JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (PUBLIC/COMMUNITY HEALTH)

1ST YEAR 1ST SEMESTER 2019/2020 ACADEMIC YEAR

KISUMU CAMPUS

COURSE CODE: SCH 3112

COURSE TITLE: ORGANIC CHEMISTRY

EXAM VENUE: **STREAM: (BSc. Public & Commu. Health)**

DATE: 13/08/2019 **EXAM SESSION: 2.00-4.00PM**

TIME: 2:00 HRS

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**
4. **Some important information/formula are found on the last page of the questions paper**

SECTION A 30 MRKS

QUESTION 1

a) Define the term pH 1 mrk

b) Determine the pOH of a solution of Sulphuric acid whose concentration is given as 0.4 M 4mrks

c) A patient was admitted in a hospital with chronic obstructive pulmonary disease (COPD) characterized with shortness of breath due to Pneumonia. His arterial blood show: pH 7.29, $PaCO_2$ 65.3 mmHg, bicarbonate 27 mmol/l. Classify his acid-base balance as

   a. Acidosis or alkalosis, and as metabolic or respiratory. Explain 4 mrks
   b. Propose the mechanism by which pneumonia contributed to this disorder. 2 mrks

d) Explain;

   a. how the renal system compensates for respiratory acidosis and alkalosis 4 mrks
   b. how the respiratory system would compensate for acidosis 2 mrks

e) Name **TWO** potential causes of Acidosis. 2 mrks

f) Draw the structure for each of the following compounds. 4 mrks

   i. 2,3-dimethylbutane
   ii. 4-ethyl-2-methylheptane

g) State the Le Chatelier's Principle 2 mrks

h) With the help of an example explain how concentration affects chemical equilibrium. 5 mrks

SECTION B

QUESTION 2 20 MARKS

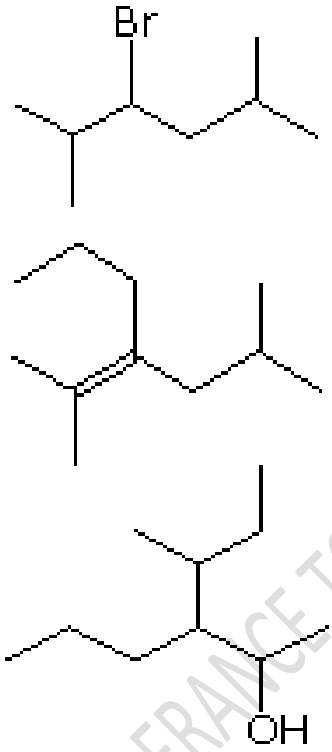
a) Consider the reaction: $\mathbf{P_4 + 6\ H_2 \rightarrow 4\ PH_3}$. A rate study of this reaction was conducted at 298 K. The data that were obtained are shown in the table.

$[P_4]$, mol/L	$[H_2]$, mol/L	Initial Rate, mol/(L · s)
0.0110	0.0075	3.20×10^{-4}
0.0110	0.0150	6.40×10^{-4}
0.0220	0.0150	6.39×10^{-4}

i. What is the order with respect to **P_4 and H_2** **6mrks**
ii. Write the rate law for this reaction 2 mrks
iii. Determine the value and units of the rate constant, k. 3 mrks

b) Explain why unbranched hydrocarbon molecules have lower boiling point than straight chain molecules. 3 mrks

iv. Give IUPAC name for the following organic compounds 6 mrks



QUESTION 3 20 MARKS

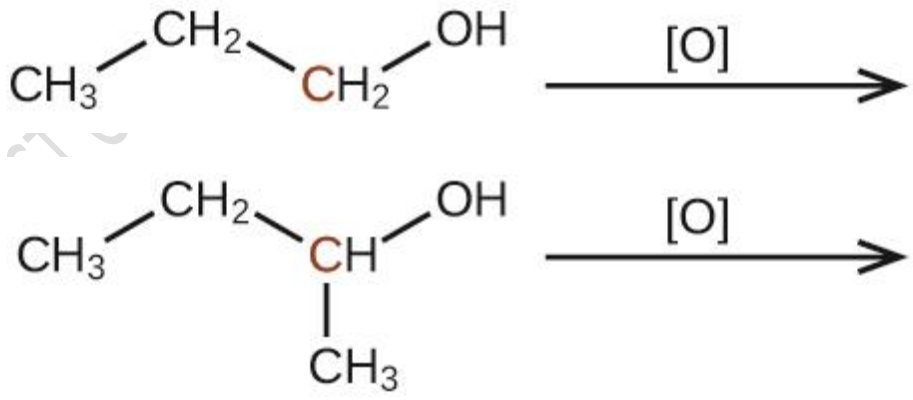
a) Explain ONEreason why aldehydes are more reactive than ketones. 2 mrks

b) Draw the structure of the following organic compounds 6mrks

i. 1,3-dichloro-4-ethyloct-2-ene

ii. 4- methylhexanoic

c) Predict the products formed in each of the reactions below 4 mrks



d) Define the term equivalence point 2 mrks

e) If 20.0 cm^3 of a Sulphuric acid solution was titrated with a standardized solution of 0.0500 mol/dm^3 (0.05M) potassium hydroxide. And using phenolphthalein indicator for the titration, the acid required 36.0 cm^3 of the alkali KOH for neutralization.

Determine the concentration of the acid in g/lit? H=1; S=32; O= 16; K= 40 6 mrks

QUESTION 4 20 MARKS

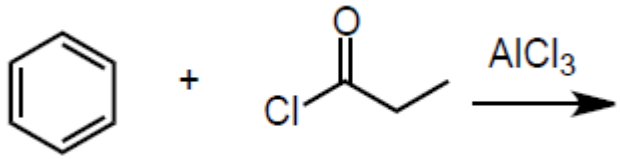
a) State Le Chatelier's Principle 2 mrks

b) Explain how temperature and catalystaffect rate of reactions. 4 mrks

c) The reaction below gives two products in unequal amounts. Identify the two products and state which one is the major product.

Reaction of but-1-ene with HBr 2 mrks

d) Study the Friedel-Crafts Acylation reaction below predict the compounds formed 3 mrks



e) Standard electrode potential provided below for use to answer the questions below;

Equations	E^o
$Cr^{+3}_{(aq)} + 3e^- \rightarrow Cr_{(s)}$	E^0 = -0.74 V
$Cu^{+2}_{(aq)} + 2e^- \rightarrow Cu_{(s)}$	E^0 = +0.34 V
$Fe^{+2}_{(aq)} + 2e^- \rightarrow Fe_{(s)}$	E^0 = -0.44 V
$I_{2\,(s)} + 2e^- \rightarrow 2I_{(aq)}$	E^o = +0.54 V

i. Use the half-cell reactions for Fe(s)/$Fe^{2+(}$aq) and Cu(s)/ $Cu^{2+(}$aq) to construct an electrochemical cell and predict its standard voltage and state whether the reaction is spontaneous or not. 5mrks

ii. State **ONE** function of the salt bridge in an electrochemical cell 2mrks

iii. Briefly explain one importance of redox process in industrial process 2 mrks

END