

Name.....

Index No...../.....

School.....

Candidates Signature.....

Date

233/1

CHEMISTRY

THEORY

Paper 1

July/August 2009

2 ½ Hours

BORABU INTER - SECONDARY SCHOOL

JOINT EVALUATION TEST - 2009

Kenya Certificate of Secondary Education (K.C.S.E)

233/1

CHEMISTRY

THEORY

Paper 1

July/August 2009

2 ½ Hours

INSTRUCTIONS TO CANDIDATES

- Write your name and Index Number in the spaces provided above.
- Sign and write date of examination in the spaces provided above.
- Answer **ALL** questions in the spaces provided.
- Mathematical tables and silent electronic calculators may be used.
- All workings **MUST** be clearly shown where necessary.

For Examiners use only.

Question	Maximum Score	Candidates Score
1 – 31	80	

This paper consists of 12 Printed pages.

Candidates should check the question paper to ensure that all the Papers are printed as indicated and no questions are missing

1. A mixture of magnesium powder and copper powder was reacted with dilute hydrochloric acid. The solution was filtered.

Name:

- (a) (i) The residue (1mk)

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- (ii) The filtrate (1mk)

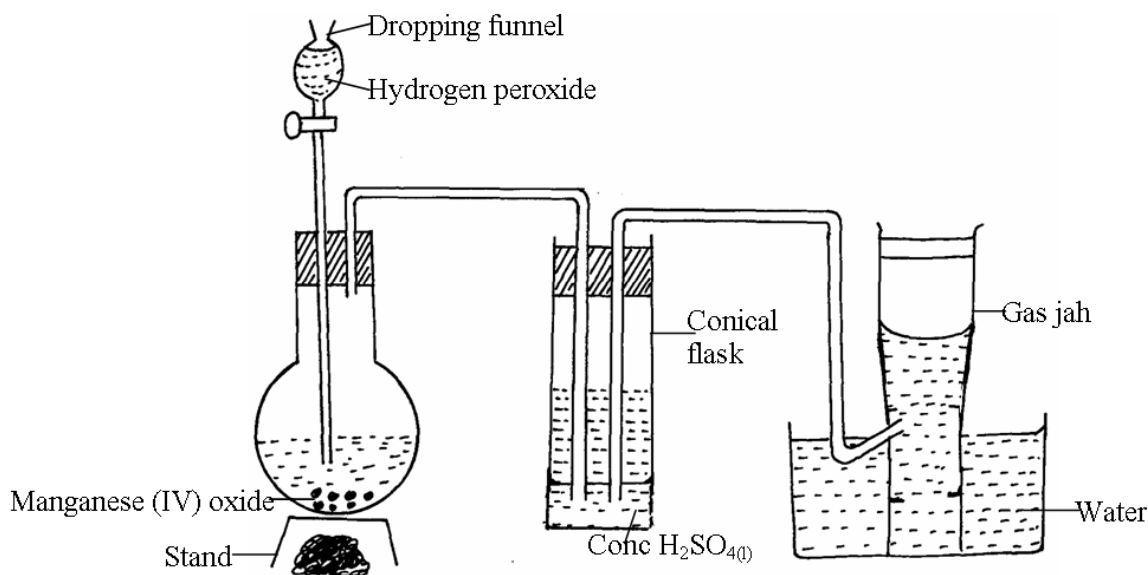
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- (b) Write an ionic equation for the reaction that takes place (1mk)

2. Aluminium chloride solution changes the blue litmus paper red. Explain this observation (2mks)

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3. The diagram below shows the set-up that can be used to prepare and collect oxygen gas. Study it and answer the questions that follow.



- (a) Identify **two** mistakes from the diagram which must be corrected for one to collect **dry** oxygen gas (2mks)

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(b) What property of oxygen gas makes it possible to be collected over water? (1mk)

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4. The table below gives information on four elements by letters K, L, M and N. Study it and answer the questions that follow. The letters do not represent the actual symbol of the elements.

