

CHEMISTRY OF ORGANIC

26-JAN-22

COMPOUNDS CONTAIN TWO OR MORE FUNCTION GROUPS

OH- Alcohol	COR- Ketone
COOH- Carboxylic	NH ₂ - Amine
CHO- Aldehyde	CONH ₂ - Amide
COOR'- Ester	CH=CH ₂ -CH(OH)-COOH
ROOR'- Ether	

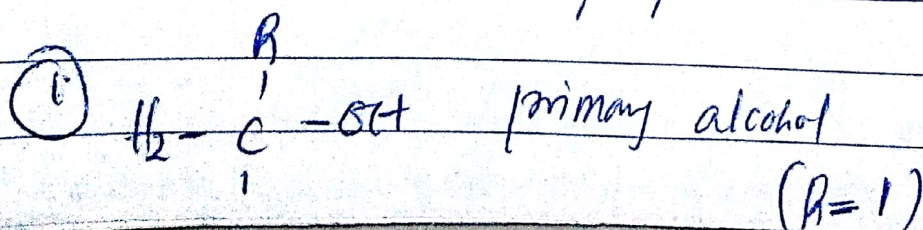
2-hydroxybutanoic acid

FUNCTIONAL GROUP:-

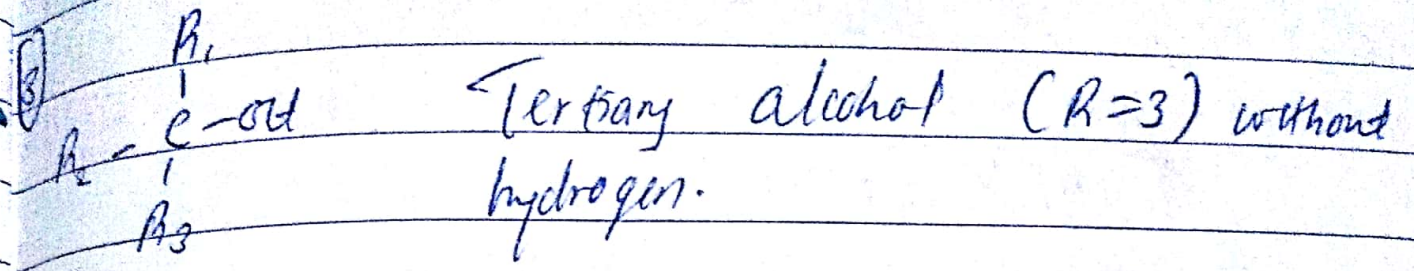
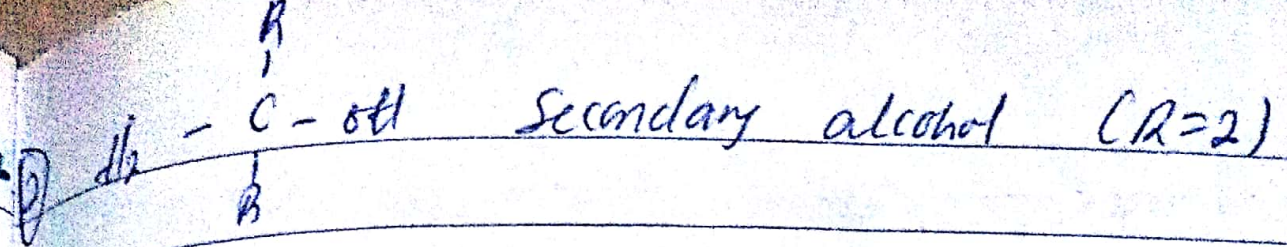
are atoms or small groups of atoms or compounds that exhibit a characteristic reactivity of the compound. functional group is a specific structural arrangement of atom/bond that are important to predict the chemical behaviour/Reactivity of the molecules. In another word functional group is a region that determine the chemistry of the respective organic compound. They're also essentially cluster of atoms. The examples are listed above.

ALCOHOL (-OH)

The alcohol functional group involve an O atom that is bonded to 1 hydrogen and 1 carbon



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PRIMARY ALCOHOL

In primary alcohol the carbon bonded directly to the oxygen atom is also bonded to exactly 1 carbon atom as indicated above.

SECONDARY ALCOHOL

The carbon atom in secondary alcohol is attached to 2 other carbon atoms, while in tertiary the carbon that is directly attached to the OH group is attached to 3 carbon atoms.

USES OF ALCOHOL

- ① Ethanol which is a second group in alcohol family is found in alcoholic beverages.
- ② It's also widely used in industrial manufacture of other chemicals.
- ③ Methanol is used as a gasoline additive.
- ④ Methanol is also used to manufacture formaldehyde which is employed in the production of plastics, paints and other useful substances.

5) - Isopropanol is common known as robbing alcohol. It is also used to clear various surfaces such as computer monitor, whiteboard, and skin.

ETHER (R-O-R')

The ether functional group consists of an oxygen atom that forms single bonds with two carbon atoms, e.g., diethoxyethane. Ethers are good solvents for other organic compounds because of their low reactivity. They readily dissolve non-polar molecules. Diethyl ether ($\text{C}_2\text{H}_5\text{OCC}_2\text{H}_5$) is used as an inhalable anesthetic. Ethers can be converted to peroxides after prolonged exposure to oxygen. Peroxides are very reactive and are often explosive at elevated temperatures.

