NAME:
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233/1
CHEMISTRY
PAPER 1
THEORY
JULY / AUGUST 2010
2 HOURS

JOINT INTER SCHOOLS EVALUATION TESTS (JISET)
Kenya Certificate of Secondary Education 2010

233 / 1
CHEMISTRY
PAPER 1

INSTRUCTIONS TO CANDIDATES

- *Answer **all** the questions in the spaces provided*
- *Mathematical tables and electronic calculators **may** be used*
- *All workings **must** be clearly shown where necessary*

For Examiner's Use Only

Questions	Maximum Score	Candidates Score
1-29	80	

1. a) State the starting materials in the Solvay process (1½ mk)

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……

b) Name the process of extracting Sodium carbonate from Trona. (½ mk)

……

2. Element R has atomic number 8 and a mass number 16.

(i) Draw the atomic structure of element R. (1mk)

(ii) Write the formula of the ion of element R. (1mk)

(iii) Explain why R forms a hydride with a low boiling point. (1mk)

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3. a) Explain why 2M Sulphuric acid is a stronger acid than 18M Sulphuric acid (1mk)

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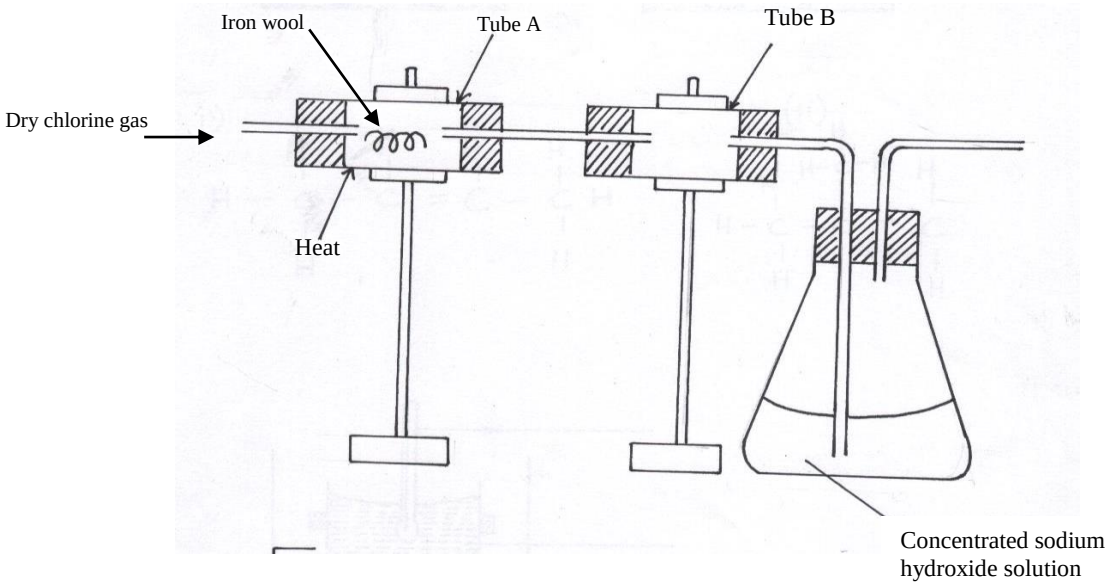
b) Write a balanced equation to show how Sulphuric acid is formed from Oleum. (1mk)

4. An element Z has two isotopes with relative abundance of 65% and 35%. If the mass number of the two isotopes is A and 31 respectively, find the mass number represented by A, given the relative atomic mass of the element is 30. (2mks)

5. Study the diagram below and answer the questions that follow.



(i) What is observed when the hot iron wool reacts with chlorine gas. (1mk)

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(ii) What is the purpose of:

a) Tube B (1mk)

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b) Concentrated Sodium hydroxide solution. (1mk)

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6. When powdered Sodium Carbonate is added to a solution of Aluminium chloride, what observation would be made. Explain. (3mks)

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7. The mass of 1dm^3 of a gas at s.t.p is 1.52g. What is the relative molecular mass of the gas? (Molar volume at s.t.p is 22.4 dm^3) (2mks)

8. Give two properties of carbon (IV) oxide that makes it suitable for use in extinguishing fire

a)……

b)……

9. When dilute Hydrochloric acid was added to a colourless solution, a white precipitate which dissolved on warming was formed.

(i) Give the name of the white precipitate. (1mk)

……

(ii) Write an ionic equation for the formation of the white precipitate. (1mk)

10. Form four students wanted to determine the solubility of Potassium nitrate. They obtained the following results.

Mass of evaporating dish =14.32g

Mass of evaporating dish + solution =35.70g

Mass of the evaporating dish + salt =18.60g

Calculate the solubility of potassium nitrate from the sample results. (3mks)

11. a) Consider the reversible reaction below

$$H_{2(g)} + I_{2(g)} \rightleftharpoons 2Hl_{(g)} \Delta H = -53KJ$$

Explain how each of the following factors would affect the concentration of Hydrogen iodide.

