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**DEPARTMENT: DENTISTRY AND DENTAL SURGERY.**

**COURSE: CHM 102**

**QUESTION 1:**

1. Classification based on the number of hydrogen atoms attached to the carbon carrying the hydroxyl group. If the number of hydrogen atoms attached to the carbon bearing the hydroxyl groups are 2 or 3, It is a primary alcohol (1°). It is called a secondary alcohol (2°) when it has one hydrogen atom attached to the carbon bearing the hydroxyl group and if no hydrogen atom is attached to the carbon bearing the hydroxyl group, It is called a tertiary alcohol (3°).

Examples:

* CH3OH- Methanol (1°)
* CH3CH(OH)CH3- Propan-2-ol (2°)
* (CH3)2C-OH- 2 methyl propan-2-ol (3°).

1. Classification based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols (Glycols) have 2 hydroxyl groups present in the alcohol structure, Trihydric alcohols (Triols) have 3 hydroxyl groups present in the alcohol structure. Polydric alcohols (Polyols) have more than 3 hydroxyl groups.

Examples:

* CH3CH2CH2OH ; Propanol, Monohydric alcohol.
* OHCH2CH2OH ; Ethane 1,2-diol, Dihydric alcohol.
* OHCH2CH(OH)CH2OH ; Propane 1,2,3-triol, Trihydric alcohol.

**QUESTION 2:**

Lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decrease with increasing molecular mass. All monohydric alcohols are soluble in organic solvents.

**QUESTION 3:**

Carbohydrates such as starch are major groups of natural compounds that can be made to yield ethanol by the process of fermentation.

The starch containing materials includes molasses, potatoes, cereals, rice and on warming with malt to 60°C for a specific period of time are converted into maltose by the enzyme contained in the malt.

2(C6H10O5)n + nH2O nC12H22O11

60°C/diastase maltose

The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C.

C12H22O11 + H2O 2C6H12O6

Maltose 15°C/maltase Glucose

The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme zymase also contained in yeast.

C6H12O6 2CH3CH2OH + 2CO2

Glucose 15°C/Zymase Ethanol.

**QUESTION 4:**

Reaction between 2-methyl propanal and butylmagnessiumchloride.

(CH3)2CHO reacts with CH3CH2CH2CH2MgCl (CH3)2

(CH3)2C=O + CH3CH2CH2CH2MgCl CH3CH2CH2CH2 C OMgCl + H2O

H H dilute acid

(CH3)2

CH3CH2CH2CH2 C OH + Mg(OH)Cl

H

2-methylpentan-3-ol.

**QUESTION 6:**

Reduction of 2-methylpropanone:

**QUESTION 7:**

Reduction of 2-methylpropanal:

(CH3)2CHO (CH3)2CH2OH

LiAlH4/(C2H5)2O 2-methylpropanol.

**QUESTION 8:**

Propan-1-ol to Propan-2-ol

CH3CH2CH2OH CH3CH-CH3

OH

CH3CH2CH2OH + H2SO4 CH3CH2CH2[OH2]OSO3H

-H2O

CH3CH2CH2 OSO3H

-H2SO4

CH3CH=CH2 + H2O CH3CH CH3

OH

Propan-2-ol.