Element	Electron arrangement	Atomic radius (nm)	Ionic radius (nm)
K	2.8.2	0.136	0.065
L	2.8.7	0.099	0.181
M	2.8.8.1	0.203	0.133
N	2.8.8.2	0.174	0.099

(a) Which **two** elements have similar properties? Explain (2mks)

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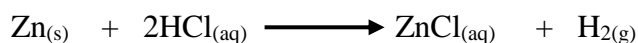
(b) What is the most likely formula of the oxide of L? (1mk)

(c) Which element is a non-metal. Explain (1mk)

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5. A fixed mass of a gas has a volume of 250cm³ at a temperature of 27⁰C and 750mmHg pressure. Calculate the volume the gas would occupy at 42⁰C and 750mmHg pressure. (2mks)

6. Zinc metal and hydrochloric acid react according to the following equation



1.96g of zinc were reacted with 100cm³ of 0.2M Hydrochloric acid,

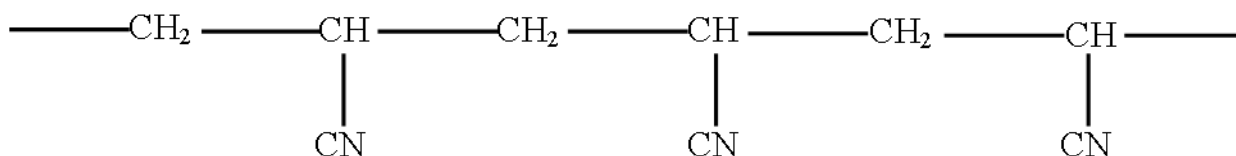
(a) Determine the reagent that was in excess (2mks)

(b) Calculate the total volume of hydrogen gas that was liberated at S.T.P conditions
(Zn = 65.4, molar gas volume = 22.4 litres at S.T.P) (2mks)

7. Explain how a sample of $\text{CH}_3\text{CH}_2\text{OH}$ could be distinguished from a sample of CH_3COOH by a chemical test (2mks)

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8. A polymer has the following structure



A sample of this polymer is found to have a molecular mass of 5194. Determine the number of monomers on the polymer (H = 1.0, C = 12.0, N = 14.0) (2mks)

9. Describe how the following reagents can be used to prepare lead (II) sulphate. Solid potassium sulphate, solid lead (II) carbonate, dilute nitric acid and distilled water. (3mks)

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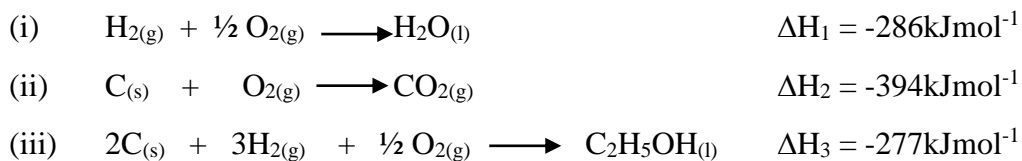
10. Explain why the enthalpy of neutralization of ethanoic acid with sodium hydroxide is different from that of hydrochloric acid with sodium hydroxide. (2mks)

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11. Use the information below to answer the questions that follow:

Equation:

Enthalpy of formation.



Calculate the molar enthalpy of combustion of ethanol. Given that:



12. The structure shown below represent two cleansing agents A and B.



A



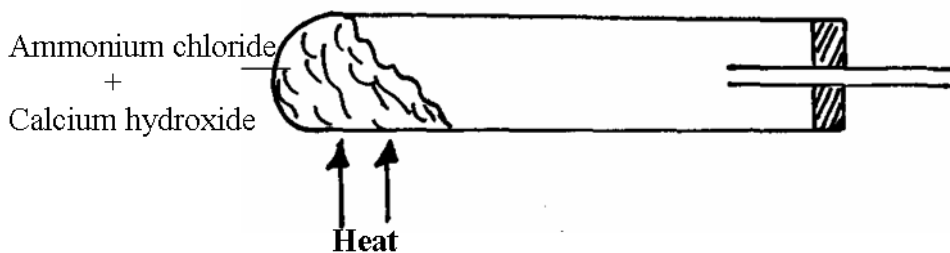
B

Which cleansing agent would be more suitable for washing in water containing magnesium sulphate? Explain (2mks)

