KCSE TRIAL 2019

CHEMISTRY PAPER 1 QUESTIONS

1. a) What do you understand by the term radio isotope? (1 mark)

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   b) A radio isotope Y decays by emitting one alpha particle and one beta particle to form $^{207}_{81}$. Determine the atomic number and mass number of Y. (Y is not the actual symbol of the element) (2 marks)

2. a) In the equation of the reaction below select an oxidizing agent. Give a reason for your answer.

   $$MnO_{4(aq)}^{-} + Fe_{(aq)}^{2+} + 8H_{(aq)}^{+} \rightarrow Mn_{(aq)}^{2+} + Fe^{3+}{}_{(aq)} + 4H_2O_{(l)}$$

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   b) State the observation that would be made in the reaction above.
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3. Using a chemical test describe how one would distinguish between sodium sulphite and sodium sulphate ……
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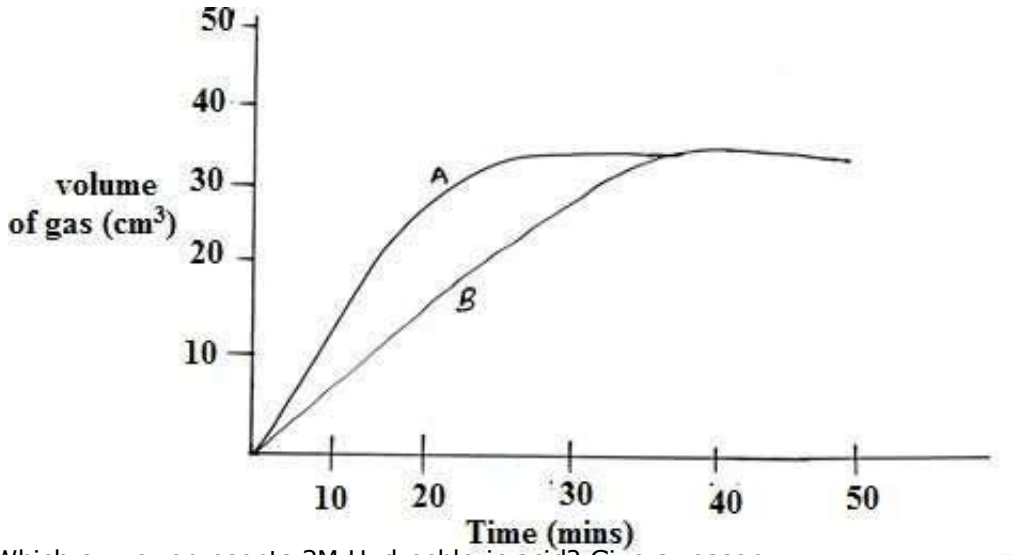
4. The graph below is the result of an experiment for the reaction between cleaned magnesium ribbon and different equal samples of dilute 2 M hydrochloric acid and dilute 2 M ethanoic acid.



   a) Which curve represents 2M Hydrochloric acid? Give a reason.

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   b) Give a reason why the two graphs level at the same time.

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5. Give the systematic name of the following organic compounds.

i. $CH_3CH\underset{\underset{CH_3}{|}}{C}CH_2CH_3$ (1 mark)

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ii. $CH_3C(CH_3)_3$ ……(1 mark)

6. (i) State Graham's Law of diffusion. (1 mark)

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(ii) It takes 30 minutes for nitrogen gas to diffuse through a membrane. How long will it take an equal volume of Carbon (iv) oxide to diffuse through the same membrane. (N=14,C=12,O=16) (2 marks)

7. a) Sulphur has two main allotropes. a) Define the term allotropy.

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b) State the observations that would be made when a sample of solid sulphur is heated till it boils.

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8. By use of an energy cycle diagram use the equation for the reactions below to determine the heat of formation of ethane.

$$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)} \Delta H_C = -394kJMol^{-1}$$

$$H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(l)} \Delta H_C = -286kJMol^{-1}$$

$$C_2H_{6(g)} + \frac{7}{2}O_{2(g)} \rightarrow 2CO_{2(g)} + 3H_2O_{(l)} \Delta HC_C = -1560kJMol^{-1}$$

9. Starting with solid zinc oxide, describe fully how you would obtain a dry sample of zinc carbonate.

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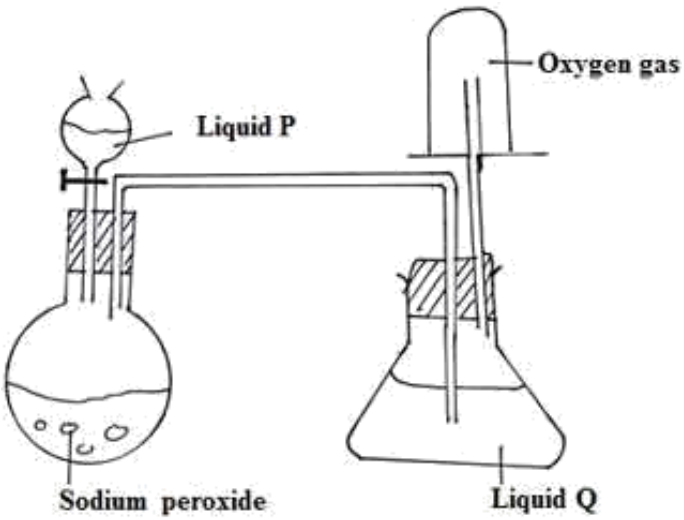
10. Study the set up below for preparation of O2 and answer the questions that follow.



