

Name: Index No.

School: Date: Candidate's Sign

233/1
CHEMISTRY
PAPER 1 (THEORY)
FORM 4
MARCH / APRIL 2013
TIME: 2HOURS

ELDORET EAST INTER - SCHOOLS EXAMINATIONS - 2013
The Kenya Certificate of Secondary Education (K.C.S.E)

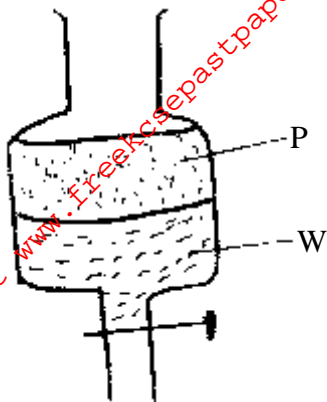
INSTRUCTIONS TO CANDIDATES

- Write your name, Index No. and class in the spaces provided above.
- Answer all questions in the spaces provided
- Mathematical tables and electronic calculators may be used.
- All working and diagrams must be clearly shown where necessary.

FOR EXAMINER'S USE ONLY

Questions	Maximum Score	Candidates' Score
1 - 31	80	

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



State the identity;

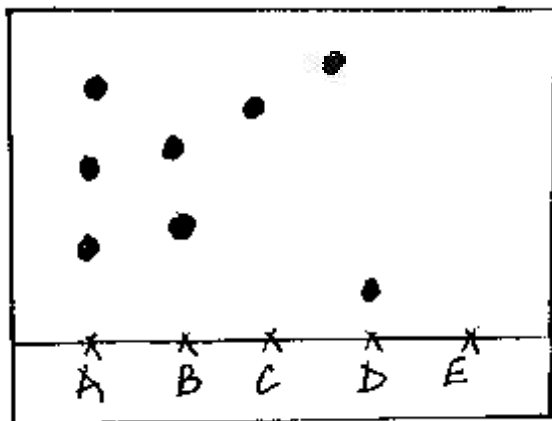
i) P (1mark)

ii) W (1mark)

A crystal of copper (II) sulphate was placed in a beaker of water. The beaker was left standing for two days without shaking. State and explain the observations that were made. (2marks)

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3. The following diagram shows a paper chromatogram of substances A, B, C and D which are coloured.



a) Indicate the baseline on the diagram (1/2mark)

b) Which substance is pure? (1/2mark)

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c) Substance E is a mixture of C and D. Indicate its chromatogram in the diagram. (1 1/2marks)

4. Sulphur exists in two crystalline forms

a) Name one crystalline form of sulphur (1mark)

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b) State two uses of sulphur (2marks)

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5. The information in the table below gives pH values of solutions V, W, X, Y and Z.

Solution	pH values
V	2
W	6.5
X	11
Y	14
Z	4.5

a) Which solution is likely to be;

i) Calcium hydroxide?

(½mark)

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ii) Rain water?

(½mark)

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b) Which solution would react most vigorously with zinc carbonate?

(½mark)

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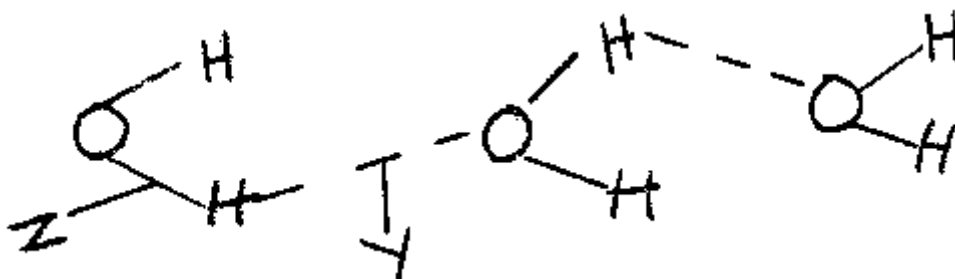
6. Copper (II) oxide solid is a base but cannot turn red litmus blue. Explain

(1mark)

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7. The structure of water molecules can be represented as shown below;



a) Name the type of bond represented by Y and Z

(2marks)

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b) The relative molecular mass of methane and water are almost similar. However, the boiling point of water is 100°C while that of methane is -161°C. Explain.

