gas X is highly soluble in water. Gas Y is completely insoluble in water. Describe how you would obtain a sample of gas Y from a mixture of gases X, Y and water vapour.

(3mks)

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6. Study the standard electrode potentials in the table below and answer the questions that follow. The letters are not the actual symbols of the elements.

| | | | |
|---------------------|----------------------|-----------|--------|
| $M^+_{(aq)} +$ | \rightleftharpoons | $M_{(s)}$ | + 0.80 |
| $N^+_{(aq)} +$ | \rightleftharpoons | $N_{(s)}$ | - 2.90 |
| $P^{2+}_{(aq)} + 2$ | \rightleftharpoons | $P_{(s)}$ | - 0.40 |
| $Q^{2+}_{(aq)} + 2$ | \rightleftharpoons | $Q_{(s)}$ | - 0.76 |

(i) Select from the table the strongest reducing agent. Give a reason for your answer. (1mark)

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(ii) When Q rod is dipped into a solution of P ions, write the ionic equations of the reaction that occurs.

(1mark)

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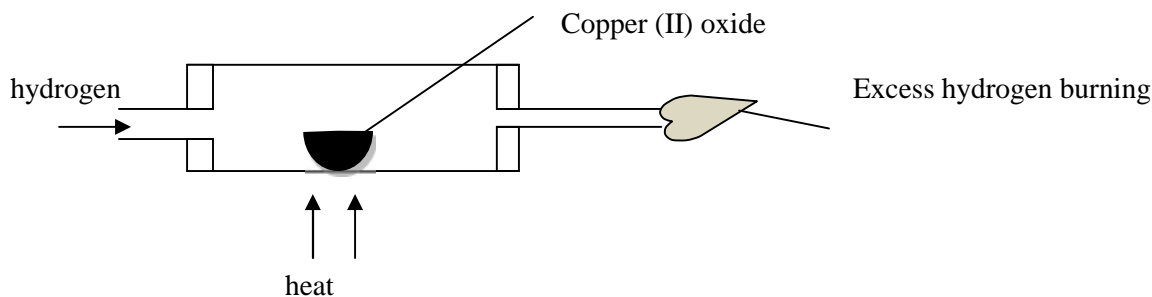
(iii) Calculate the E value for the above reaction (1mark)

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7. Study the diagram below and answer the questions that follow;



a) State and explain the observation made

i) in the combustion tube.

(1mk)

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b) write the equation for the reaction when hydrogen burns in air

(1mk)

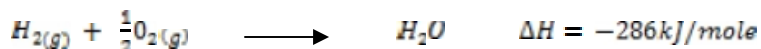
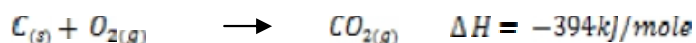
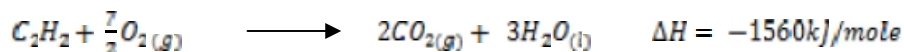
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c) After the experiment is over, the stream of hydrogen should be continued to be passed over heated oxide of copper until it cools explain.

(1mk)

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8. Use the thermochemical equations below to answer the questions that follow.



Calculate the enthalpy of formation of ethane.

(3 marks)

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9. A piece of burning magnesium ribbon was lowered in a gas jar full of chlorine;

a) State and explain the observation made.

(1mk)

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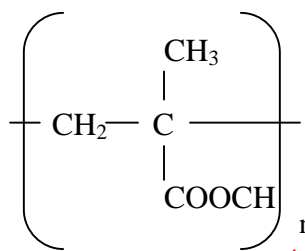
b) Magnesium ribbon is first polished before the reaction starts, give a reason (1mk)

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c) Give a reason why calcium does not readily react with chlorine gas when heated (1mk)

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10. Perspex is a synthetic polymer of formula;



(a) Write the structural formula of the monomer of Perspex. (1 mark)

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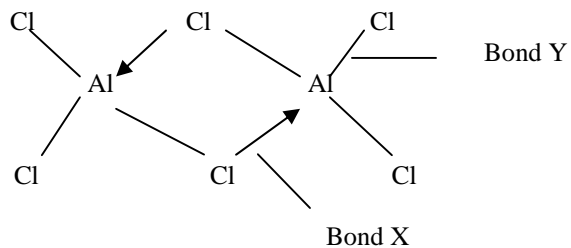
(b) State the type of polymerization involved in the formation of Perspex. (1 mark)

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(c) Give one use of Perspex. (1 mark)

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11. Below is a structure of aluminium chloride dimer. Study it and answer the question that follow

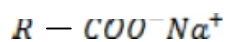


Identify bond

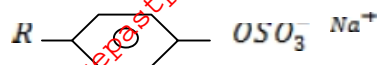
X (1mk)

Y (1mk)

12. The structures below represent two cleaning agents M and P.



M



P

Which cleaning agent would be most suitable for use with water containing calcium sulphate? Give a reason.

