

Name Index No.

233/i
CHEMISTRY

Paper 1
(Theory)

July/August 2013

Time: 2 Hours ■■■■■

Candidate's Signature.....

Date!

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WESTLANDS DISTRICT JOINT MOCK EXAMS

Kenya Certificate of Secondary Education

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CHEMISTRY
Paper '1
(Theory) . ■
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INSTRUCTIONS TO CANDIDATES

- a) Write your name and index number in the spaces provided above.
" * #
- b) Sign and write the date of examination in the spaces provided above.
- c) Answer all the questions in the spaces provided.
- d) Mathematical tables and silent electronic calculators may be used.
- e) All working must 'be clearly shown where necessary.
- f) This paper consists of printed pages.
- g) Candidates should check the questions to ascertain that all the pages are printed as indicated and that no questions are missing.

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For Examiner's Use Qnlv

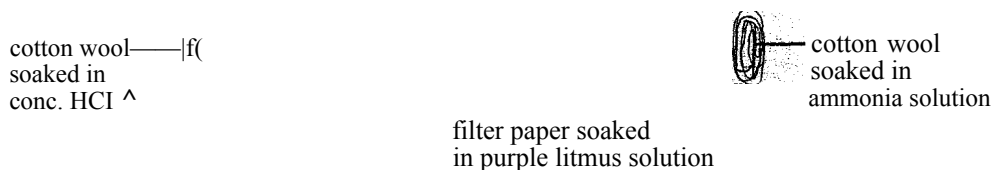
QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1*2?	80 v	

The electronic arrangement of two ions Q^{2+} and P^{2-} 2,8.8 and 2.8.8 respectively,

a) Write the electron arrangement of neutral atoms Q and P. (1 mk)

b) What is the most likely structure of an oxide element P? (1 mk)

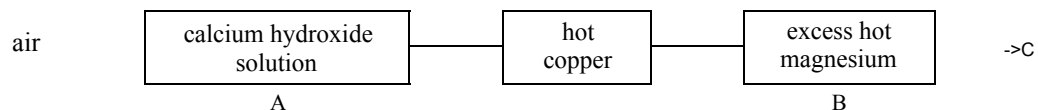
The set up below was used by a student. Filter paper soaked in purple litmus solution was placed in the middle of the combustion tube.



i) What is the main aim of the experiment? (1 mk)

ii) State the first observation likely to have been made in the tube. Explain the observation. (2 mks)

Air was passed through reagents as shown below.



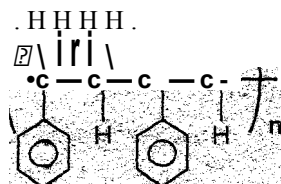
i) State and explain the observation made when air is passed through chamber A for a long time. (2 mks)

ii) Name one component in C. Explain (2 mks)

During electrolysis of a metal sulphate, 0.9g of metal was deposited when a current of 16A flowed for 10 minutes.
 a) How many Faradays of electricity were used? (1 Faraday = 96000C) (1 mk)

b) How many grams of metal would be deposited from the same solution if a current of 3.2A flowed for 20 minutes? (2 mks)

The structure formula below represents a portion of a polymer.



a) Draw the monomer from which it is made.

b) Name the polymer.

(1 mk)

c) Give ONE disadvantage of continued use of the above polymer.

(1 mk)

Explain the following observation;

a) Alkaline earth metals are generally less reactive than alkali metals..

(1 mk)

b) The order of reactivity increases down group 1 but decreases down group VII.

■ (2 mks)

c) Non-metallic ionic radius is larger than its corresponding atomic radius.

(1 mk)

a) A few drops of freshly prepared iron (II) Sulphate were added to Potassium Nitrate solution in a test tube. Concentrated Sulphuric acid was added slowly and carefully along the wall of the test tube containing the mixture. State the observation that was made.

