JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL & PHYSICAL SCIENCES

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION SCIENCE

1ST YEAR 2ND SEMESTER 2014/2015 ACADEMIC YEAR

REGULAR RESIT

COURSE CODE: SCH 104:

COURSE TITLE: BASIC ANALYTICAL

EXAM VENUE: LAB 1 **STREAM: (BED. SCIENCE)**

DATE: 06/05/16 **EXAM SESSION: 9.00 – 11.00 AM**

TIME: 2.00 HOURS

Instructions:

1. **Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

Question One (1) (**30 Marks**)

(a)Describe the systematic steps involved in gravimetric analysis. (**6 marks**)

(b) A sample of $FeSO_4(NH_4)_2SO_4.6H_2O$ containing only inert impurities weighs 1.5g. After the sample was dissolved, the Iron was oxidized and then precipitated as $Fe(OH)_3$. Then the Iron hydroxide $Fe(OH)_3$ was ignited giving 0.3417g of Iron (II) oxide Fe_2O_3.

Calculate the percentage of Sulphur (S) in the sample.

$2FeSO_4(NH_4)_2SO_4.6H_2O \longrightarrow 2Fe(OH)_3 \longrightarrow Fe_2O_3$ (**8 marks**)

(c) 12g of ammonium Iron (II) Sulphate crystals were made up to 250 cm^3 of acidified aqueous solution. 25 cm^3 of this solution required 25.5 cm^3 of 0.03M Potassium dichromate for oxidation. Calculate the number of moles of water of crystallization in the crystal $FeSO_4.(NH_4)_2SO_4.xH_2O$ (**10 marks**)

(d) Describe the principle stages in Chemical analysis (**6 marks**)

Question Two (2) (**20 Marks**)

(a) What is meant by buffer capacity? (**5 marks**)

(b) The ionization constant for a certain acid, is 4.5×10^{-4} at 298k.

(i) What concentration of the acid would be required to produce $[H^+]$ of 3.2×10^{-3} M (**5 marks**)

(ii) What would be its degree of ionization? (**5 marks**)

(c) Describe the working principle of a flame test (**5 marks**)

(**9 marks**)

Question Three (3) (**20 Marks**)

(a) Using a suitable example illustrate the reaction mechanism for the following;

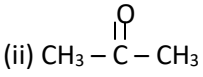
(i) Aldol condensation for aldehydes (**5 marks**)

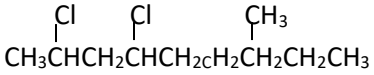
(ii) Cannizaro reaction for aldehydes (**6 marks**)

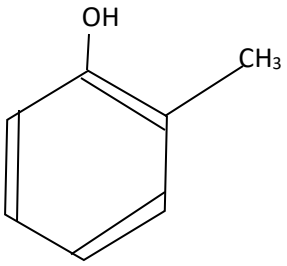
(iii) Benzaldehyde reacting with Phenylhydrazine (**3 marks**)

(b) Give the IUPAC name for the following;

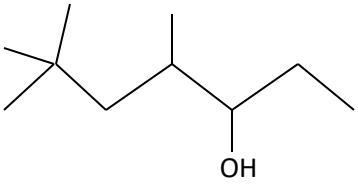
(i) $CH_3 - CH = CH - CHO$ (**1 marks**)

(ii)  (**1 marks**)

(iii)  (**1 marks**)

(iv) 

(**1 marks**)

(v) 

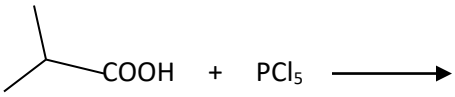
(**1 marks**)

Question Four (4) 20 Marks

(a) A mixture of 10 cm^3 of a gaseous hydrocarbon and 100 cm^3 of Oxygen (excess) was exploded. The volume after explosion was 75 cm^3 and this was reduced to 35 cm^3 on treatment with Potassium hydroxide solution.

Deduce the molecular formula of the hydrocarbon and give its possible structural formulae and name them using IUPAC system (All measurement were made at the same temperature and atmospheric pressure) 8 marks

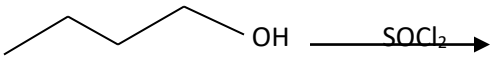
(b) Complete the following reaction;

(i) 

(**2 marks**)

(ii) $CH_3CHO + H_2N - NH_2 \longrightarrow$ (**2 mark**)

(iii) $CH_4 + Cl_2 \xrightarrow{\text{Heat or light}}$ (**2 marks**)
i.e. (Illustrate full chlorination of methane)

(iv) 

(**2 mark**)

(c) (i) How can one distinguish between an aldehyde and a ketone in a laboratory

(**2 marks**)

(ii) Why is Toluene more acidic than alkanes, illustrate your answer by showing how Benzyl anion is able to be stabilized by delocalization of the negative charge into the Benzene ring.

(**2 mark**