JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE COMMUNITY HEALTH AND DEVELOPMENT & BACHELOR SCIENCE PUBLIC HEALTH

MAY –SEPTEMBER 2019 CLASS

COURSE CODE: SCH 3112

COURSE TITLE: ORGANIC CHEMISTRY

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 4 mrks

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 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: P_4 + $6 H_2$ → $4 PH_3$. 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 **P₄ and H₂**   **6 mrks**
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
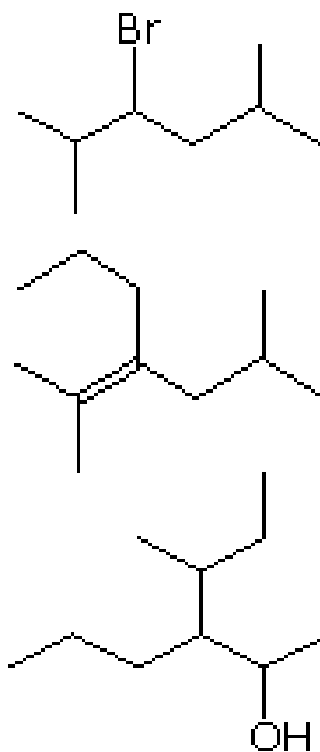
QUESTION 3   20 MARKS

a) Explain ONE reason why aldehydes are more reactive than ketones.   2 mrks
b) Draw the structure of the following organic compounds   6 mrks
      i. 1,3-dichloro-4-ethyloct-2-ene
      ii. 4- methylhexanoic
c) Predict the products formed in each of the reactions below   4 mrks
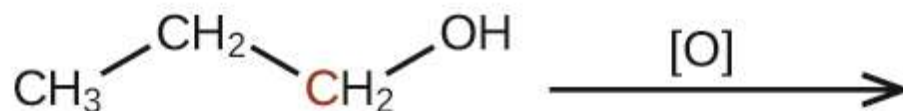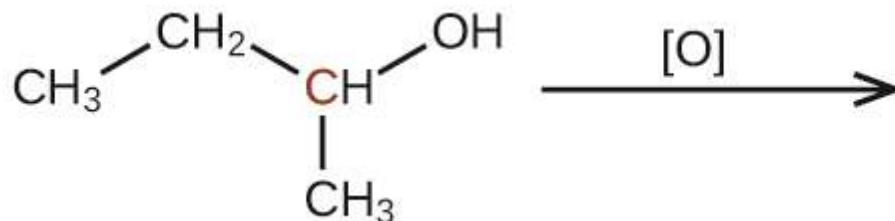
d) Define the term equivalence point   2 mrks

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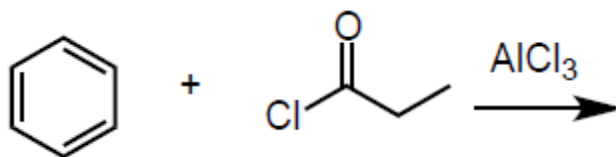
e) Standard electrode potential provided below for use to answer the questions below;

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^0 = $ +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.   5 mrks

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

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

END