

Name:.....Index No.....

P525/1
CHEMISTRY
PAPER 1
AUGUST 2004
2 HOURS 45 MINUTES

ST. HENRY'S COLLEGE KITOVU
S.6 MOCK EXAMINATIONS 2004
CHEMISTRY
PAPER 1

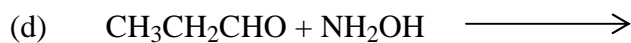
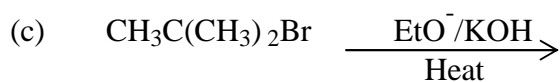
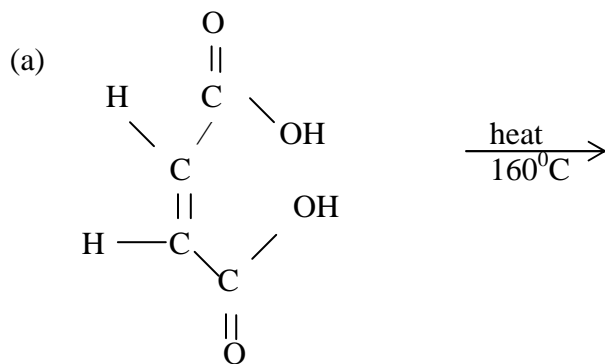
INSTRUCTIONS TO CANDIDATES:

1. Answer all questions in Section A and six (6) questions in Section B.
2. All questions must be answered in the spaced provided.
3. Periodic table with relative atomic masses will be provided.

FOR EXAMINERS USE ONLY																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

3. Complete the following reactions.

(1 ½ marks each)



4. (a) Arrange the following compounds in order of increasing boiling points. (1 mark)

$\text{CH}_3(\text{CH}_2)_6\text{CH}_3$, $\text{CH}_3\text{C}(\text{CH}_3)_2\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_3$ and
 $\text{CH}(\text{CH}_3)_2(\text{CH}_2)_4\text{CH}_3$.

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(b) Explain why the boiling points of compounds in (a) above increase in that order. (2 ½ marks)

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5. Write an ionic equation for the reaction between excess sodium hydroxide and
(a) Silicon (IV) oxide. (1 ½ marks)

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(b) Lead (II) oxide. (1 ½ marks)

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(c) Zinc (II) oxide. (1 ½ marks)

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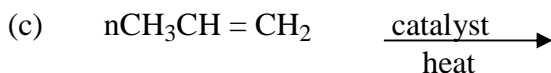
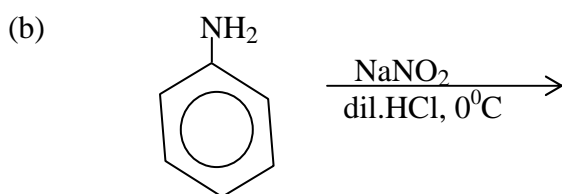
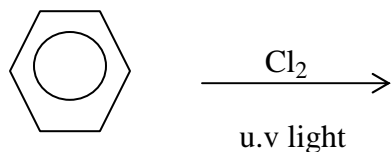
6. (a) One of the properties of transition metals is complex ion formation.
(i) Define the term 'complex ion'. (2 marks)

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(ii) Explain why transition metals form many complexes. (2 ½ marks)

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8. Complete the following equations and write the IUPAC name of the major organic product. (1 ½ marks each)



9. (a) The relative molecular mass of aluminium chloride in vapour phase is 267.
For aluminium chloride in its vapour state write its:
(i) Molecular formula. (1 mark)

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(ii) Structural formula. (1 mark)

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- (b) With reference to aluminium oxide, explain the term amphoteric oxide, use equations where necessary. (3 marks)

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SECTION B

Answer only **six (6)** questions from this section.
All questions carry the same marks.

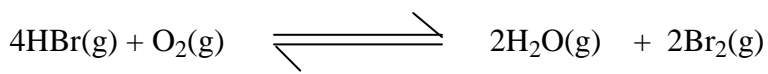
10. (a) Define the terms:
(i) order of a reaction. (2 marks)

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- (ii) molecularity of a reaction. (2 marks)

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- (b) Consider the reaction below:



A student wrote the rate law for this reaction with respect to oxygen as

$$\frac{d[\text{O}_2]}{dt} = -K[\text{HBr}]^4 [\text{O}_2]$$

In practice it is found that the rate law for this reaction is

$$\frac{d[\text{O}_2]}{dt} = -K_1[\text{HBr}] [\text{O}_2]$$

- (i) Explain what is wrong with the student's rate law. (2 marks)

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(ii) The rate law for this reaction with respect to hydrogen bromide is given by

$$\frac{d[\text{HBr}]}{dt} = -K_2[\text{HBr}][\text{O}_2]$$

From the two equations, derive the relationship between K_1 and K_2 . (2 ½ marks)

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11. (a) Give the structure formulae of the following compounds. (1 mark each)

(i) 2, 3-dimethyl but-2-ene.