(1mark)

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8. An element G has an electronic arrangement of 2.8.18.2. State;

a) The period into which element G belongs in the periodic table.

(1mark)

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b) The name of the chemical family into which element G belongs.

(1mark)

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9. Element T consists of two isotopes ^{62}T and ^{64}T in the ratio 7:3 respectively. Calculate the relative atomic mass of element T. (3marks)

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10. Fill in the blanks in the table below

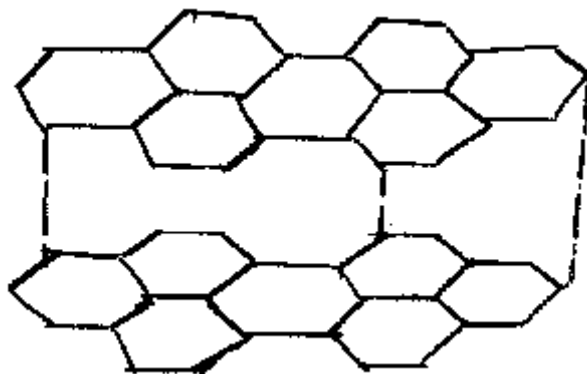
Ion of Element	Number of electrons	Number of Neutrons
$^{39}_{19}\text{Q}^+$		

11. a) What is meant by allotropy? (1mark)

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- b) The diagram below shows the structure of one of the allotropes of carbon.

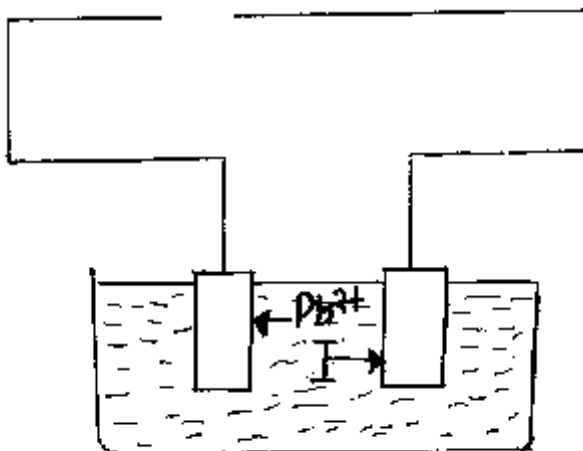


- i) State one property of the above allotrope and explain how it is related to its structure. (2marks)

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12. The set-up below was used to investigate electrolysis of a certain molten compound.



a) Complete the circuit by drawing two dry cells in the gap left in the diagram above. (1mark)

b) Write half-cell equation to show what happens at the cathode (1mark)

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c) Using an arrow shows the direction of electron flow in the diagram above. (1mark)

13. Hydrogen can be prepared by reacting magnesium with dilute hydrochloric acid.

i) Write an equation for the reaction (1mark)

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ii) Explain why zinc metal is commonly used in the preparation of hydrogen instead of magnesium (1mark)

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iii) Why is copper metal not used in the preparation of hydrogen gas? (1mark)

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14. In an experiment, an unknown mass of anhydrous sodium carbonate was dissolved in water and the solution made up to 250cm³. 25cm³ of this solution neutralized 20cm³ of 0.25M nitric acid.

(RFM of Na₂CO₃ = 106)

Calculate:

a) Moles of nitric acid used. (1mark)

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b) Moles of sodium carbonate in 25cm³ of the solution. (1mark)

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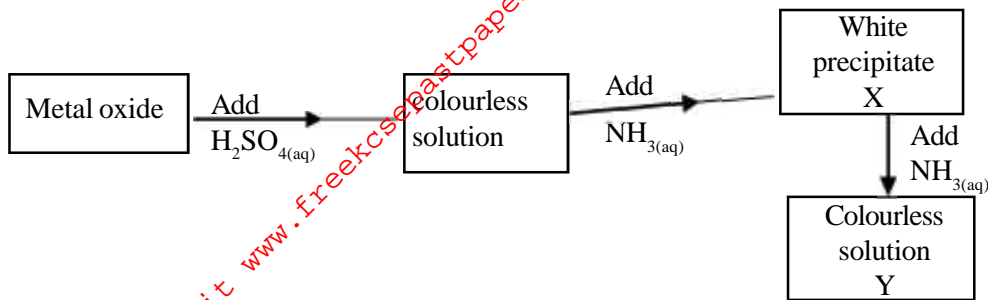
c) Mass of the unknown sodium carbonate used. (1mark)

