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**Chemistry 102**

**Department:Pharmacy**

**Matric no:19/mhs11/028**

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

ANSWER-[1]; CLASSIFICATION 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  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3$ . SHOW THE REACTION STEPS

ANSWER- COMPOUND GIVEN =  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3$  (OCTAN-4-ONE)

IT WILL REACT WITH A GRINGARD REAGENT E.G (ETHYL MAGNESIUM BROMIDE)  $\text{C}_2\text{H}_5\text{MgBr}$  TO GIVE A TERTIARY ALANOL.

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3 + \text{C}_2\text{H}_5\text{MgBr} \longrightarrow 4\text{-ETHYLOCTAN-4-OL}$

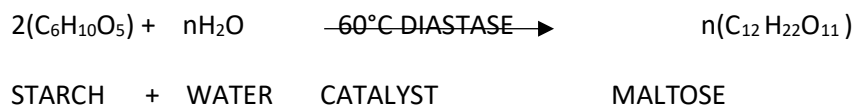
**QUESTION 3**- DISCUSS THE INDUSTRIAL MANUFACTURE OF ETHANOL SHOWING ALL REACTION EQUATIONS AND THE NECESSARY ENZYMES AND TEMPERATURE OF REACTION.

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

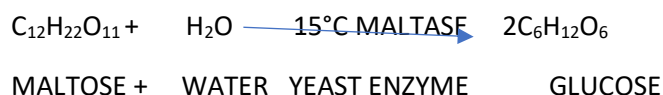
PROCESS 1 – EXTRACTION OF STARCH-(USING POTATO)- THE POTATO IS STEAMED AT A TEMPERATURE OF 140°C TO 150°C UNDER PRESSURE TO PREPARE A STARCH SOLUTION KNOWN AS MASH.

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.



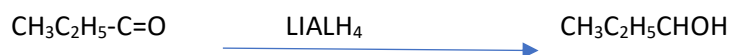
PROCESS 4- FERMENTATION-THE YEAST IS FINALLY ADDED TO MALTASE. YEAST SECRETS TWO ENZYMES (MALTASE-CONVERTS MALTOSE TO GLUCOSE AND ZYMASE- CONVERTS GLUCOSE TO ETHANOL).



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

ANSWER- REDUCTION OF ALKANONE YIELDS SECONDARY ALCOHOL WHILE THE REDUCTION OF AN ALKANAL OR AN ALDEHYDE YIELDS A PRIMARY ALKANOL. THE REDUCING AGENT USED IN THIS PROCESS IS LITHIUM ALUMINIUM HYDRIDE ( $\text{LiAlH}_4$ ) OR SODIUM BORO HYDRIDE ( $\text{NaBH}_4$ )

\*REDUCTION OF ALKANONES TO GIVE SECONDARY ALKANOL



\*REDUCTION OF ALKANALS TO GIVE PRIMARY ALKANOL