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(ii) cis-2-methyl hept-3-ene

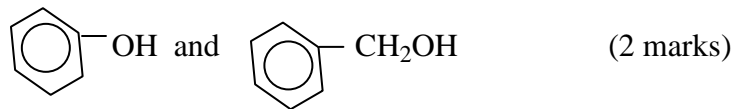
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(iii) trans-2,3-chlorobut-2-ene

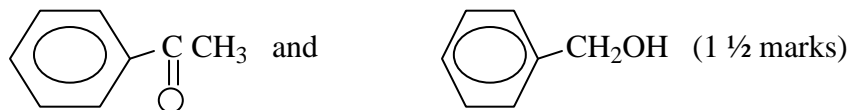
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(b) State one reagent, you can use to distinguish between the following compounds. State the observations in each case.

(i)



(ii)



(iii) 2-methyl butan-2-ol and pentan-2-ol

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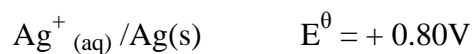
12. (a) The atomic number of copper is 29. Write down the electronic configuration of copper. (1 mark)

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- (b) A current of 0.20A was passed for 20 minutes through a solution of sulphuric acid using platinum electrodes. Find the volume of oxygen in cm^3 liberated at s.t.p. (Faraday's constant 96500 Coulombs per moles, molar gas volume is 22400 cm^3). (3 ½ marks)

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- (c) A cell is constructed between copper and silver. Standard electrode potentials for the two metals are given below:



(i) Name:

Cathode:..... (½ mark)

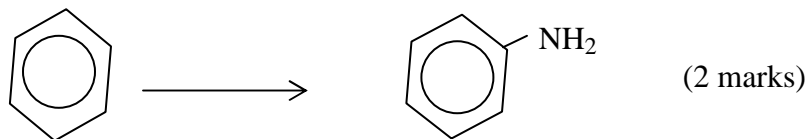
Anode:..... (½ mark)

(ii) Calculate the cell electromotive force. (2 marks)

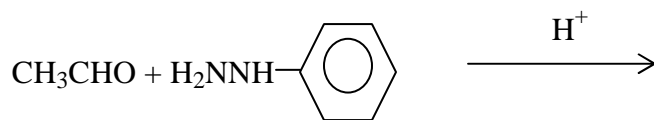
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14. (a) Show how the following conversions can be effected stating the conditions for the reaction.

(i)



- (b) Complete the following equation and outline a mechanism for the reaction. (4 ½ marks)



15. (a) State conditions for the reaction between hydrogen and bromine. (1 mark)

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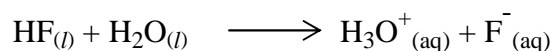
(b) (i) State the oxidation state of chlorine in the compound dichloride pentoxide (Cl₂O₇) (½ mark)

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(ii) Write the equation of reaction between dichloride pentoxide (Cl₂O₇) and water and name the compound produced. (2 marks)

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(c) Hydrogen fluoride dissolves in water according to the equation:



Explain what happens when the concentration of hydrogen fluoride is increased.

(3 marks)

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(d) At 0°C hydrogen fluoride is a liquid whereas the rest of the hydrides of group VII are gases. Explain. (2 marks)

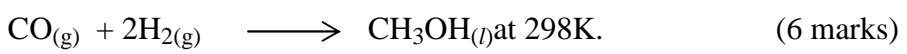
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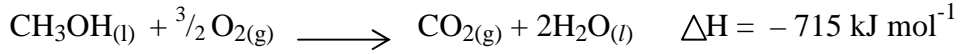
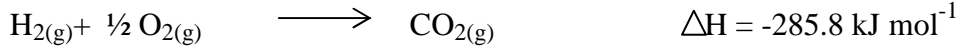
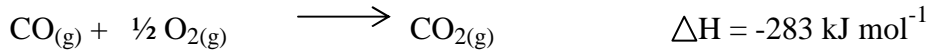
16. (a) State Hess's law of constant heat summation. (2 marks)

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(b) (i) Use the data below to calculate the enthalpy change for the reaction.



Data:



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(ii) Name the type of reaction in (b) (i) above. (½ mark)

17. (a) Beryllium is in group II of the periodic table but in some reactions it resembles aluminium in group III.

(i) State two properties in which Beryllium resembles aluminium. (2 marks)

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(ii) State two reasons why these elements have similar properties. (2 marks)

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(b) Lithium is a very small ion as compared to caesium but in aqueous solutions, caesium has a high electrical conductivity than lithium. Briefly explain. (2 marks)

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(c) Briefly explain what is meant by SP^3 hybridization.

(2 ½ marks)

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