

Chemistry assignment

1. Alkanols belong to the group of organic compounds known as alcohols. All alcohols containing the OH functional group which is called the hydroxyl or hydroxy. It can be classified in two cases.
 - a) It is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the carbon atom carrying the hydroxyl group are three or two, it is called a primary alcohol. If it is one hydrogen atom, it is called a secondary alcohol and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group it is called tertiary alcohols.

Ex: CH_3OH - Methanol

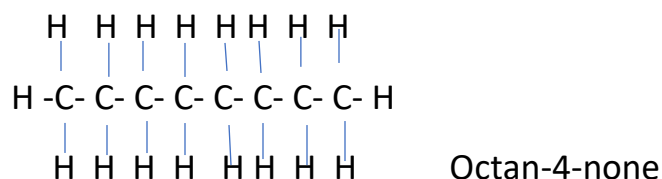
$(\text{CH}_3)_3\text{C-OH}$ 2- Methylpropan-2-ol

- b) It is based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohols structure. Dihydric alcohols are also called glycols have two hydroxyl groups present in the alcohols structure while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohols or polyols have more than three hydroxyl groups.

Ex: $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ Propanol (monohydric alcohol)

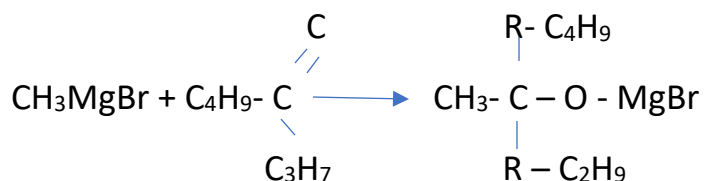
$\text{OHCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$ Propane-1,2,3-triol (trihydric alcohols)

2. $\text{CH}_3\text{CH}_2\text{CH}_2\text{MgCl} + \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$

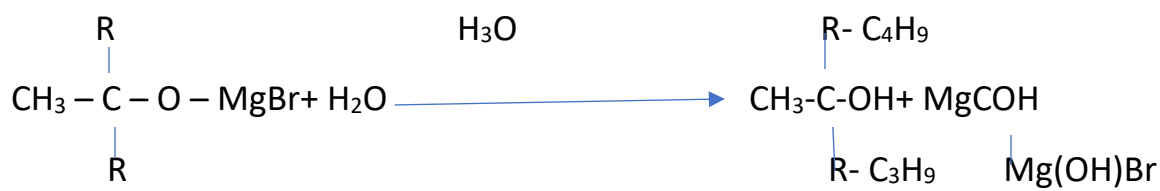


Grignard reagent = RMgX , named grignard reagent - CH_3MgBr

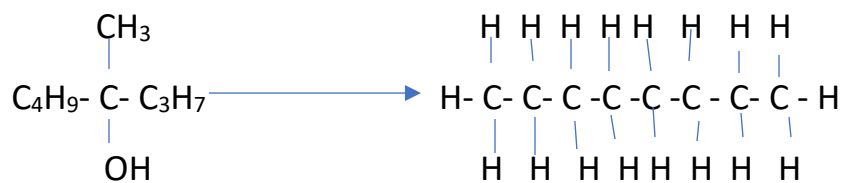
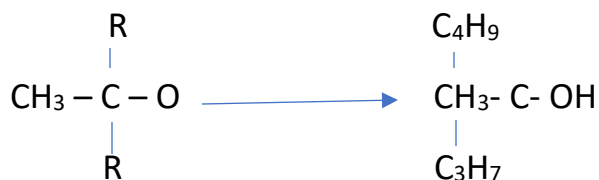
Reacting CH_3MgBr with $\text{C}_8\text{H}_{16}\text{O}$ (Octan-4-one)



Addition of dilute acid for the purpose of hydrolysis or dilute acids is added to hydrolysis.



The alcohol is a secondary alcohol



4-methyl octan-4-ol

3. Industrial production of ethanol

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



Carbohydrate 60°C/diastase maltose

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



Maltose 15°C/maltase glucose

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



Glucose 15°C/ zymase ethanol

4. Both alkanals and alkanones can undergo reduction using hydrogen gas and a catalyst, or a metal hydride reducing reagent. In effect we are adding a hydrogen atom (H) to the carbon of the carbonyl functional group, and to the oxygen present in the carbonyl functional group (C=O) to produce a new functional group, the hydroxyl functional group (OH).

When we do this to an alkanal, R-CH-O, the hydroxyl group will be present at the end of the carbon chain, and hence a primary alkanol is produced R-CH₂OH.

When we do this to an alkanone, R-CO-R^I the hydroxyl group will be present, not at the end of a chain, but somewhere between the end of the chain, R-CH(OH)-R; the hydroxyl group will be present in a carbon atom

which is itself covalently bonded to two other carbon atoms therefore this will be a secondary alkanol.

Example: using a platinum catalyst with hydrogen gas under pressure we can convert butanal to butan-1-ol, and we can convert butanone to butan-2-ol using a nickel catalyst as shown below.

