ÉcoleBooks

NAME ………………………………………INDEX NO …………………………….

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Date …………………………………

233/1

CHEMISTRY

PAPER 1

(THEORY)

JULY/AUGUST 2019

TIME: 2 ¼ HRS

GATUNDU SOUTH JOINT EXAM   Kenya

Certificate of Secondary Education

CHEMISTRY PAPER 1

Instructions to candidates

1. Answer ALL questions in the spaces provided in the question paper
2. Electronic calculators and mathematical tables may be used
3. All working must be clearly shown where necessary
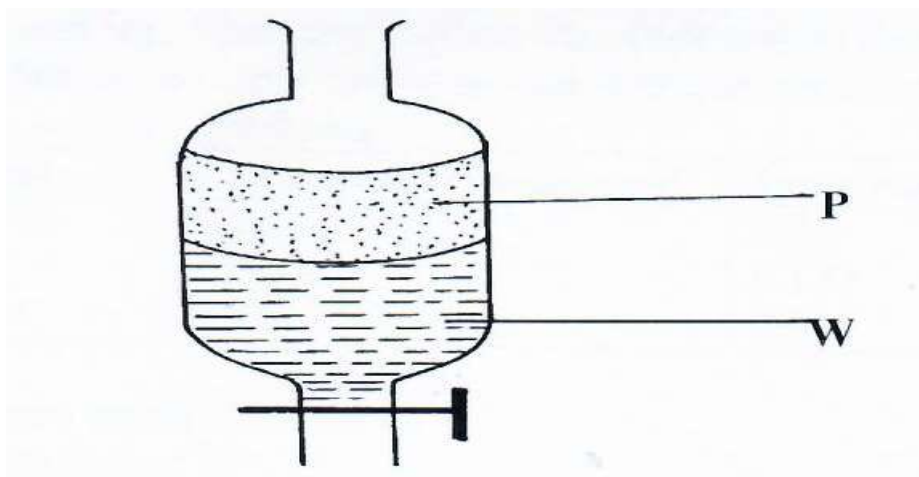4. Answer the questions in English

For Examiner's use only

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1-29		

TOTAL SCORE		

1. A mixture of hexane and water was shaken and left to separate as shown in the diagram below:

State the identity of;
   (i)   **P** ………………………………..………………
   (ii)   **W** …………………………….………………. (2mks)

2. Copper (II) oxide and charcoal are black solids. How would you distinguish between the two solids? (2mks)
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3. Cooking oils comprise of a mixture of compounds which have a boiling point range of $23^{\circ}C$ to $27^{\circ}C$.
(i) What evidence is then to support the statement that cooking oil is a mixture? (1mk)
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(ii) Name another experimental technique that could be used to confirm your answer in part **(i)** above. (1mk)

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4. State two uses of hydrogen gas that are also uses of carbon (II) oxide gas. (2mks)

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5. The setup below was used to investigate the reaction between metals and water.
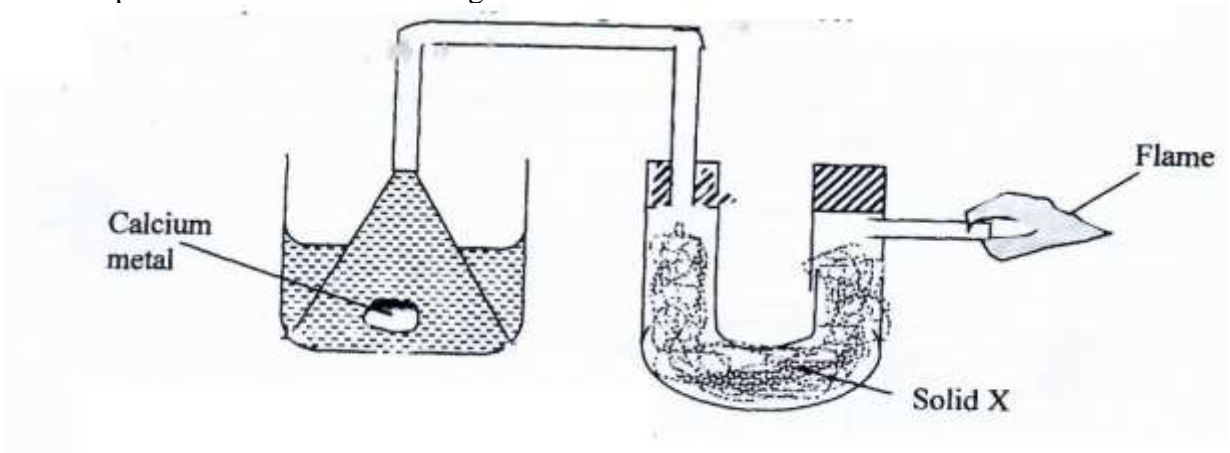
Identify solid **X** and state its purpose