(2marks)

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13. Starting with copper powder describe how copper (II) carbonate can be prepared

(3marks)

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14. When potassium nitrate is heated, it produces potassium nitrite and gas C.

(a) Identify gas C.

(1 mark)

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(b) Name the type of reaction undergone by the potassium nitrate.

(1 mark)

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15. Draw a well labeled diagram to show a set up that can be used to electroplate a copper ring with a silver coat.

(3mks)

16. 30cm^3 of Hydrogen gas diffuse through a porous plug in 120 seconds. How long will 150cm^3 of hydrocarbon gas of molecular mass 72 take to diffuse through the same plug under same conditions? (H = 1, C = 12). (2marks)

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17. (i) Define solubility. (1 mark)

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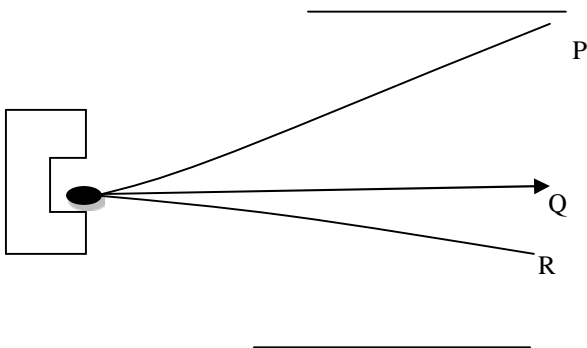
(ii) Salt X has a solubility of $30\text{g} / 100\text{g}$ of water. 60g of salt X is stirred in 65g of a solution which contains 10g of salt. Determine the amount of the salt that remained undissolved. (2marks)

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18. A compound X is made of carbon, hydrogen and oxygen whose percentage composition by mass are 62.1% , 10.3% and the rest oxygen respectively. The relative molecular mass of X is 58 (H = 1, O = 16, C = 12) Determine the molecular formula of the compound. (3 marks)

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19. The diagram below shows three radiations from an element x subjected through an electric field



a) Identify the radiations P, Q and R.

(1½ marks)

P.....
Q.....
R.....

ii. Why is Q not deflected along the electric field?

(1 mark)

b) Give one use of Q

(½ mark)

20. Study and complete the table below;

(3mks)

| Alloy | Composition | Properties | Uses |
|-----------------|---------------|--------------------------------------------|-------|
| Brass | Zinc | harder than pure metal golden in colour | |
| Bronze | Tin | Harder than pure metal | |
| Stainless steel | Iron | Tough Does not corrode | |

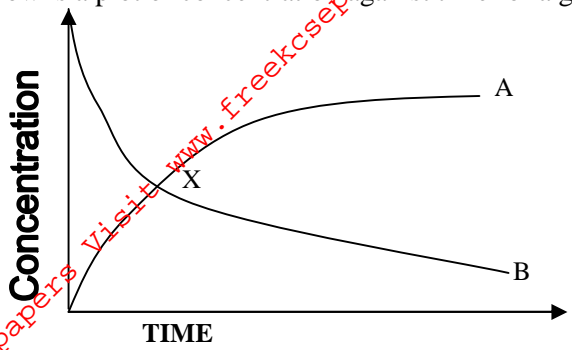
21.

Aqueous hydrogen chloride reacts with potassium manganate (VII) to produce chlorine gas, while a solution of hydrogen chloride in acetone (C₃H₆O) has no effect on potassium manganate (VII) solution. Explain this observation.

(2mks)

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22. The graph below is a plot of concentration against time for a given reaction.

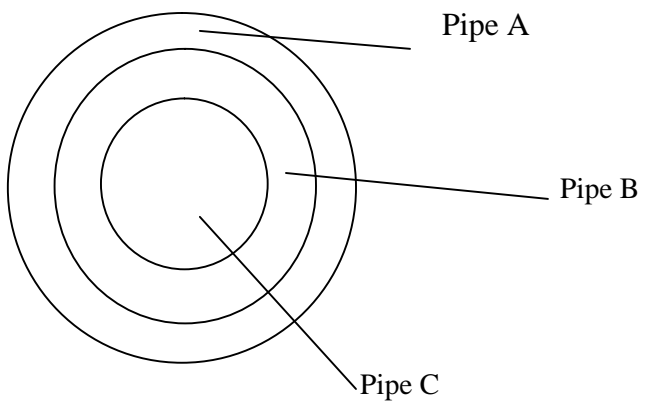


- a) What is represented by curve A? Explain. (1mk)

- b) Explain why curve B drops fast initially. (1mk)

- c) What does point X represent on the graph? (1mk)

23. The diagram below represents a cross section of concentric pipes used in the Frasch process to extract sulphur.



State what passes through pipes; (3marks)

A

B

C

24.

a) Define allotropy. (1mk)

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b) Explain why graphite conducts electricity while diamond does not. (2mks)

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25. A farmer has three plots each measuring 0.25 acre . He applied nitrogenous fertilizers as follows