(1 mk)

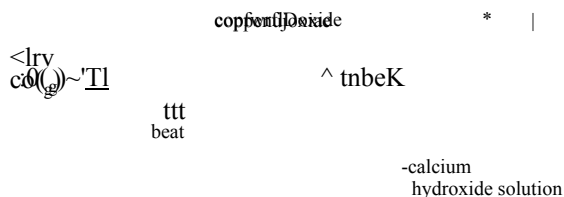
b) Write the equation for the reaction that occurs when solid potassium nitrate is strongly heated.

(1 mk)

c) In an attempt to prepare Sulphur (IV) Oxide gas, dilute Sulphuric acid was reacted with Barium Sulphite. The yield of the gas was found to be negligible. Explain

(2 mks)

8. The apparatus shown below was used to investigate the effect of Carbon (II) Oxide on Copper (II) Oxide.



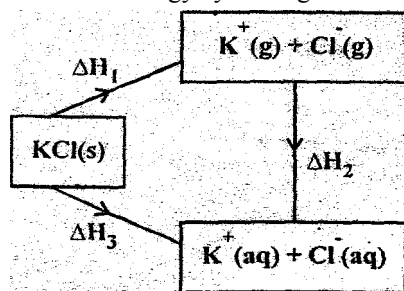
- State the observation that was made in the combustion tube. (1 mk).
 - Write an equation for the reaction that took place in the combustion tube. - (1 mk).
 - Why is it necessary to burn the gas coming out of tube K? (1 mk)
9. The atomic number of element A is 11 and that of B is 8.
- Write down the possible formulae of compound formed between A and B. (1 mk)
 - Draw a diagram using dots (.) and crosses (x) to show the bonding in the compound formed. (2 mks)
10. Explain using chemical test how you will differentiate between Carbon (II) Oxide and Carbon (IV) Oxide (1 mk)
11. When Magnesium ribbon is burnt in air and the product dissolves in water, a colourless solution is formed and a gas is evolved.
- What effect does the solution have on litmus paper? (1 mk)
 - Name the compound responsible for the production of the colourless gas. (1 mk)
-
- Write down a balanced chemical equation for the reaction producing the colourless gas. (1 mk)
12. Hydrogen Sulphide gas reacts with moist Chlorine gas according to the equation below:
- $$H_2S + Cl_2 \rightarrow S + 2HCl$$
- Which substance is the reducing agent? Explain (2 mks)
 - State the observation made when this reaction occurs. (1 mk)
13. Give names of the following processes used to:
- Obtain a solvent from a saturated solution (2 mks)

b) Iron (III) Chloride and Sodium Chloride

c) Separate Zinc Carbonate from water

d) Separate a mixture of nitrogen and Argon

14. Use the information in the energy cycle diagram below and answer the questions that follow.



i) State Hess's law.

(1 mk)

ii) Name the enthalpy changes represented by ΔH_1 and ΔH_3 .

(1 mk)

ΔH_2

(1 mk)

15. In an experiment to study properties of Carbon, a small amount of charcoal is placed in a boiling tube. 50cm³ of concentrated nitric acid is added. The mixture is heated.

a) Explain the observations made.

(1 mk)

b) Write an equation for the reaction that took place in the boiling tube.

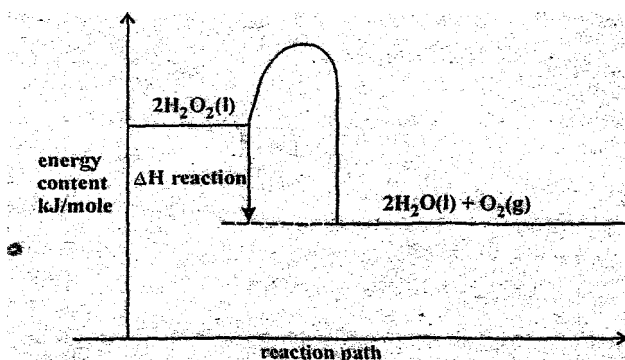
(1 mk)

c) What property of Carbon is shown in this reaction.

(1 mk)

16. 0.5g of Manganese(IV) Oxide were added to 50cm³ of 3.5M. hydrogen peroxide. The temperature of the solution rose from 21 °C to 64°C. The information was represented on an energy level diagram as shown.