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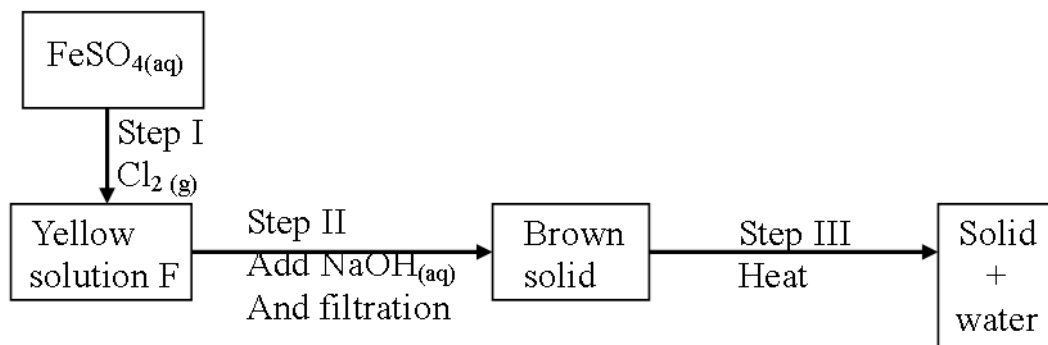
13. M grammes of a radioactive isotope decayed to 5 grammes in 100 days. The half – life of the isotopes is 25 days.
- (a) What is meant by half – life? (1mks)
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-
- (b) Calculate the initial mass M of the radioactive isotope (2mks)

14. Complete the diagram to show how a sample of dry ammonia gas can be prepared in the laboratory. (3mks)



15. 30cm³ of hydrogen gas was exploded with 10cm³ of oxygen gas at room temperature and pressure. Calculate the total volume of the mixture at;
- (a) 100⁰C (2mks)
- (b) 70⁰C (1mk)

16. Study the scheme below and answer the questions that follow



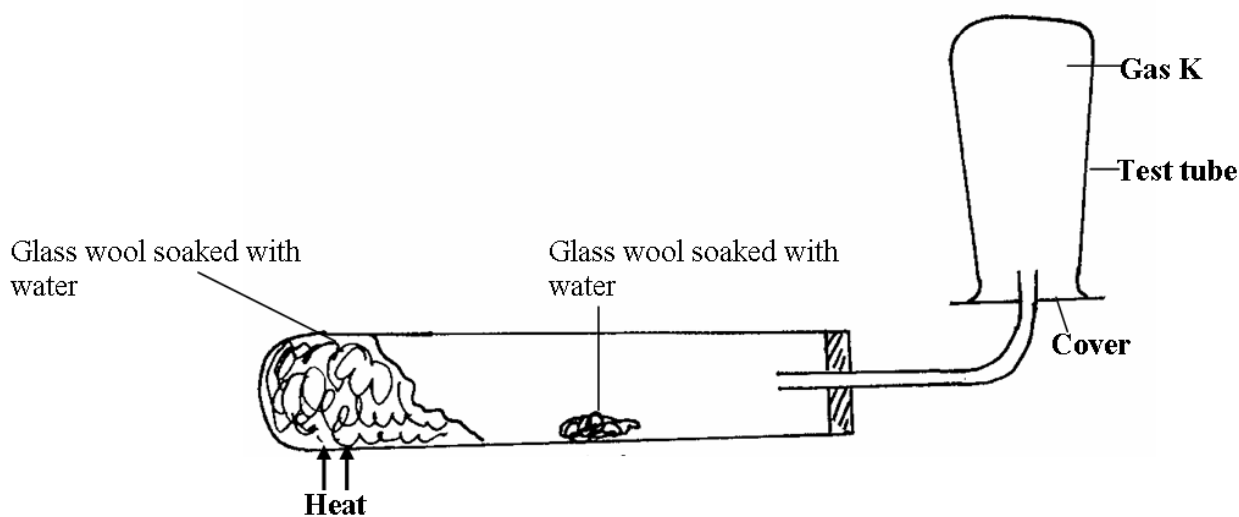
(a) Write the formula of the cation present in the yellow solution F (1mk)

(b) What property of chlorine is shown in step I (1mk)

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(c) Write an equation for the reaction in step (III) (1mk)

17. A student set up the experiment below to collect gas K. The glass wool was heated before heating the zinc powder.



(a) Why was it necessary to heat the moist glass wool before heating the zinc powder (1mk)

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(b) What observations were made in the test tube (1mk)

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18. Using dots (•) and crosses (×) to represent the outermost electrons, draw the structure to show the bonding in CO₂. (C=6, O = 8). (2nks)

