Uzoma kaosisochukwu
chinaelo
19/mhs01/431
Mbbs

CHM 102 ASSIGNMENT ON CARBOXYLIC ACIDS

1.
IUPACNAMESOFGIVENORGANICCOMPOUNDS

HCOOH- Methanoic acid
HOOCCH2C H2C H2C OOH- Pentan-1, 5-dioic acid
CH3C H2C H2C OOH- Butanoic acid
HO2C -CO2H - Ethanedioic acid
CH3(CH2) 4C OOH- Hexanoic acid
CH3C H=CHCH2C H2C OOH- Hex-4-enoic acid

2.PHYSICALPROPERTIESOF CARBOXYLICACIDS

i. Physical appearance: All simple aliphatic carboxylic acids up to C10 are liquids at

room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid(acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

ii Boiling points: Boiling point increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

iiiSolubility: lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water; this largely due to their ability to form hydrogen bonds with water molecules. The water solubility of the acids decreases as the relative molecular mass

increases because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents.

3 INDUSTRIAL PREPARATIONS OF CARBOXYLIC ACIDS

i From ethanol
HC≡CH dil. H_2SO_4/ $HgSO_4$ CH_3COOH CH_3COOH

ii. From petroleum

Equation:
C5- C7 O_2/ High temperature C5- C7 Carboxylic acids

4. SYNTHETICPREPARATIONSOFCARBOXYLICACIDS

I. Oxidation of primary alcohols and aldehydes
O_2 /$(CH_3COO)_2Mn$
Oxidation of

primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e K2C r2O 7 O R KMnO4) in acidic solution.
RCH2O H [O], excess acid/ KMnO4 RCHO [O] RCOOH

II. Carbonation of Grignard reagent
Aliphatic carboxylic acids are obtained by bubbling carbon (IV) oxide into the Grignard reagent and then hydrolyzed with dilute acid
RMgBr + CO2 (C2H 5) 2O RCOOMgBr H2O /dil. acid RCOOH + MgBrOH R may be 10 , 20 , 30 aliphatic alkyl or aryl radical.

III. Hydrolysis of nitriles (cyanides) or esters
RCN + 2H2O H+ RCOOH + NH4+
(R=alkyl or aryl radical)
RCOOR` H2O /H+ reflux RCOOH + R`OH

5. CHEMICALREACTIONS OFCARBOXYLICACIDS

I Reduction to primary alcohol
4RCOOH + 3LiAlH4
(C2H 5) 2O (RCH2O)4A lLi + 2LiAlO2 + 4H2 | 4H2O
4RCH2O H + Al(OH)3 + LiOH L iAlH4 CH3C H2CH 2C H2OH
CH3C H2C H2C OOH

ii Decarboxylation
This involves removal of the carboxyl group from the acid to give a hydrocarbon or its derivative
Thermal decarboxylation
butanol

Carboxylic acids with a strong electron attracting group e.g –COOH, -CN, NO 2, C=O decarboxylate readily on heating to 100-1500 c while others decarboxylate when their salts are heated with soda lime CH3C H2C H2C OONa

+ NaOH fuse CH3C H2C H 3 + Na2C O3

Kolbe synthesis

2CH3C H2C OONa + 2H2O electrolysis/aq. CH3O H CH 3(CH2) 2C H3 + CO2(anode) + 2NaOH + H 2(cathode) III.

iii Esterification

In the presence of strong acid catalyst, carboxylic acids react with alcohols to form esters

C H 3 C H 2 C H 2 C O O H + C H 3 C H 2 C H 2 O H H +