Solid X …………………..……………………………………………………………….. (1mk)

Purpose …………………………………………………………………………………….. (1mk)

6. (a) Explain why aluminium is a better conductor of electricity than magnesium (2mks)

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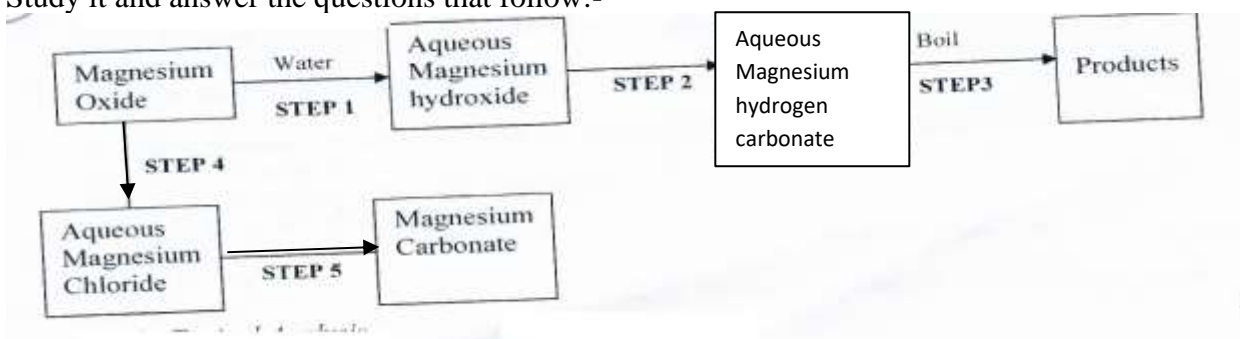
(b) Other than cost and ability to conduct, give a reason why aluminium is used for making cables while magnesium is not (1mk)

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7. Differentiate between the bleaching effect of chlorine and sulphur (IV) oxide gases. (2mks)

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8. . (a) The scheme below shows some reactions starting with magnesium oxide.
    Study it and answer the questions that follow:-

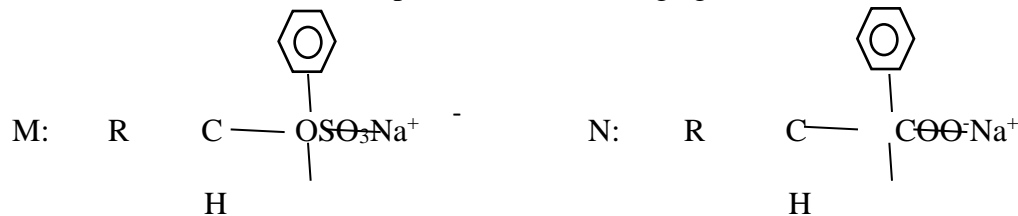(i)   Name the reagents used in **steps 2 and 4**   (2mks)
      Step 2……………………………………………………………………………………

      Step 4…………………………………………………………………………………….

(ii) Write an equation for the reaction in **step 2**   (1mk)

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(iii) Describe how a solid sample of anhydrous magnesium carbonate is obtained in **step 5**
                                                                                    (2mks)
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9.   The formula below represents two cleaning agents M and N.

M: R   C —— $OSO_3^-Na^+$ N: R   C —— COO^-Na^+

         H   H

a) Identify the one that would be suitable to use with water containing calcium ions. Explain. (2mks)

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b) Identify the one that has a longer pollution effect. (1mk)

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10. (a) State Graham's Law of diffusion. (1mk)

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(b) 240cm^3 of oxygen diffused through an orifice in 100 seconds. How long will it take 300cm^3 of sulphur (IV) oxide to diffuse through the same orifice? (S = 32, O = 16)(3mks)

11. A hydrated salt has the following composition by mass. Iron 20.2 %, oxygen 23.0%, sulphur 11.5%, water 45.3%. Determine the formula of the hydrated salt (Fe=56, S=32, O=16, H=1). (3mks)

12. When propane is passed over heated broken porcelain, it decomposes into ethane and methane.

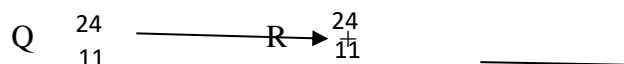   (a)   What name is given to this type of reaction? (1mk)