(i) Increase in temperature. (1mk)

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(ii) Increase in pressure. (1mk)

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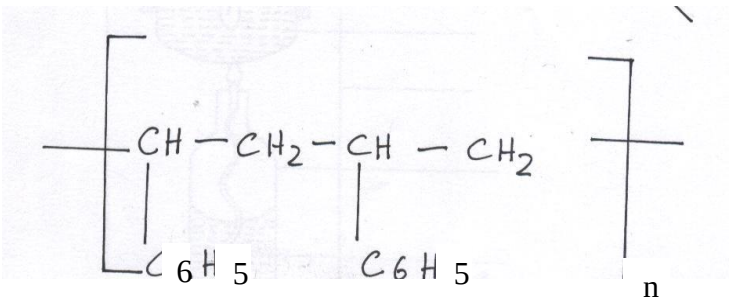
12. A certain Polymer has the following structure



a) Name the type of polymerisation exhibited by the structure above. (1mk)

……

b) Draw the structure of the monomer. (1mk)

c) If the molecular mass of the polymer is 20800. What is the value of n? C =12, H=1 (1mk)

13. What is the difference between a deliquescent and a hydroscopic substance. (2 mks)

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14. The table below shows physical properties of some substances. Use the information to answer the questions that follow.

Substance	Density (gm^{-3})	M-P (^{O}c)	B.P (^{O}c)	Electrical conductivity	
				Solid	Liquid
M	3.5	801	1413	POOR	GOOD
O	0.8	-114	-84.9	POOR	POOR
P	3.8	3550	4827	POOR	POOR
Q	21.4	-39	357	GOOD	GOOD
R	1.53	660	2470	GOOD	GOOD

(i) Which of the elements is a liquid at room temperature. Explain (1mk)

……

(ii) Identify the type of structure in

P……

R…… (1mk)

(iii) Which element would be the most suitable for use in over-head electric wire transmission? (2 mks)

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15. The melting and boiling points of molecular substances increase with increase in relative molecular mass. Explain why sugar with a relative mass of 183 has a higher melting point ($200^{o}c$) than iodine with a relative molecular mass of 186 and a melting point of $114^{o}c$. (2 mks)

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16. a) Write the chemical formula of rust. (1mk)

b) What is the most effective method of preventing iron from rusting? (1mk)

……

c) Name two properties of Iron that make it suitable for use in construction of a rail line. (1mk)

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17. An atom of a radio-active element R undergoes a series of decay as shown below. The letters are not the actual symbols of the elements.

$$^{220}_{83}R \xrightarrow[stepI]{} {}^{220}_{84}S \xrightarrow[stepII]{} {}^{220}_{85}T$$

a) What type of decay does the element undergo? (1mk)

……

b) Write a balanced equation to represent the decay process in step I. (1mk)

c) State one property of the type of radiation emitted in the decay process above. (1mk)

……

18. a) State role of the following parts during fractional distillation of a mixture of water and ethanol.

(i) Fractionating column (1½mks)

……

……

(ii) Glass beads in the fractionating column. (1mk)

……

……

b) State any two applications of fractional distillation process. (2mks)

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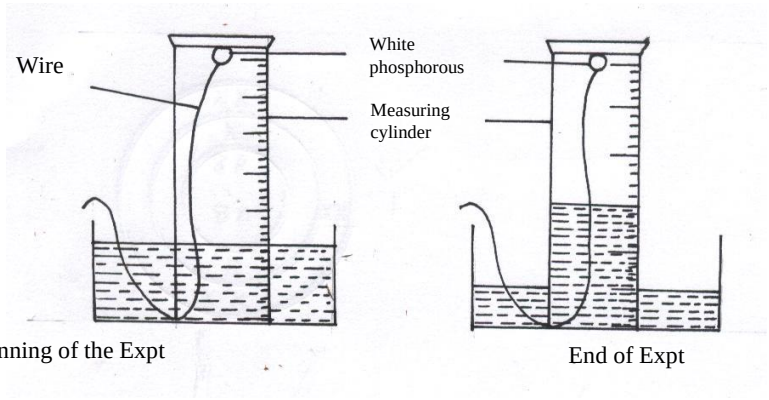
19. The set-up below was used by a form one student to determine the percentage of active air. Study it and answer the questions that follow.



a) What is observed when white phosphorus is exposed to air? (1½mks)

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b) Calculate the percentage volume of air used up in the above experiment (2 mks)

c) How is phosphorus stored in the laboratory (½mk)

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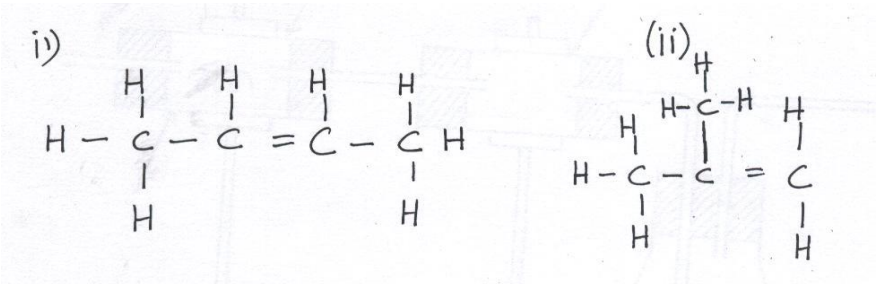
20. A compound forms isomers of structural formulae.



a) Give the IUPAC names of the isomers above. (2mks)

(i).....

