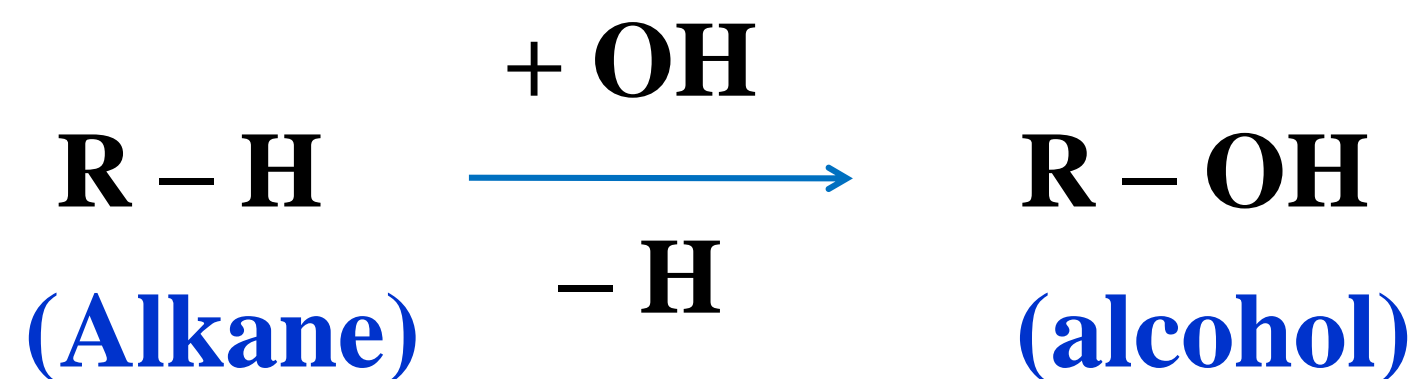


# ALCOHOLS, PHENOLS AND ETHERS



# INTRODUCTION TO ALCOHOLS

## Alcohols



**(Hydrocarbon)**


Now, replace hydrogen of alkane **with hydroxyl group**

Alcohols are the hydroxyl derivatives of hydrocarbons **in which one or more hydrogen atoms are replaced by corresponding number of hydroxyl (– OH) group(s).**

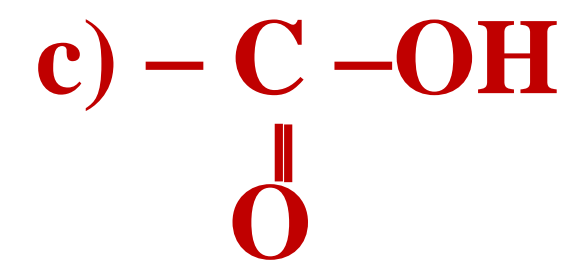
**For e.g.**  $\text{H}_3\text{C} - \text{OH}$  (Methyl alcohol),  
 $\text{H}_5\text{C}_2 - \text{OH}$  (Ethyl alcohol), etc.

# MCQs

**1. R – H means...**

- a)  Alkane**
- b) Alkynes**
- c) Alkene**
- d) Both a & b**

## 2. Functional group of an alcohol is...



### 3. Alcohols are ... derivatives of hydrocarbons

a) keto

b) ✓ hydroxyl

c) aldehyde

d) halogen

4.  $C_2H_5OH$  (Name of this compound is \_\_\_\_\_ )

a) methyl alcohol

b) butyl alcohol

c)  ethyl alcohol

d) isopropyl alcohol



# CLASSIFICATION OF ALCOHOL (PART-I)



# Classification of alcohols

## Alcohols

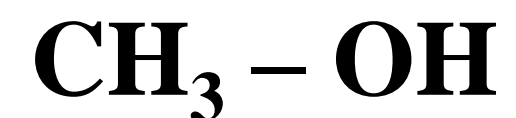
- 1. Monohydric alcohols
- 2. Dihydric alcohols
- 3. Trihydric alcohols
- 4. Polyhydric alcohols

# Classification of alcohols

## 1. Monohydric alcohols

(Contains only one – OH group)

**For eg.**



(Methyl alcohol)