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    (b)   State one application of this reaction. (1mk)

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    (c)   Name a reagent that can be used to differentiate ethane and methane. (1mk)

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13. (a)   Complete the nuclear equation below. (1mk)

$$Q\ {}^{24}_{11} \longrightarrow R\ {}^{24}_{11} \underline{\hspace{2cm}}$$

    (b)   It was found that only $^{1}/_{32}$ of radioactive compound ${}^{131}_{53}I$ was remaining after a period of 150 days; determine the length of the half-life. (2mks)

14. The diagrams below represent two allotropes of Sulphur. Study them and answer the questions which follow:-
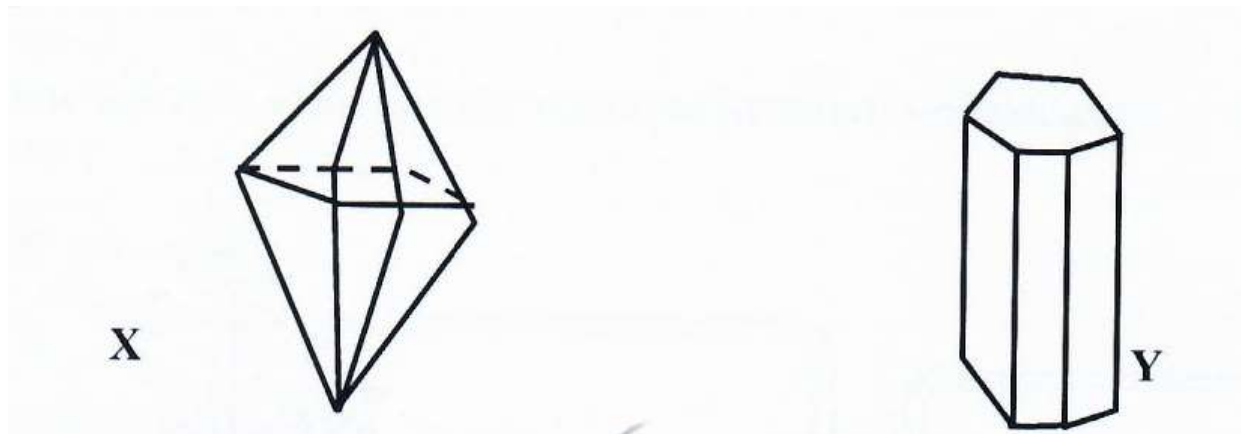
(i)   Name the **two** allotropes labelled **X** and **Y.**   **(1mk)**

   X ....
   Y ....

(ii)   Explain why a piece of burning magnesium continues to burn in a gas jar of Sulphur (IV)
        Oxide.   (2mks)
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15. Describe how you would prepare a dry sample of crystals of potassium sulphate starting with
     $100cm^3$ of 1M sulphuric (VI) acid.   (3mks)

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16. The solubility of potassium nitrate in water at 70^oc is 155g/100g H_2O while at 20^oc, the
     solubility is 31g/100g water. 50g of a saturated solution of potassium nitrate at 70^oc was
     cooled to 20^oc, calculate the mass that crystallized out.   (2mks)
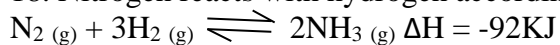
17. Bond energies for some bonds are tabulated below:-

BOND	BOND ENERGY KJ/mol
H-H	436
C=C	610
C-H	410
C-C	345

Use the bond energies to estimate the enthalpy for the reaction.   (3mks)

$$C_2H_{4\,(g)} + H_{2\,(g)} \longrightarrow C_2H_{6\,(g)}$$
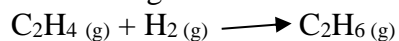
18. Nitrogen reacts with hydrogen according to the equation below:-

$N_{2\,(g)} + 3H_{2\,(g)} \rightleftharpoons 2NH_{3\,(g)}$ ΔH = -92KJ

How would the yield of ammonia be affected by increase in:-

i) Pressure   (1mk)

ii) Temperature   (1mk)

19. In an electrolysis, a current of 200A was passed through molten oxide of metal **Q** for 58 minutes and 64.8g of the metal deposited. Determine;
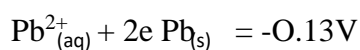
i)   Charge on metal **Q.** (RMM of Q = 27)   (1mk)

ii) The volume of oxygen gas produced at standard temperature and pressure
   IF = 96500C, molar gas volume s.t.p. =22.4dm^3. (2mks)

20. . Consider the reduction potentials below.