- Plot A 250 kg of ammonium phosphate
- Plot B 250 kg of urea $\text{CO}(\text{NH}_2)_2$
- Plot C 250 kg of ammonium nitrate

Which plot received the highest nitrogen content? (3marks)

H=1, N= 14, O= 16, P= 31, C=12,

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26.

a) Draw the following organic compounds; (2mks)

(i) 2,2,3-trimethylpentane

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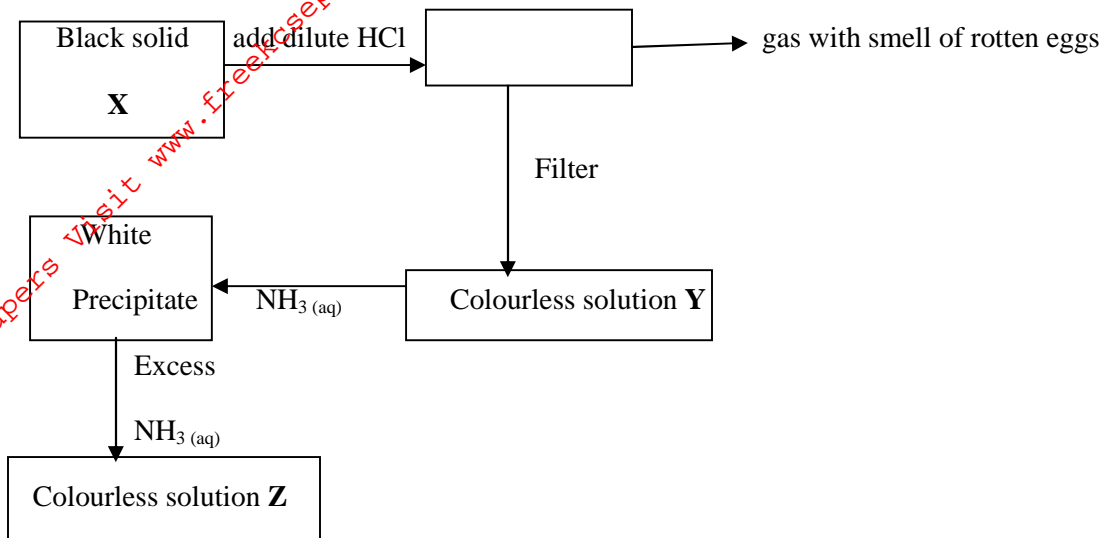
(ii) 2,3-dimethylbut-2-ene

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b) Draw and name the chain isomer of the compound in a)(ii) above. (1mk)

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



a) Identify;
 i) Solid **X** (1mk)

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ii) The white precipitate (1mk)

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b) Write the formula for the complex ion in solution **Z**. (1mk)

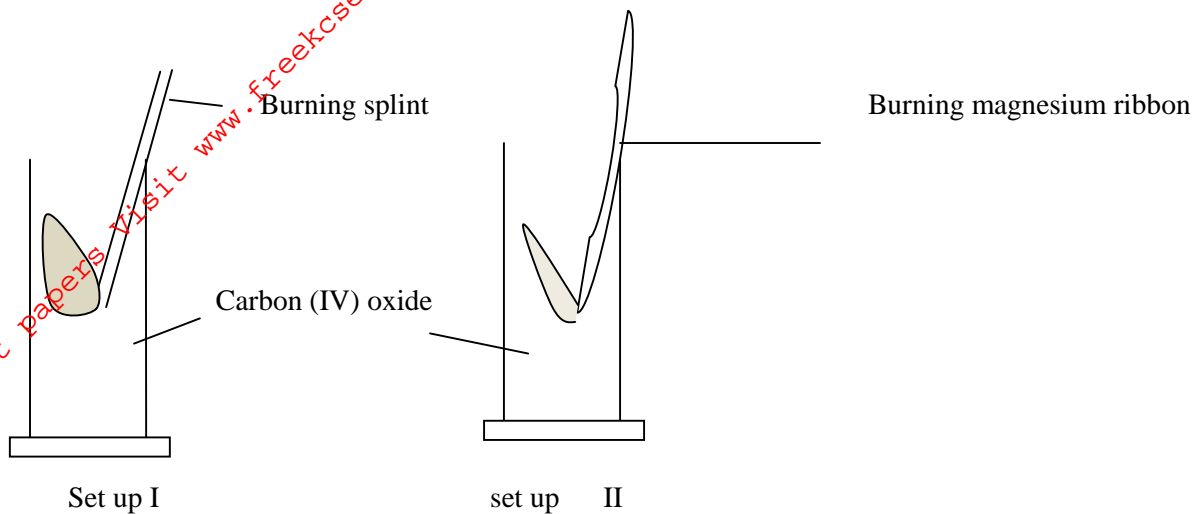
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28. A burning wooden splint and a burning magnesium ribbon were lowered in gas jars full of carbon (IV) oxide separately as shown below;



State and explain the observations made in

a) Set up (I)

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..... (1½mks)

b) Set up (II)

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..... (1½mks)