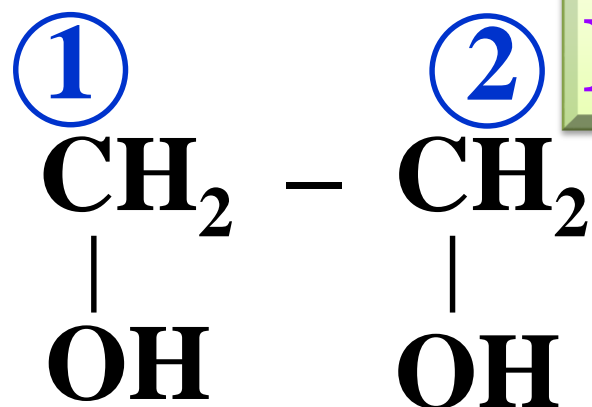
**How many hydroxyl groups  
does it contain?**

## Classification of alcohols

### 2. Dihydric alcohols

(Contain two – OH groups)

For eg.



Common name:  
Ethylene glycol

IUPAC name:  
Ethane – 1, 2 – diol)

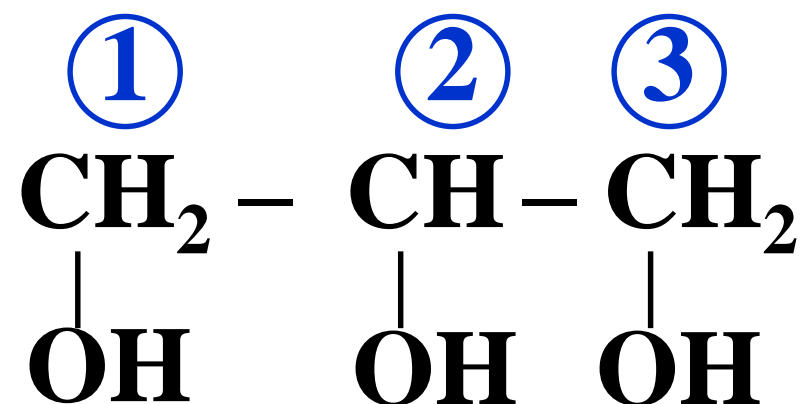
What is the IUPAC name of this compound ?

## Classification of alcohols

### 3. Trihydric alcohols

(Contain three – OH groups)

For eg.



Common Name:  
Glycerol / Glycerin

IUPAC Name:  
Propane – 1, 2, 3 – triol)

What is the IUPAC name of this compound ?

# Classification of alcohols

## 4. Polyhydric alcohols

(Contains four or more than four – OH group)

For eg.



Common Name:  
Sorbitol

## Classification of Monohydric alcohols

According to the type of **hybridization** of the Carbon atom to which the hydroxyl group is attached :

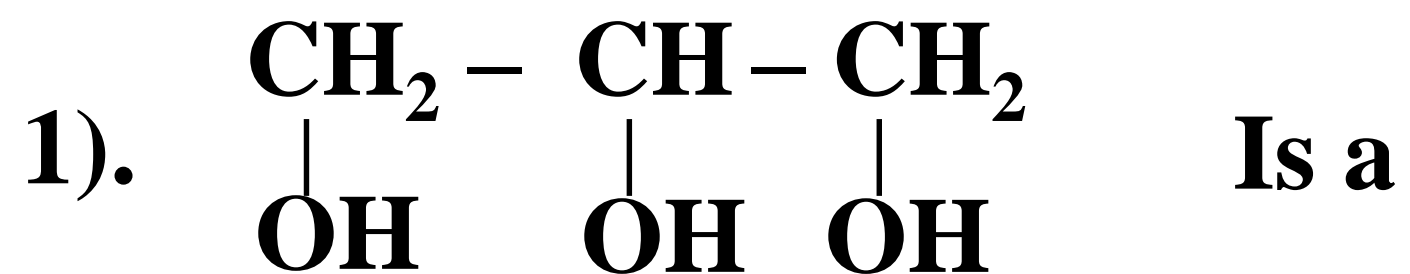
### Monohydric alcohols

There are two types of monohydric alcohols

1. Alcohols Containing  $C_{sp^3} - OH$  bond

2. Alcohols Containing  $C_{sp^2} - OH$  bond

# MCQs



a) mono hydric alcohol

b) di hydric alcohol

✓ c) tri hydric alcohol

d) Tetra hydric alcohol



# CLASSIFICATION OF ALCOHOL (PART-II)



# 1. Alcohols Containing $C_{sp^3} - OH$ bond

## Alkyl Alcohols

→ Primary ( $1^0$ ) alcohols

→ Secondary ( $2^0$ ) alcohols

→ Tertiary ( $3^0$ ) alcohols

There are three types of Alkyl alcohols

## Alkyl Alcohols

### Primary ( $1^{\circ}$ ) alcohols

For eg.  $1^{\circ}$



IUPAC Name:  
Ethanol

To what type of carbon  
OH group is attached?

