



DEPARTMENT OF CHEMISTRY,
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SECOND SEMESTER EXAMINATION 2018/2019 SESSION

COURSE CODE: CHM 221

UNITS: 2

COURSE TITLE: ORGANIC CHEMISTRY II

TIME ALLOWED: 2 HOURS

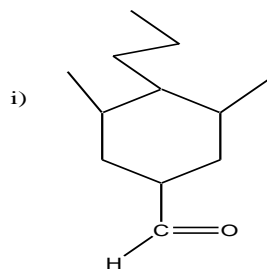
INSTRUCTIONS: ANSWER ANY THREE (3) QUESTIONS

Q1. a. Give the structure of each of the following compounds:

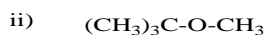
- (i) 3-Methyl-1-phenylbutanol
- (ii) 3-Bromo-1-phenylbutanone
- (iii) *m*-Toluyaldehyde
- (iv) Di-propylether

(2 marks)

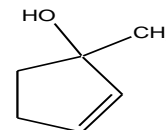
b. Give the I.U.P.A.C name of each of the following compounds:



(2 marks)

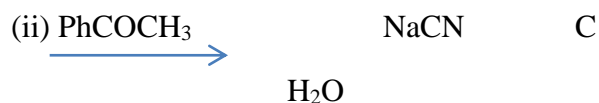


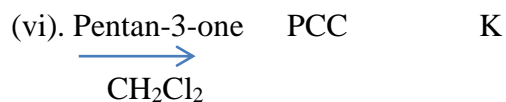
(iii)



c. If you are given 10 cm^3 of an unknown solution of a pure carbonyl compound, using only a solution of 2, 4- Dinitrophenyl hydrazine in the presence of heat; explain using chemical equations how would you identify which class the compound belongs? (3 marks)

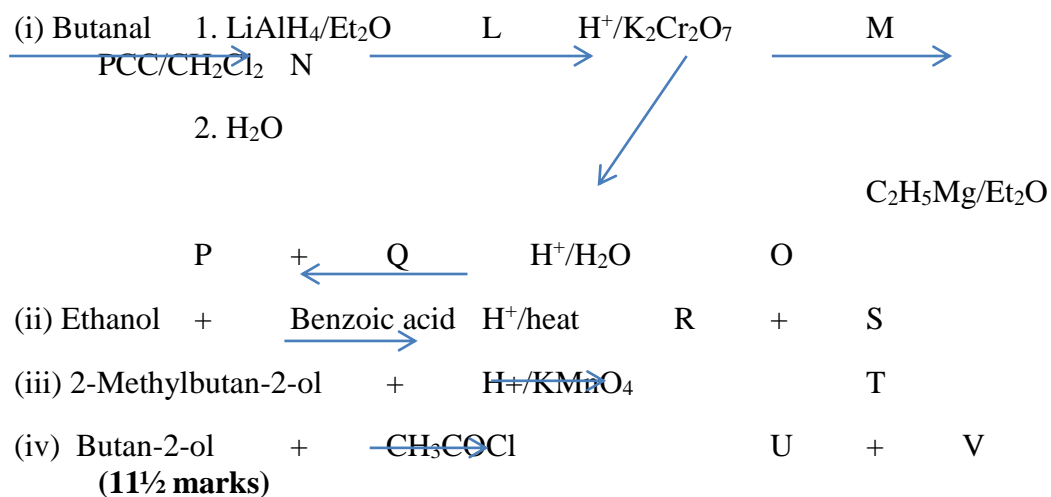
d. For the following conversions, give structures and names of compounds A – K (13 marks)





Q2. a. Propanone (58 gmol^{-1}) boils at 56°C and is miscible with water in all proportions, while propanol (60 gmol^{-1}) boils at 97°C and is miscible with water in all proportions. Justify **(5 marks)**

b. For the following conversions, give structures and names of compounds L – V



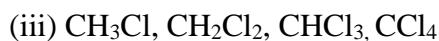
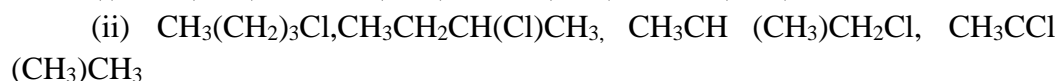
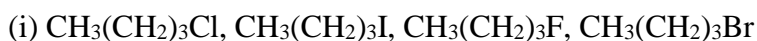
c. Give the structures and names of all the isomers of $\text{C}_5\text{H}_{12}\text{O}$
(3½ marks)

Q3. (a) Compounds A, B, C, and D have the same molecular formula (C_4H_6). Each of these compounds decolourises bromine water in carbon tetrachloride. Compound A gives a positive test with AgNO_3 and CuCl while compound B showed no reaction to both AgNO_3 and CuCl but reacts with ozone in $\text{Zn/H}_2\text{O}$ solution to give 2 moles of Ethanoic acid. Compound C undergoes both 1,2 and 1,4 addition reaction on treatment with 1 mole of HBr . Compound D undergoes hydrogenation reaction in the presence of a Ni catalyst to yield cyclobutane.

i) Make deductions from the above statements and give the structural formula/name of compounds A, B, C and D. **(8 marks)**

ii) What products would be formed when compound A reacts with ozone in the presence of $\text{Zn/H}_2\text{O}$ **(2 marks)**

(b) Arrange the following in order of increasing boiling point/melting/density **(10 marks)**



(iv) CH_3Br , $\text{C}_2\text{H}_5\text{Br}$, $\text{CH}_3(\text{CH}_2)_2\text{Br}$, $\text{CH}_3(\text{CH}_2)_3\text{Br}$

(v) Write an equation for the reaction between propanone and methyl magnesium bromide

Q4. (a) Starting with ethane, propose a suitable route for the preparation of the following compounds i) Butan-1-ol (ii) Butan-2-ol (iii) methanoic and propanoic acid

(iv) Butan-2-one **(10 marks)**

(b) Starting with Benzene, outline the synthesis route for the following compounds

(i) ortho and para-nitrotoluene (ii) meta-nitrotrifluoromethylbenzene

(iii) para-bromonitrobenzene (iv) ortho and para-chlorophenol **(10**

marks)