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19/Mhs01/889.
Chemistry Ass'
Answer

1a) Classification based on the number of hydrogen atom attached to the Carbon atom bearing the hydroxyl group. If hydrogen is attached to the Carbon atom, it is called primary alkanols. If 2 is attached it is called secondary alkanols. If there is 3 attached it is known as tertiary alkanols e.g Ethanol - $CH_3CH_2OH$.
Methanol - $CH_3OH$.

b) Classification based on the number of hydroxyl group. There are monohydric, di and trihydric and also polyhydric alkanols. Monohydric has one hydroxyl group, dihydric has 2 & tri has 3. Polyhydric contains more than 3 hydroxyl group e.g
~~Ethanol~~ Ethane-1, 2 diol (Dihydric acid)
$OH\ CH_2\ CH_2\ OH$.
Butanol → $CH_3\ CH_2\ CH_2\ CH_2\ OH$ (monohydric).

2) Alcohols are soluble in water. This is due to the hydroxyl group in the alcohol which is able to form hydrogen bons with water molecules. Alcohols with a smaller hydrocarbon chain are very soluble. Also as the length of hydrocarbon chains increases, the solubility in water decreases. In the other hand they are ~~also~~ soluble in organic solvents, which is non-polar as the alcohol it self. also alcohol is ~~both~~ soluble in organic solvent (i.e) as the size of the alkyl group gets larger, alcohols become less soluble in water. Alcohols with 2 (ethanol) or 3 (n-propanol & Isopropanol) Carbon atoms are miscible with water and are great solvents for non-polar organic compounds.

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5) Industrial preparation of Ethanol: It can be prepared by either, By the fermentation of starch or By the fermentation of molasses.

a) By fermentation of starch ~~: Extraction of starch eg potatoes~~. Crushed potatoes is steamed at 140°C to 150°C under pressure to prepare starch solution (known as mash. Germination before hydrolysis, starch first Undergo germination at 10°C to 13°C for few days. This germinated starch is called MALT.

* HYDROLYSIS OF STARCH: ~~STARCH~~ is hydrolysed to maltose by an enzyme known as diastase.

~~2[(C6H10O5)+nH2O → n(C12H22O11)~~

Starch maltose.

$$2(C_6H_{10}O_5) + nH_2O \rightarrow n(C_{12}H_{22}O_{11})$$

* fermentation - finally yeast is added to maltose. Yeast secrets 2 enzymes:

i. maltase: converts maltose into glucose

ii. zymase: Converts glucose into ethanol.

$$C_{12}H_{22}O_{11} + H_2O \longrightarrow 2C_6H_{12}O_6$$

$$C_6H_{12}O_6 \longrightarrow C_2H_5OH + 2CO_2$$

second method by fermentation of molasses.

Method of preparation - ~~follow steps~~

a. DILUTE OF MOLASSES - first diluted with water in 1:5 (molasses: water) ratio by volume

b. ADDITION OF AMMONIUM SULPHATE.

c. ADDITION OF SULPHURIC ACID.

D. FERMENTATION: The resulting solution is received in a large tank and yeast is added to it at 30°C & kept for 2 to 3 days. during this period, enzymes Sucrase & zymase which are present in yeast, convert sugar into ethyl alcohol.

$$C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$$

$$C_6H_{12}O_6 \longrightarrow C_2H_5OH + 2CO_2$$

6) FRACTIONAL DISTILLATION:- Alcohol obtained by fermentation is called WASH - which is 15% to 18% pure, By fractional distillation technique, it is converted into 95% pure alcohol which is known as rectified spirit or commercial alcohol.

4) $CH_3-\underset{CH_3}{\overset{H}{C}}-\overset{H}{C}=O + C_4H_9MgCl \xrightarrow{HCl,\ H^+}$

$C_4H_9-\underset{C_3H_7}{\overset{H}{C}}-OH + Mg(OH)Cl$

7) $C_2H_5\underset{H}{C}=O \xrightarrow[LiAlH_4]{+2[H]} C_3H_7OH$

8) Conversion of propan-1-ol to Propan-2-ol -
Can be done by dehydration.

$CH_3-CH_2-CH_2-OH$ (Propan-1-ol)

* heat in the presence of concentrated $H_2SO_4$, to dehydrate it and form propene ($CH_2=CH-CH_3$).

* $CH_3-CH_2-CH_2-OH = CH_2=CH-CH_3$ (after heating with concentrated $H_2SO_4$).

* Now to propene add water

$CH_3-CH=CH_2 + H_2O = CH_3-CH(OH)-CH_3$
Propan-2-ol

or

$CH_3\underset{OH}{\overset{or}{CH}}CH_3$