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15. Describe how you would prepare Lead (II) chloride solid starting with Lead (II) carbonate. (3marks)

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



a) Identify the metal oxide. (1 mark)

b) Write an ionic equation leading to the formation of the white precipitate X. (1 mark)

c) Give the formula of the complex ions present in the colourless solution Y. (1 mark)

17. The table below gives elements represented by letters which are not their actual symbols.

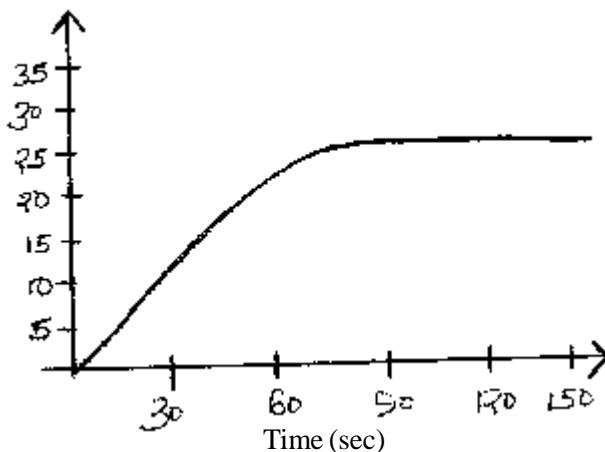
Element	U	V	W	X	Y	Z
Atomic Number	8	12	13	15	17	20

i) Select an element that can form a divalent anion (1 marks)

ii) Compare the atomic radius of W and X. (1 mark)

iii) What is the structure of the oxide of Z? (1 mark)

18. A certain mass of marble chips reacted with excess dilute hydrochloric acid at 25°C. The volume of carbon (IV) oxide gas liberated was measured after 30 seconds. The results were presented as shown below.



a) Name one piece of apparatus that may have been used to measure the volume of the gas liberated. (1mark)

b) i) On the same axis sketch the curve that would be obtained if the experiment was repeated using calcium carbonate powder. (1mark)

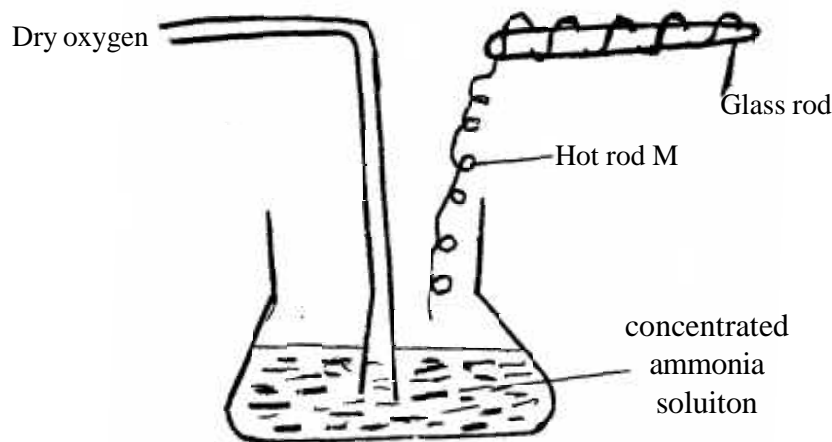
ii) Explain the shape of your curve in b(i) above. (1mark)

19. a) State Graham's law of diffusion. (1mark)

b) A certain volume of gas A diffuses through a porous plug in 41 seconds and the same volume of air diffuses through the plug in 155 seconds. Calculate the density of gas A given that the density of air is 0.001g/cm^3 . (2marks)

20. A fixed mass of gas occupies 100cm^3 at 740 mmHg and -18°C . Calculate its volume at s.t.p; (3marks)

21. The diagram below shows the catalytic oxidation of ammonia gas. Use it to answer the questions that follow.



a) What metal could rod M be made of? (1mark)

b) State and explain **two** observations made inside the conical flask. (2marks)

22. The table below shows the solubility of salts Q and R at different temperatures

Temperature		0	10	20	30	40	50
Solubility in grammes per 100g of water	Salt Q	3.0	5.0	7.4	10.0	14.0	19.0
	Salt R	15.0	17.0	20.7	25.7	28.7	33.0

a) Define the term 'solubility of salt'. (1mark)

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b) If both salts Q and R are present in 100cm³ of saturated solution at 50°C, what will be the total mass of crystals formed if the solution is cooled to 20°C. (2marks)

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23. 6g of potassium nitrate solid was added to 120cm³ of water in a plastic beaker. The mixture was stirred gently and the following results were obtained.