In primary alcohols hydroxyl group is attached to  $1^{\circ}$  Carbon atom or Primary carbon.

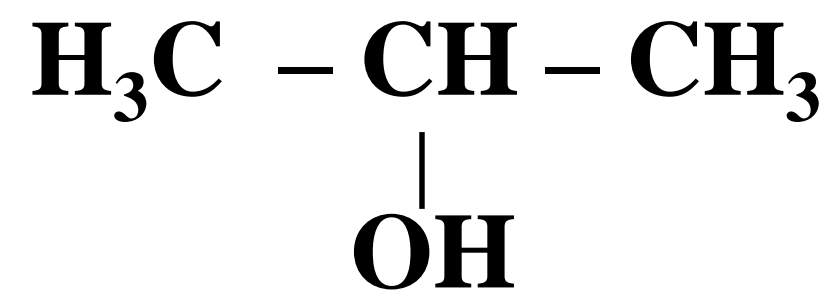
## Alkyl Alcohols

## Secondary ( $2^{\circ}$ ) alcohols

In secondary alcohols hydroxyl group is attached to  $2^{\circ}$  Carbon atom.

For eg.

$2^{\circ}$  - Carbon



(Iso/sec – propyl alcohol)

IUPAC Name:

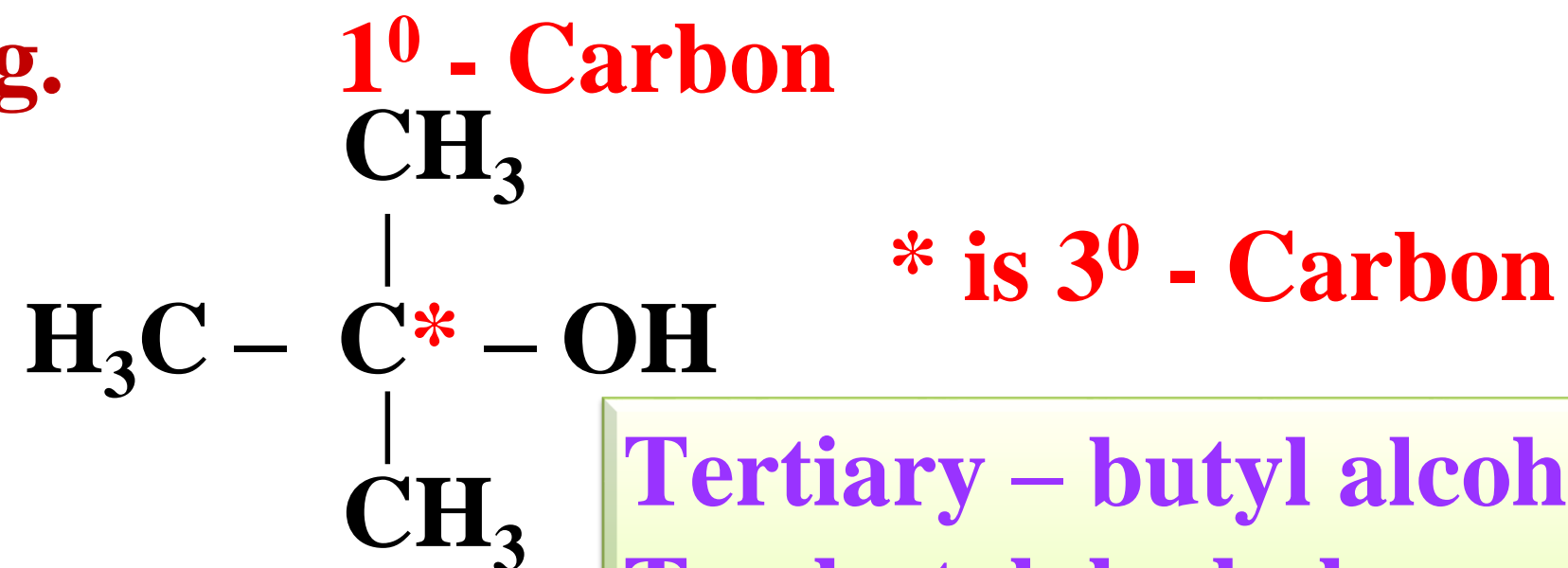
Propanol-2 or Propan-2-ol

## Alkyl Alcohols

## Tertiary ( $3^0$ ) alcohols

In tertiary alcohols hydroxyl group is attached to  $3^0$  or Tertiary carbon atom)

For eg.