19. Calculate the mass of nitrogen(IV)oxide gas that would occupy the same volume as 10g of hydrogen gas at the same temperature and pressure. (H = 1.0, N = 14.0, O = 16.0) (2mks)

20. Below is a table of reduction potentials and volts of some half cells. The letters are not actual symbols but use them to answer the questions which follows

Reaction	volts
$A^{2+}_{(aq)} + 2e \longrightarrow A_{(s)}$	-2.80
$B^{+}_{(aq)} + e \longrightarrow B_{(s)}$	-1.50
$2C^{+}_{(aq)} + 2e \longrightarrow C_{2(g)}$	0.00
$D_{2(g)} + 2e \longrightarrow 2D^{-}_{(aq)}$	+3.20
$G^{+}_{(aq)} + e \longrightarrow G_{(s)}$	+1.80

(a) Select the species with the largest

(i) Oxidizing power (1mk)

(ii) Reducing power (1mk)

- (b) Calculate the electrode potential (e.m.f) for a cell constructed using half-cells of A and B
(1mk)

21. The following table gives the melting points oxides of elements in period 3.

Study it and answer the questions that follow:-

Formula of oxide	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₄ O ₁₀	SO ₃
Melting point (°C)	1190	3080	2050	1730	560	-73

- (i) Explain the difference in the melting point of MgO and P₄O₁₀ (2mks)

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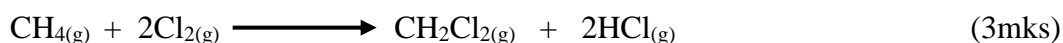
- (ii) Name the compound in the above table that will dissolve both in dilute hydrochloric acid and dilute sodium hydroxide (1mk)

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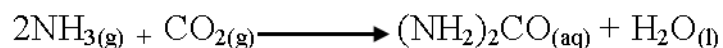
22. Study the information in the table below and answer the questions that follow

Bond	Bond energy (KJmol ⁻¹)
C – H	414
Cl – Cl	244
C – Cl	326
H - Cl	431

Calculate the enthalpy change of the reaction



23. Urea, $(\text{NH}_2)_2\text{CO}$ is prepared by the reaction between ammonia and carbon(IV) oxide



In one process, 340kg of ammonia were reacted with excess carbon (IV) oxide.

Calculate the moles of urea that were formed. (H = 1.0, C = 12.0, N = 14.0, O = 16.0) (2mks)

24. What is the oxidation number of

(i) Chromium in $\text{Cr}_2\text{O}_7^{2-}$ (1mk)

(ii) Phosphorus in PO_4^{3-} (1mk)

25. In an attempt to prepare sulphur (IV) oxide gas, dilute sulphuric acid was reacted with barium carbonate. The yield of sulphur dioxide was found to be negligible. Explain (2mks)

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26. An element P has a relative atomic mass of 88. When a current of 0.5 amperes was passed through the fused chloride of P for 32 minutes and 10 seconds, 0.44g of P were deposited at the cathode. Determine the charge on an ion of P. (1 faraday = 96500 coulombs) (3mks)

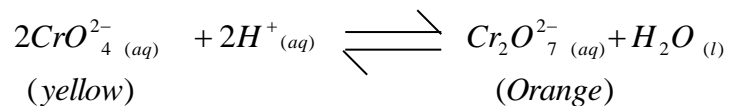
27. In a filtration experiment 25cm^3 of solution of sodium hydroxide containing 8g per litre was required for complete neutralization of 0.245g of a dibasic acid.
Calculate the relative molecular mass of the acid. (Na = 23.0, O = 16, H = 1) (3mks)

28. (i) Name one drying agent for hydrogen chloride (1mk)
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(ii) State and explain the observation that would be made when hydrogen chloride gas is bubbled into a solution of silver nitrate. (2mks)
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29. A solution contains 7.5g of solution in 20cm^3 of water. When the solution is cooled crystals begin to appear at 10°C . Calculate the solubility of the solute at 10°C . (2mks)

30. An equilibrium exists between the chromate ion (CrO_4^{2-}) and the dichromate ion ($Cr_2O_7^{2-}$) as represented by the following equation



State and explain the observation made on adding aqueous potassium hydroxide solution to the equilibrium mixture (2mks)

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31. In an experiment to study the properties of concentrated nitric acid, a mixture of the acid and wood charcoal was heated in a boiling tube.

(a) What observations were made? Explain your answer (2mks)

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

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