Initial temperature of water = 21.5°C

Final temperature of the solution = 17.0°C

a) Calculate the enthalpy change for the reaction. (Density of the solution = g/cm³, C = 4.2Jg⁻¹K⁻¹) $\Delta H = MC\Delta T$. (2marks)

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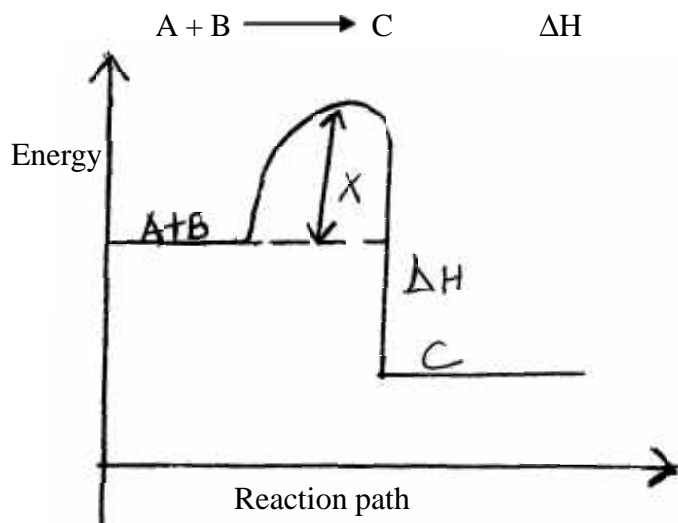
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b) Calculate the molar enthalpy change for the dissolution of potassium nitrate. RFM of KNO₃ = 101 (1mark)

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24. The diagram below shows the energy changes that occur during a reaction



a) What does X represent? (1mark)

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b) State the sign for ΔH . Explain (2marks)

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c) On the same axes above, draw an energy level diagram for the reaction when a suitable catalyst is used. (1mark)

25. In an experiment, soap solution was added to three samples of water. The results below show the volume of soap solution required to lather 500cm^3 of each water sample before and after boiling.

	Sample 1	Sample 2	Sample 3
Volume of soap used before water boiled (cm^3)	26.0	14.0	4.0
Volume of soap used after water boiled (cm^3)	26.0	4.0	4.0

i) Which water sample is likely to be soft? (1mark)

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ii) Explain the change in volume of soap solution used in sample 2. (1mark)

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iii) Write down the formula of one compound that could be responsible for the effect of soap in sample 1. (1mark)

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26. Bond energies for some bonds are tabulated below.

Bond	Bond Energy KJmol^{-1}
H - H	H - H
C = C	C = C
C - H	C - H
C - C	C - C

Use the bond energies to estimate the enthalpy for the reaction



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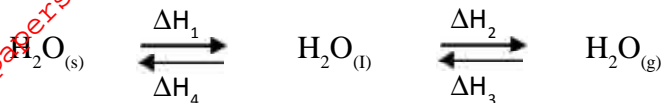
27. a) Define the term fuel (1mark)

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b) State two reasons why wood fuel is chosen for domestic cooking (1mark)

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28. The scheme below shows the energy changes that take place between ice, water and steam. Study it and answer the questions that follow.



a) What name is given to the energy change (2marks)

i) ΔH_1

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ii) ΔH_2

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b) What is the sign of ΔH_3 , give a reason. (1mark)

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29. a) What is a drug? (1mark)

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b) Name two drugs that are commonly abused by the youth (2marks)

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30. Classify the following processes as chemical or physical changes. (2marks)

Process	Physical or chemical
Neutralization
Sublimation
Fractional distillation
Displacement reaction

31. Bromine dissolves in water forming a yellow solution according to the dynamic equation shown below



State and explain the observation that would be made if a solution of sodium hydroxide is added to the system. (2marks)

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