Tertiary – butyl alcohol (or)  
Ter-butylalcohol

IUPAC Name:

2-methylpropan-2-ol

## 1. Alcohols Containing $C_{sp^3} - OH$ bond

### Allylic Alcohols

There are three types of  
Allylic alcohols

(Hydroxyl group is attached to a  $sp^3$  hybridised carbon atom next to the  $C = C$  i.e. to an allylic carbon)

## Allylic Alcohols

### 1<sup>o</sup> allylic alcohols

For eg.

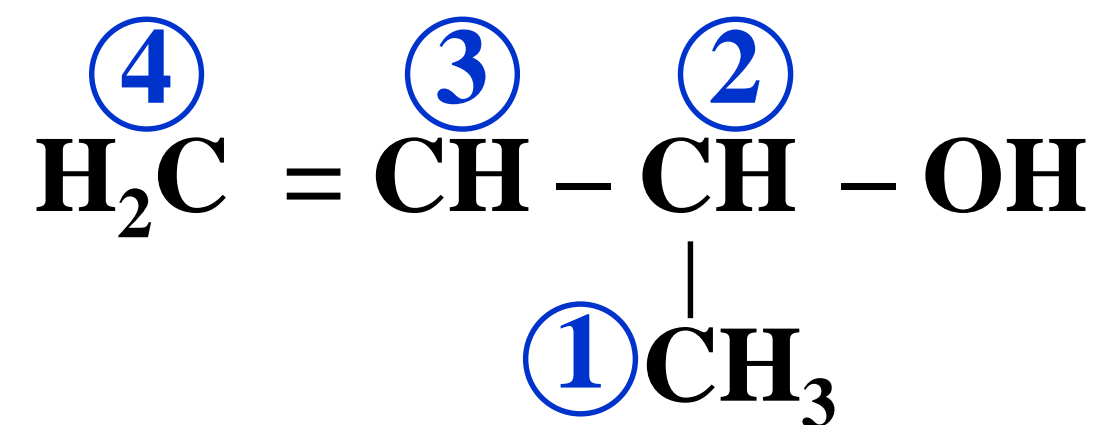


(Prop – 2 – en – 1 – ol)

## Allylic Alcohols

### 2<sup>o</sup> allylic alcohols

For eg.

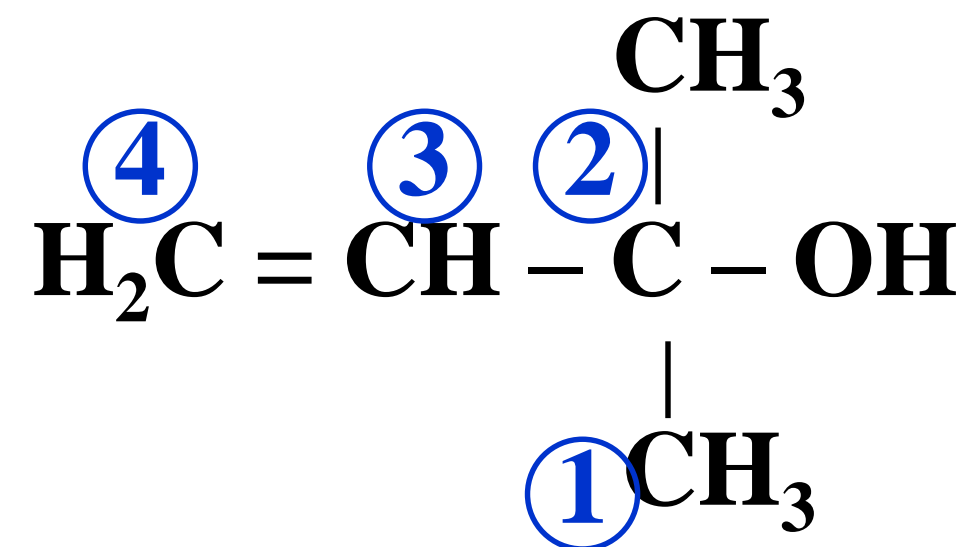


(But – 3 – en – 2 – ol)

## Allylic Alcohols

### 3<sup>o</sup> allylic alcohols

For eg.



