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PHARMACY  
19/MHS11/122  
CHEM 102 ASSIGNMENT**

1) The two major classifications of Alkanols are as follows;

I. The first one is based on the number of hydrogen

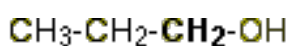
atoms attached to the carbon atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two. It is called a primary alcohol

Primary alcohols are those alcohols where the carbon atom of the hydroxyl

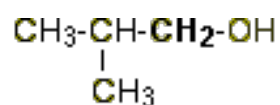
group(OH) is attached to only one single alkyl group. Some of the examples of these primary alcohols include Methanol (, propanol, ethanol, etc. The complexity of this alkyl chain is unrelated to the classification of any alcohol considered as primary. The existence of only one linkage among –OH group and an alkyl group and the thing that qualifies any alcohol as a primary.



ethanol



propan-1-ol

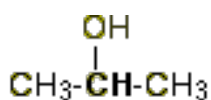


2-methylpropan-1-ol

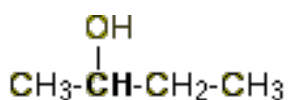
## Primary Alcohols – Examples

### 2. Secondary Alcohols

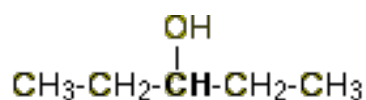
Secondary alcohols are those where the carbon atom of the hydroxyl group is attached to two alkyl groups on either side. The two alkyl groups present may be either structurally identical or even different. Some of the examples of secondary alcohols are given below-



propan-2-ol



butan-2-ol



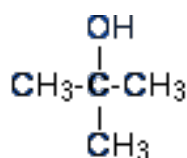
pentan-3-ol

## Secondary Alcohol – Examples

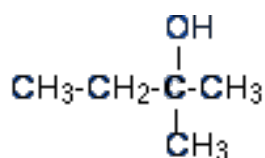
### 3. Tertiary Alcohols

Tertiary alcohols are those which feature hydroxyl group attached to the carbon atom which is connected to 3-alkyl groups. The physical properties of these alcohols mainly depend on their structure. The presence of

this -OH group allows the alcohols in the formation of hydrogen bonds with their neighboring atoms. The bonds formed are weak, and this bond makes the boiling points of alcohols higher than its alkanes. The examples of tertiary alcohols include-



2-methylpropan-2-ol



2-methylbutan-2-ol

## Tertiary Alcohol – Examples

B. Classification based on the number of hydroxyl groups they possess. Monohydric alcohols have one OH group present in the alcohol structure. Dihydric alcohols are called glycols, they have 2 hydroxyl groups present in the structure while trihydric alcohols or triols have 3OH groups present in the

structure of the alcohol.

Polyhydric alcohols or polyols have more than 3OH groups.

Examples Monohydric alcohol—

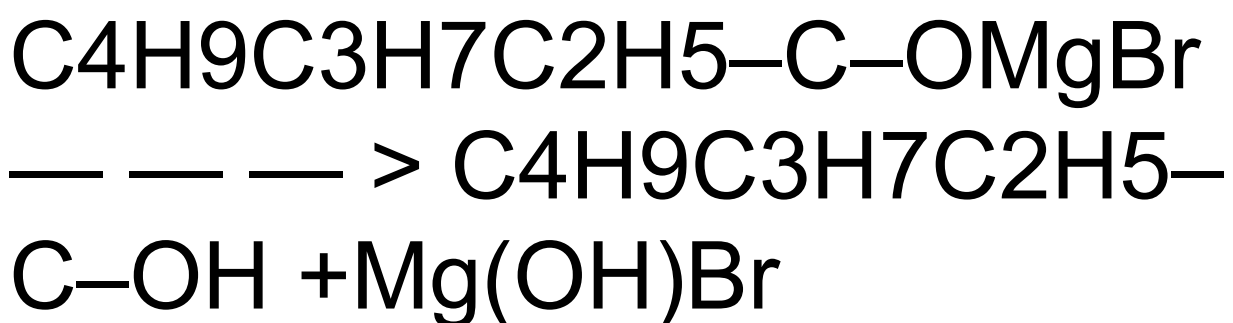
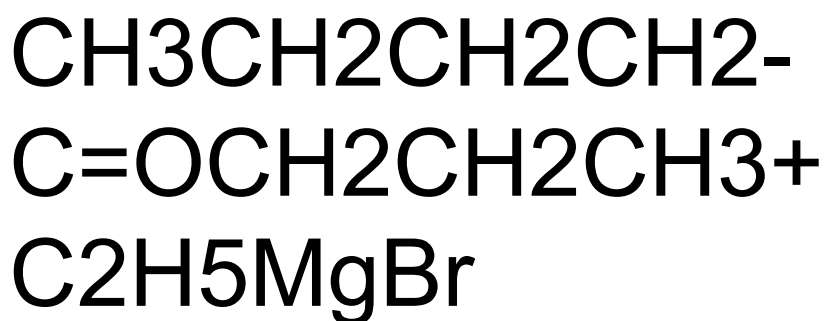
Propanol  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

Dihydric alcohol—

Ethane 1,2 diol  $\text{HOCH}_2\text{-CH}_2\text{OH}$

2. Grignard synthesis of Alkanols Grignard reagent—





3. Industrial manufacturer of Ethanol

Carbohydrate such as starch are major group of natural

compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast breakdown the carbohydrate molecules into ethanol to give a yield of 95%. On warming starch with malt to 60° for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



> n(C<sub>12</sub>H<sub>22</sub>O<sub>11</sub>)

Carbohydrate 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<sub>12</sub> H<sub>22</sub> O<sub>11</sub> + H<sub>2</sub>O .

— — — > 2 C<sub>6</sub> H<sub>12</sub> O<sub>6</sub>

Maltose. 15°C/maltase.

Glucose

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. Alkanone Reduction of  
alkanone gives secondary



(2°)alcohol

LiAlH<sub>4</sub> Alkanals. Reduction of alkanals gives primary alkanols.