(ii)……..

b) Write down the molecular formula of the compound above. (1mk)

21. Explain what will be observed when Hydrogen sulphide gas is passed through acidified Potassium dichromate solution. (3mks)

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22. 18.7cm^3 of a dibasic acid H_2A required 25cm^3 of 0.1M NaOH for complete neutralization.

a) How many moles of Sodium hydroxide are contained in 25cm^3? (1mk)

b) Calculate the molarity of the dibasic acid. (2mks)

23. The figure below shows a curve obtained after plotting results from a class experiment. The class reacted excess Zinc granules with 1M Hydrochloric acid and measured the volume of Hydrogen gas produced at s.t.p.

a) Why did the students use excess Zinc granules? (1mk)

……

b) Calculate the rate of evolution of Hydrogen gas between the 1st minute and the 3rd minute. (1½mks)

c) On the same axes above, sketch the kind of graph the students would get if they used powdered Zinc. (½mk)

24. a) In the equation below, identify the reagent that acts as (2mks)

$$H_2O_{2(aq)} + H_2O_{(l)} \rightleftharpoons H_3O^+_{(aq)} + HO^-_{2(aq)}$$

(i) Base……

(ii) Acid……

b) The reaction above is in equilibrium. What does the term equilibrium mean? (1mk)

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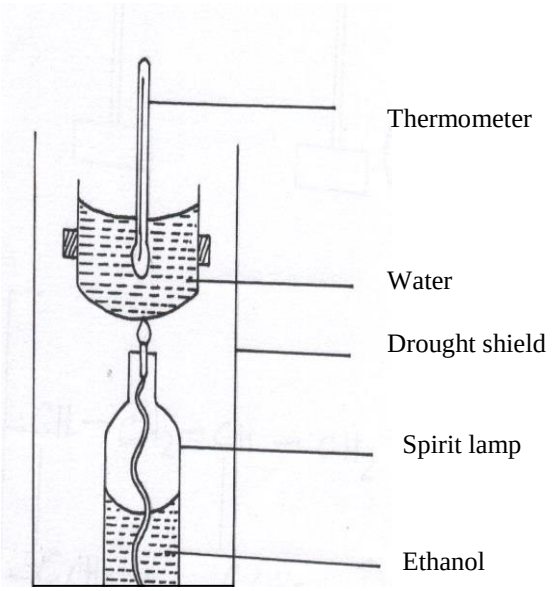
……

25. The diagram below shows the set up of the apparatus by a student to determine the enthalpy change of combustion of Ethanol. The heat produced by burning fuel warms a known mass of water. By measuring the mass of fuel burnt and the temperature rise of water, it is possible to obtain an approximate value for the enthalpy of combustion of Ethanol.



Results

Volume of water in the beaker = 500cm^3

Initial temperature of water = 12^{0}C

Final temperature of water = 31.5^{0}C

Mass of ethanol burnt = 1.50g

Density of water, 1gcm^{-3}

Specific heat capacity = 4.2Jg $^{-1}$K^{-1}

a) Work out the temperature change (ΔT) of the combustion of Ethanol.

(½mk)

b) How much heat is required to raise the temperature of the water from 12^0C to 31.5^0C? (1mk)

c) Find the molar enthalpy of combustion of Ethanol. (C = 12, O = 16, H = 1).

(1½mks)

d) An accurate value for ΔH_C (CH_3CH_2OH) is 1368 KJ mo1^{-1}. State one source of error for the low figure obtained in (c) above. (1mk)

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26. A crystalline organic compound X reacted with concentrated Sulphuric acid in the presence of a few drops of water to produce a black porous mass of substance S. Substance S after washing and drying, burned in air to form a colourless gas only.

a) Name the type of reaction between X and concentrated Sulphuric acid.

(½mk)

……

b) Identify substance S. (½mk)

……

c) Suggest a compound that could be X. (1mk)

……

27. An oxide of Potassium has a relative formula mass of 110. If 2.75g of the oxide contains 1.95g of Potassium, determine the formula of the oxide. K =39.0, O = 16.0. (3mks)

28. A farmer wishes to enrich his soil with nitrogen. He goes to the shops and finds the following fertilizers.

    - Ammonium sulphate, $(NH_4)_2 SO_4$.
    - Ammonium nitrate, $NH_4 NO_3$
    - Urea, $CO (NH_2)_2$.

    With reasons, suggest the fertilizer that you would advice the farmer to buy given that each type of fertilizer costs shs.500 per bag. (H = 1, C = 12.0, N = 14, S = 32) (4mks)

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29. Chlorofluorocarbons are used in the manufacture of aerosols. State one factor which make chlorofluorocarbons serious gaseous pollutants (1mk)

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