{density of solution = 1g/cm³, S.H.C = 4.2J/g/°C}



a) Determine the number of moles of hydrogen peroxide that decomposed.

(1 mk)

b) Calculate the molar enthalpy of decomposition of hydrogen peroxide. (1 mk)

'C) On the same set of axes above, sketch the curve that would be obtained if Manganese (IV) oxide was not used and other conditions remained constant. (1 mk)

17. 60 cm³ of Ozone (O₃) diffuse through a semi permeable membrane in 80 s. Calculate the time taken for 90 cm³ of nitrogen (IV) Oxide (NO₂) to diffuse under the same conditions. (O = 16, N = 14) (3 mks)

18. A hydrated salt has the following composition by mass. Iron is 20.2%, Oxygen is 23.0%, Sulphur is 11.5%, water 45.3%. Its relative formula mass is 278. Determine the formula of the hydrated salt. (Fe = 56, S = 32.0, O = 16, H = 1.)

19. Francium ²²³Fr decays by emission 4 beta particles to form polonium (Po)

a) Write the equation for the nuclear reaction undergone by one radioisotope of Francium - (1 mk)

b) State two differences between chemical and nuclear reactions. (2 mks)

c) The activity of a radioactive isotope decreases from 512 counts per minute to 64 counts per minute in 9 minutes. What is the half-life of the radioactive isotope. (2 mks)

d) Give two uses of radioactive isotopes in medicine. (1 mk)

20. In a reaction, an alkanol B was converted to pent-2-ene.

a) Give the structural formula of alkanol B (1 mk)

b) Name i) the type of reaction that converts alkanol B to pent-2-ene. (1 mk)

ii) the reagent used and give the condition for the reaction to take place. (1 mk)

21. Some salts may be classified as double salts or basic salts. Trona with the formula $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3$ is an example of a double salt. An example of a basic salt is basic magnesium carbonate with formula $\text{MgCO}_3 \cdot \text{Mg}(\text{OH})_2$.
a) What is meant by a double salt? (1 mk)

b) Write equations of reactions that occur when dilute hydrochloric acid is reacted with:
i) Trona (2 mks)

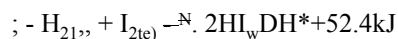
ii) Basic Magnesium Carbonate

22. A solution of bromine in methyl benzene turns colourless when butene gas is passed through it.
a) What type of reaction takes place? (1 mk)

b) Write an equation of the reaction which takes place. (1 mk)

23. 15.8 g of Sodium nitrate is saturated with 29.3 cm³ of water at 32°C. Determine the solubility of Sodium nitrate at 32°C {Density of water = 1 g/cm³} (2 mks)

24. The thermochemical equation below shows a dynamic equilibrium between hydrogen iodide gas and its elements:



a) Explain how the following changes would affect the production of hydrogen iodide.
i) Increase in temperature (1 mk)

ii) Decrease in pressure (1 mk)

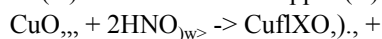
b) Calculate the molar enthalpy for formation of $\text{HI}_{(s)}$

(1 mk)

25. Calculate the mass of Zinc Carbonate that would remain if 17.0g of Zinc Carbonate was reacted With 50cm³ of 4M nitric acid. The equation of the reaction is. ($\text{Zn} = 65.4$, $\text{C} = 12.0$, $\text{O} = 16.0$) (3 mks)



26. Nitric (V) acid reacts with Copper (II) Oxide according to the equation below;



0.5g of impure Copper (II) Oxide reacted with 50cm³ of 0.1 M nitric acid. Calculate the percentage of the Copper (II) Oxide in the impure sample, assuming that its impurities did not react with nitric acid ($\text{Cu} = 64$, $\text{O} = 16$, $\text{N} = 14$, $\text{H} = 1$) (3 mks)

27. White or yellow phosphorous reacts with Chlorine to form a yellow liquid. The liquid produces fumes when exposed to air.

a) Write the equation for the reaction between Chlorine and Phosphorous. (1 mk)

b) Explain why the liquid produces fume when exposed to air. (1 mk)