   $Pb^{2+}_{(aq)}$ + 2e $Pb_{(s)}$ = -O.13V

   $Mg^{2+}_{(aq)}$ + 2e $Mg_{(s)}$ = -O.76V

a) Write the overall Redox reaction that takes place when the above half cells are connected.
   (1mk)

b) Determine the Eθ value of the above cell. (2mks)

21. (a) CFCs have become a big pollution concern this days, what are CFCs. (1mk)
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   …………………………………………………………………………………………………
(b) State two examples of substances that contain CFCs. (1mk)
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(c) State one negative effect of CFCs. (1mk)
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   …………………………………………………………………………………………………

22. The set-up below was used to investigate reaction between copper (II) oxide and ammonia gas
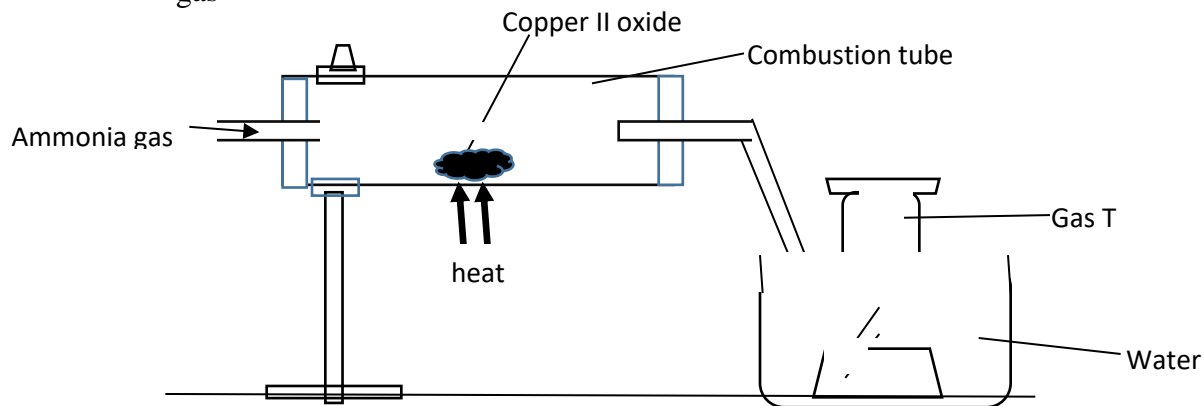
a) Identify gas T   (1mk)

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b) Write an equation for the reaction that took place in the combustion tube.   (1mk)

c) State the observation made in the combustion tube.   (1mks)

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23. a) Name the process by which propanol is converted to propanoic acid.   (1mk)

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b) Explain why solubility of propanol is higher than that of propane.   (2mks)

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24. Study the set up below and answer the questions

Flame

Bunsen burner
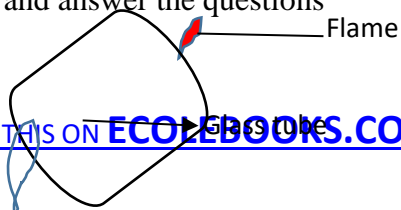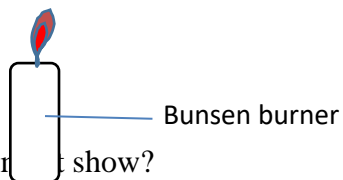
i) What does the experiment show? (1mk)

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ii) Name the type of flame shown above (1mk)

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iii) Name one characteristic of the flame (1mk)

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25. a) Sodium chloride dissolves in water to give a neutral solution but aluminium chloride dissolves in water to form Acidic solution. Explain. (2mks)

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b) Aluminium (III) chloride has a relative formula mass of 267 when in gaseous state. Explain (1mk)

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26. Write the electronic arrangement of sulphur in the following: (s=16) (3mks)
i) SO_3^{2-}

ii) SO_3

27. a) What is an acid base indicator. (1mk)

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b) Explain why universal indicator may be preferred to acid base indicator. (2mks)

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28. In the very cold countries, salts are sprinkled on the roads during winter.
   i) Explain why this is important. (1mk)

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ii) Give one negative effect of this. (1mk)

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29. Chlorine gas reacts with cold dilute sodium hydroxide to form a bleaching agent W.

    a) Write the formula of the substance W   (1mk)

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    b) Write an equation to show how substance W bleaches.   (1mk)

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