

19/ENG04/024

CH107102

IDIATA ANTHONY EMINOMEN

Electrical Electronics

1) Alcohol is classified based on which carbon atom is bonded to the hydroxyl group.

- Primary Alcohol: This is when the hydroxyl group is attached to only one other carbon atom. eg butan-1-ol

- Secondary Alcohol: It has the hydroxyl group on a secondary carbon atom, which is bonded to two other carbon atoms. eg butan-2-ol

- Tertiary Alcohol: It has the hydroxyl group on a tertiary carbon atom, which is bonded to three other carbon atoms. eg methylpropan-2-ol

2 Alcohols is soluble in water due to the hydroxyl group in the alcohol which is able to form hydrogen bonds with water molecules.

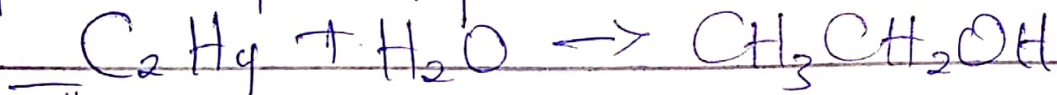
Alcohols with a smaller hydrocarbon chain are very ~~increases~~ soluble because the longer the hydrocarbon the less its solubility in water.

The reason for this is because it requires more energy to overcome the hydrogen bonds between the alcohol molecules as the molecules are more tightly packed together as the mass and size increases.

3) > Industrial Manufacture of Ethanol

- Ethylene Hydration

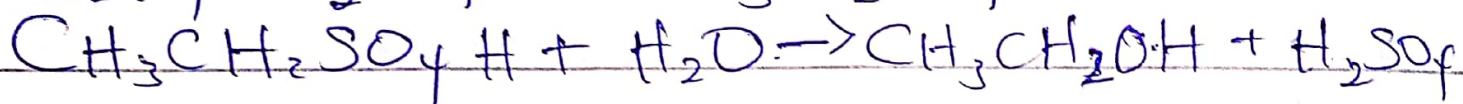
Ethanol is made from petrochemical feed stocks, primarily by the acid-catalyzed hydration of ethylene.



The catalyst is mostly commonly phosphoric acid, absorbed onto a porous support such as silica gel or diatomaceous earth. This catalyst was first used for large-scale ethanol production by the Shell Oil Company in 1947. The reaction is carried out in the presence of high pressure steam at 300°C (572°F) where a 5:3 ethylene to steam ratio is maintained.

In an older process, first practiced on the industrial scale in 1930 by Union Carbide,

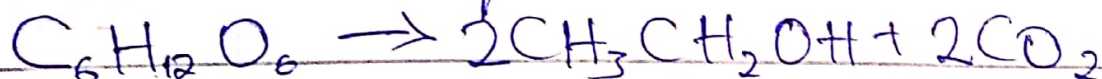
but now almost entirely obsolete, ethylene was hydrated indirectly by reacting it with concentrated sulfuric acid to produce ethyl sulfate, which was hydrolyzed to yield ethanol and regenerate the sulfuric acid.



- Fermentation

Ethanol in alcoholic beverages and fuel is produced by fermentation. Certain species of yeast metabolize sugar, producing ethanol and carbon dioxide.

The chemical equations are:



Fermentation is the process of culturing yeast under favourable thermal conditions to produce alcohol. The process is carried out at around $35-40^\circ C$ ($95-104^\circ F$). Toxicity of ethanol to yeast limits the ethanol concentration.

obtainable by brewing higher concentrations, therefore, are obtained by fortification or distillation. The most ethanol-tolerant yeast strains can survive up to approximately 18% ethanol by volume.

To produce ethanol from starchy materials such as cereal grains, the starch must first be converted into sugars. In brewing beer, this has traditionally been accomplished by allowing the grains to germinate, or malt, which produces the enzyme amylase. When the malted grain is mashed, the amylase converts the remaining starches into sugar.

From CO_2

CO_2 can also be used as the raw materials. CO_2 can be reduced by hydrogen to produce ethanol, acetic acid and smaller amounts of 2,3-butanediol and lactic acid using *Clostridium ljungdahlii*, *Clostridium autoethanogenum*.

8) * Conversion of Propan-1-ol to propan-2-ol

- Dehydration of Propan-1-ol to propene

• When propan-1-ol is treated with $\text{Conc. H}_2\text{SO}_4$, a phenomenon called dehydration occurs due to the water molecule from propan-1-ol gets eliminated. Due to this, propan-1-ol converts into propene.

- Hydrolysis of propene to propan-2-ol

According to Markovnikov's addition, when an unsymmetrical reagent, ~~gets~~ ^{the} ~~negative part~~ ^{negative part} attached of the reagent attaches itself to the atom of the alkene which has less number of hydrogen atom.

The reaction can be shown as