(2 – Methyl but – 3 – en – 2 – ol )

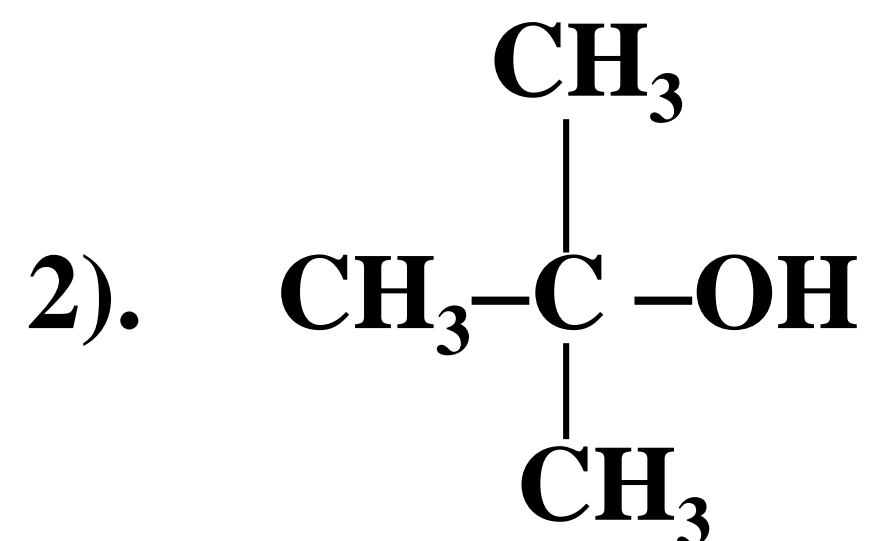


# MCQs

1).  $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{OH}$  is a...

- a)  Primary alcohols
- b) Secondary alcohols
- c) Tertiary alcohols
- d) Quaternary alcohols

# MCQs



a) Primary alcohols

b) Secondary alcohols

c)  Tertiary alcohols

d) Quaternary alcohols

**3). Which one of the following is a secondary alcohol?**

**a) 2 – methyl -2- propanol**

**b) 1- propanol**

**c) 1- butanol**

**d)  2- pentanol**

4). 2 - methyl pentanol -1 is a...

a)  1<sup>o</sup> alcohol

b) 2<sup>o</sup> alcohol

c) 3<sup>o</sup> alcohol

d) enol

5).  $\begin{array}{c} \text{CH}_2\text{OH} \\ | \\ \text{CH}_2\text{OH} \end{array}$  is a...