a) Name i. Liquid P. (½ mark)

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ii. Liquid Q (½ mark)

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b) Identify another substance that can be used in place of liquid Q. (1 mark)
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c) Write an equation for the reaction that produces oxygen gas in the set up above.(1 mark) ……
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11. The table below shows the products formed by action of heat on nitrates of elements A, B and C. The letters are not the actual symbols.

Nitrates of	Products formed when heated
A	$AO + NO_2 + O_2$
B	$B + O_2 + NO_2$
C	$CNO_2 + O_2$

a) Arrange the elements in order of increasing reactivity. (1 mark)

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b) Which element forms a soluble sulphite? (1 mark)

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c) Give an example of the element that would be C. (1 mark)

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12. A piece of paper was weighed before and after a student made a mark on it using a piece of carbon. The masses of the paper are shown below. Mass of paper before the mark=1.804g Mass of paper after the mark =1.9053g Determine the number of carbon atoms used to draw the mark. (3 marks)

    (C=12.0 ,L=6.0 x10^{23})

13. Study the table below and answer the questions that follow.

Formula of the hydrocarbon	Boiling point ^0C
C_2H_4	-104
C_3H_6	-47.7
C_4H_8	2.70
C_5H_{10}	3.30

    i. To what class of organic compounds do the above hydrocarbons belong? (1 mark)
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    ii. What is the relationship between the boiling point and the relative molecular mass of the hydrocarbons in the table above? Explain. (2 marks)

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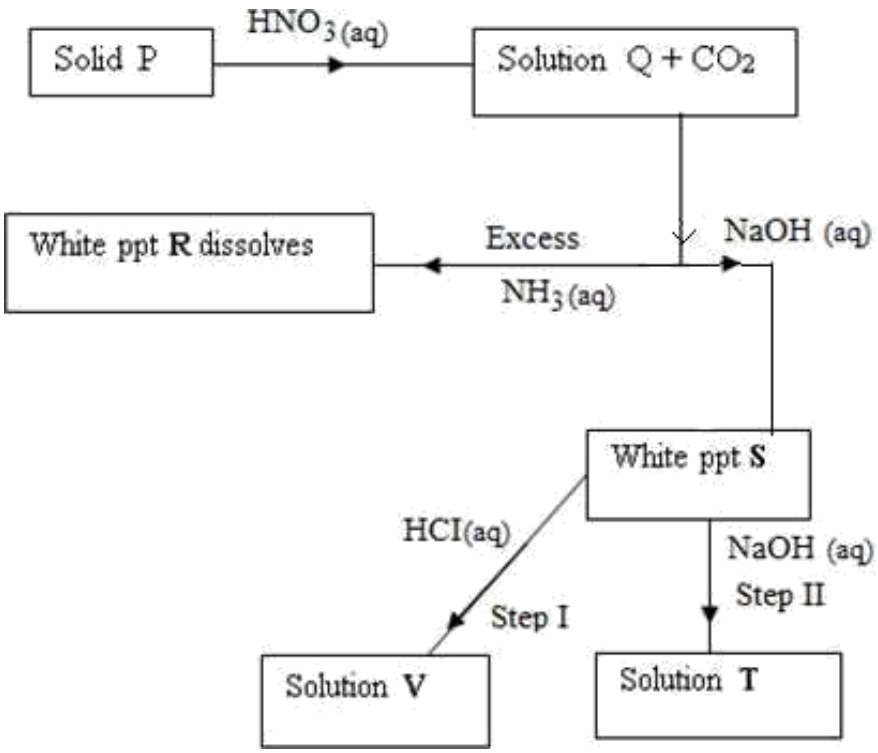
14. Study the reaction scheme below and answer the questions that follow.



a) Identify solid P. (1 mark)

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b) Write the equation for the reaction that leads to formation of white precipitate S.(1 mark)

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c) State the property of white precipitate S demonstrated by step I and II. (1mark)

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15. Aqueous sodium sulphate was electrolyzed using graphite electrodes.

a) Name the products at anode and cathode. (1 mark)

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b) Explain the changes in concentration as the experiment progresses. (1 mark)

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c) Why would it not be advisable to use sodium electrodes in the experiment? (1 mark)

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16. In attempt to prepare carbon (IV oxide gas, a student reacted dilute sulphuric acid with calcium carbonate.The yield of the gas was negligible.
a) Write an equation for the reaction. (1 mark)

