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DEPARTMENT-PHARMACY

MATRIC NO-19/MHS11/117

**QUESTION 1**-DISCUSS THE TWO MAJOR CLASSES OF ALKANOLS AND GIVE TWO EXAMPLEES EACH FOR EACH CLASS.

ANSWER-[1]; CLASSOFICATION BASED ON THE NUMBER OF HYDROXYL FUNCTIONAL GROUP (oH) PRESENT.

E.G (I) MONOHYDRIC ALKANOL- THEY HAVE ONE (oH) GROUP ATTACHED TO THE ALKYL CHAIN E.G METHANOL, ETHANOL.

(ii)POLYHYDRIC ALKANOLS- CONTAIN MORE THAN ONE HYDROXYL GROUP (oH) ATTACHED TO THE ALKYL CHAIN.

I.E IF THERE ARE TWO (oH) GROUP IT IS CONSIDERED AS A DIHYDRIC ACID, WHILE IF THERE ARE THREE (oH) GROUP IT IS KNOWN AS A TRIHYDRIC ACID.

[2]; BASED ON THE POSITION OF THE CARBON ATOM HOLDING THE HYDROXYL GROUP (oH).

E.G (I) PRIMARY ALKANOLS – IF THE CARBON ATOM HOLDING THE HYDROXYL GROUP (oH) OF THE ALKANOL IS ATTACHED TO ONLY ONE CARBON ATOM NEXT TO IT IS A PRIMARY ALKANOL. E.G METHANOL, ETHANOL ETC.

(ii) SECONDARY ALKANOLS-IF THE CARBON ATOM HOLDING THE HYDROXYL GROUP (oH) OF THE ALKANOL IS ATTACHED TO TWO OTHER CARBON ATOMS NEXT TO IT THEN IT IS A SECONDARY ALCHOL. E.G BUTAN-2-OL.

**QUESTION 2**- IN THE GRINGARD SYNTHESIS OF ALKANOLS REACT A NAMED GRINGARD REAGENT WITH CH3CH2CH2CH2C=OCH2CH2CH3. SHOW THE REACTION STEPS

 ANSWER- COMPOUND GIVEN = CH3CH2CH2CH2C=OCH2CH2CH3 (OCTAN-4-ONE)

IT WILL REACT WITH A GRINGARD REAGENT E.G (ETHYL MAGNESIUM BROMIDE) C2H5MgBr TO GIVE A TERTIARY ALANOL.

CH3CH2CH2CH2C=OCH2CH2CH3+ C2H5MgBr 4-ETHYLOCTAN-4-OL

**QUESTION 3**- DISCUSS THE INDUSTRIAL MANUFACTURE OF ETHANOL SHOWING ALL REACTION EQUATIONS AND THE NECESSARY ENZYMES AND TEMPERATURE OF REACTION.

ANSWER- ETHANOL IS MANUFACTURED INDUSTRIALLY BY THE FORMATOIN OF STARCH IN THE PRESENCE OF SUITABLE MICROORGANISMS WHICH PRODUCES OXYGEN THAT ACTS AS A CATALYST. STARCH IS A POLYSACCHARIDE CARBOHYDRATE AND AN IMPORTANCE SOURCE OF ETHANOL.

PROCESS 1 – EXTRACTION OF STARCH-(USING POTATO)- THE POTATO IS STEAMED AT A TEMPERATURE OF 140°C TO 150°C UNDER PRESSURE TO PREPARE A STARCH SOLUTION KNOWN AS MASH.

PROCESS 2- GERMINATION-BEFORE HYDROLYSIS STARCH FIRST UNDERGO GERMINATION AT

10°C TO 13°C FOR A FEW DAYS. THIS GERMINATED STARCH IS KNOWN AS MALT.

PROCESS 3- HYDROLYSIS OF STARCH- STARCH IS HYDROLYZED TO MALTOSE BY AN ENZYME KNOWN AS DIASTASE AT A 60°C.

2(C6H10O5) + nH2O 60°C DIASTASE n(C12 H22O11 )

STARCH + WATER CATALYST MALTOSE

PROCESS 4- FERMENTATION-THE YEAST IS FINALLY ADDED TO MALTASE. YEAST SECRETS TWO ENZYMES (MALTASE-CONVERTS MALTOSE TO GLUCOSE AND ZYMASE- CONVERTS GLUCOSE TO ETHANOL).

C12H22O11 + H2O 15°C MALTASE 2C6H12O6

MALTOSE + WATER YEAST ENZYME GLUCOSE

C6H12O6 15°C ZYMASE C2H5OH + CO2

GLUCOSE YEAST ENZYME ETHANOL + CARBON (iv) OXIDE

**QUESTION 4-** DETERMINE THEPRODUCT OBTAINED IN THE REDUCTION OF ALKANONE AND ALKANAL. USE A SPECIFIC EXAMPLE FOR EACH AND SHOW THE EQUATION OF REACTION.

ANSWER- REDUCTION OF ALKANONE YEILDS SECONDARY ALCHOL WHILE THE REDUCTION OF AN ALKANAL OR AN ALDEHYDE YEILDS A SECONDARY ALKANOL. THE REDUCING AGENT USED IN THIS PROCESS IS LITHIUM ALUMINIUM HYDRIDE (LIALH4) OR SODIUM BORO HYDRIDE (NABH4)

\*REDUCTION OF ALKANONES TO GIVE SECONDARY ALKANOL

CH3C2H5-C=O LIALH4 CH3C2H5CHOH

\*REDUCTION OF ALKANALS TO GIVE PRIMARY ALKANOL

CH3CH2CH=O LIALH4/ H2O CH3CH2CH3OH