a)   $1^{\circ}$  alcohols

b)  $2^{\circ}$  alcohols

c)  $3^{\circ}$  alcohols

d) Carbinol

# CLASSIFICATION OF ALCOHOL (PART-II)

# 1. Alcohols Containing $C_{sp^3} - OH$ bond

## Benzylic alcohols

→  $1^{\circ}$  benzylic alcohols

→  $2^{\circ}$  benzylic alcohols

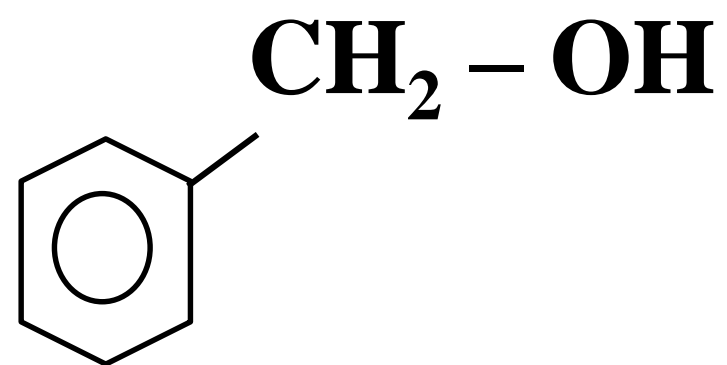
→  $3^{\circ}$  benzylic alcohols

There are three types of  
Benzylic alcohols

## Benzylic alcohols

### 1<sup>o</sup> benzylic alcohols

**For eg.**



**(Benzyl alcohol)**

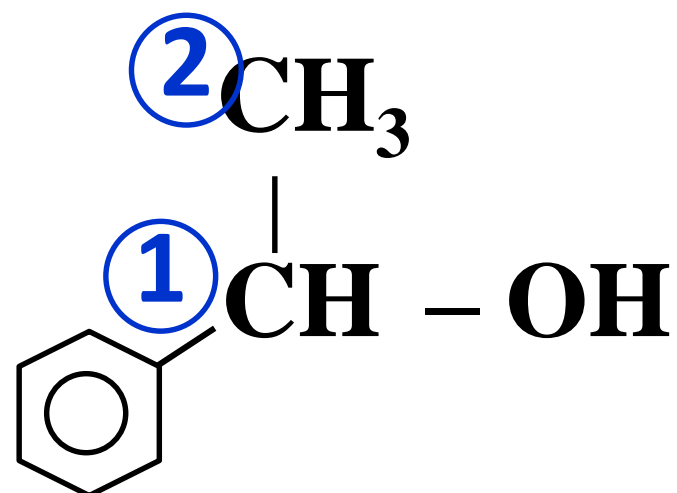
**(Phenyl methanol)**



## Benzylic alcohols

### 2<sup>o</sup> benzylic alcohols

For eg.

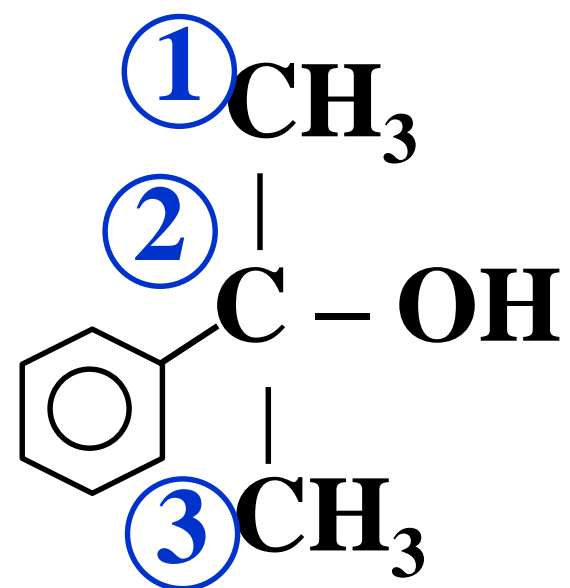


(1 – Phenyl ethanol)

## Benzylic alcohols

### 3<sup>o</sup> benzylic alcohols

For eg.



(2 – Phenyl propan – 2 – ol)

# Classification of Monohydric alcohols

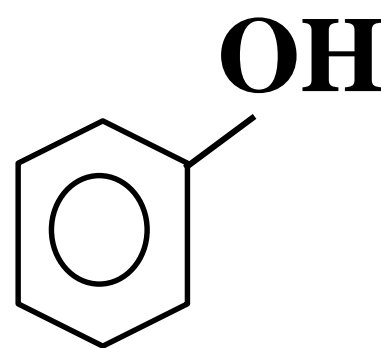
## 2. Alcohols Containing $C_{sp^2}$ – OH bond

- – OH group is attached to a  $sp^2$  hybridised carbon atom i.e. vinylic carbon or aryl carbon. these alcohols are also known as vinylic alcohols or phenols.

**For eg.**



(Vinyl alcohol)



(Phenol)

# MCQs

1). In alkyl alcohol –OH group is attached to... hybridized carbon atom

a)  $sp^2$

b)  $sp$

c)  $sp^3$

d)  $sp^3d$

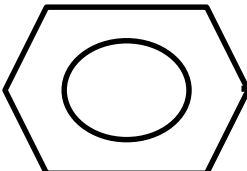
**2). In secondary alcohol, hydroxyl group is attached to... carbon atom.**


**a) Primary ( $1^0$ )**

**b) Tertiary ( $3^0$ )**

**c)  Secondary ( $2^0$ )**

**d) None of these**

3).   $\text{CH}_2\text{OH}$  is...

- a)  **Primary benzylic alcohol**
- b) **Secondary benzylic alcohol**
- c) **Tertiary benzylic alcohol**
- d) **None of these**

4). In vinylic alcohols, – OH group is attached to...hybridized carbon atom.

a)  $sp$

b)  $sp^2$

c)  $sp^3$

d)  $sp^3d$