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b) Why was the yield negligible? (1 mark)

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17. The melting point of phosphorous (iii) chloride is -91^{0}C while that of sodium chloride is 8000C. In terms of structure and bonding, explain this difference. (2 marks)

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18. a) Using dots (0) and crosses (x) to represent electrons draw diagrams to show bonding in the compounds formed when the following elements react.

i. Sodium and sulphur. (1 mark)
ii. Carbon and chlorine. (1 mark)
b) Which compound in (a) above would dissolve in ethanol? Explain. (1 mark)

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19. When a hydrocarbon was completely burnt in oxygen 4.2 g of carbon (iv) oxide gas and 1.71g of water were formed. Determine the empirical formula of the hydrocarbon. (C=12.0 H=1.0, O=16.0) (3 marks)

20. a) A piece of burning magnesium continues to burn in nitrogen gas but a burning splint is put off. Explain this observation. (2 marks)

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b) Write the equation to show the reaction that takes place when magnesium burns in nitrogen gas. (1 mark)
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21. Explain how you would obtain a pure sample of carbon (II) oxide from a mixture of carbon (II) oxide and carbon (IV) oxide. (2 marks)

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22. When a weighed sample of anhydrous copper (II) sulphate was left in an open beaker its mass was found to have increased after one day. Give a reason for this difference. (1 mark)

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23. a)Sulphur (IV) oxide and chlorine are bleaching agents. Using equations show the difference in the bleaching action of sulphur (IV) oxide and chlorine. (2 marks)

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b)State one other use of chlorine other than being used in the manufacture of bleaching agents. (1 mark)

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24. a) Element E is in group III period 3 of the periodic table. What is the atomic number of this element E. (1 mark)

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b) State one use of element E. (1 mark)

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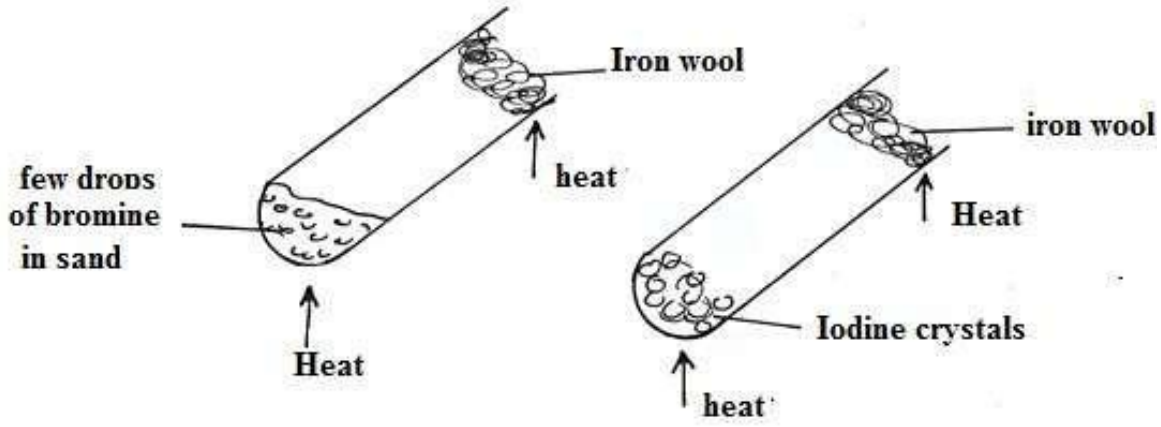
25. The set up below was used to show the reactions of iron wool with bromine and iodine.



a) State the observation made when bromine is reacted with heated iron wool. (1 mark)

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b) State and explain the difference in the reaction of heated iron wool with bromine and iodine. (2 marks)

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26. a) Calcium carbonate is insoluble in water but when rain water pours through limestone areas, it dissolves the limestone. Explain. (1 mark)

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b)State the role of limestone in the manufacture of sodium carbonate in the solvay process. (2 marks)

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27. In the extraction of aluminium from bauxite, electrolytic method is used. Give a reason for each of the following; a) Electrodes have to be replaced periodically. (1 mark)

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b) Cryolite is added to the aluminium oxide. (1 mark)

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c) The factory must be near a large source of electric power. (1 mark)

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28. Use the equation below to answer the questions that follow

$$NH_{3(g)} + H_2O_{(l)} \rightleftharpoons NH^+_{4(aq)} + OH^-_{(aq)} \Delta H + 90kJ$$

a) Identify the particle that acts as an acid in the backward reaction. Give a reason. (1 ½ marks)
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b) What would happen to the equilibrium if temperature of the reaction was increased. Give a reason. (1 ½ marks)
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29. In a neutralization ration between dilute sulphuric acid and potassium hydroxide solution, 5 cm^3 of the acid required 20 cm^3 of 0.5M of Potassium hydroxide for complete reaction. Determine the concentration of sulphuric acid in grammes per litre. (RAM: H=1, S=32, O=16)