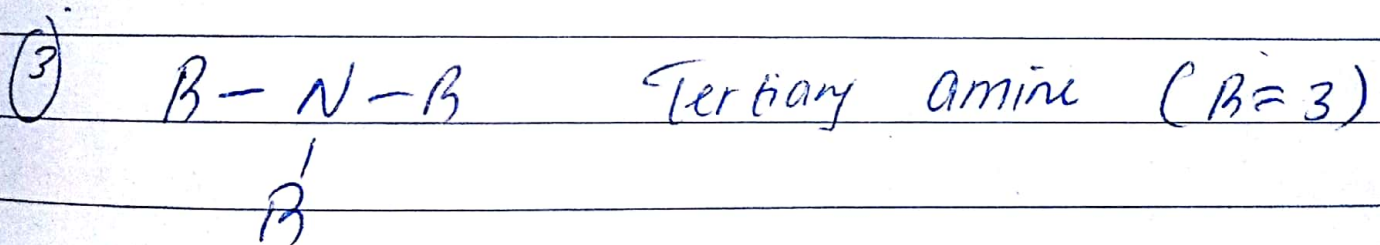
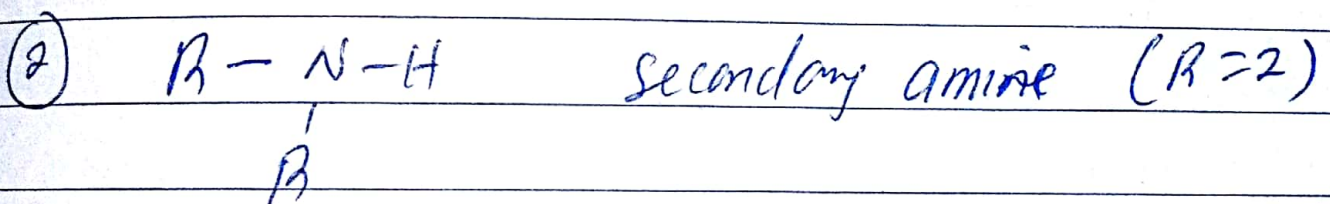
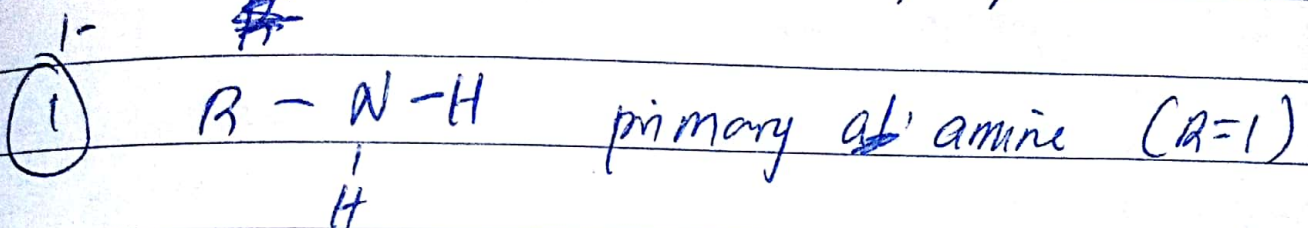
THIOL (R-SH)

The thiol functional group contains a sulphur atom bonded to a hydrogen atom. It is very similar to an alcohol functional group with sulphur replacing oxygen. Thiols are also called **mercaptans**, which is derived from the Latin phrase for capturing mercury because of the strong bond it forms with mercury-containing compounds. Some thiols have a distinctive smelly smell similar to rotting eggs. They are often added to natural gas which itself has no odor as a way to detect leaks.

Since the Odour can be detect by human in very small amount. A thiol group is also present in amino acid which is Cysteine.

AMINE ($R-NH_2$)

An amine consist- of a Nitrogen atom bonded to some combination of Carbon and hydrogen for example:



Neutral amines are weak base because the lone pair on nitrogen can act as a proton acceptor. many smaller amines have a very strong and offensive smell in order. eg Cadaverine foul smell this is form as part of the decay process after dead.

Uses of Amine

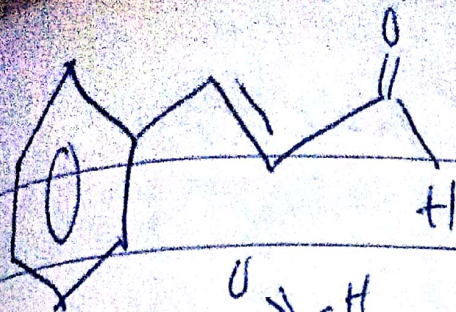
- (1) Diphenylamine act as a stabilizer for certain types of explosives.
- (2) Amines are found as component in some lubricating materials.
- (3) They are also part of waterproofing textile.
- (4) Many pharmaceutical compounds contain amine.

ALDEHYDE (CHO)

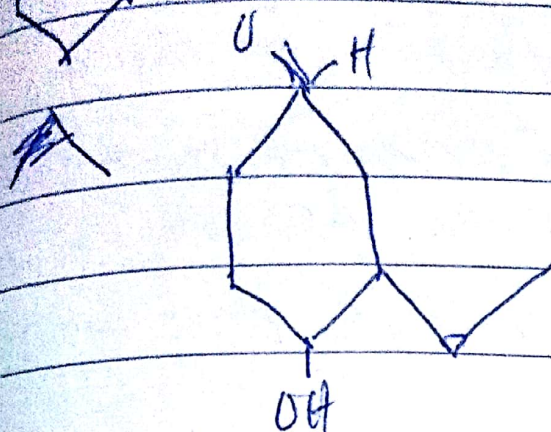
Is an organic compound with a carbonyl atom attached to it. The reactivity of carbonyl is primarily affected by the conjugation of the $C=O$ but the surrounding atom also plays a role in a specific reaction pathway. An aldehyde is a terminal functional group (appear at the end). Aldehyde are versatile reagents for a wide variety of organic synthesis. Many aldehydes have a distinctive aroma and flavour eg. the flavour of Cinnamom is primarily due to the molecule Cinnamaldehyde. A special type of aldehyde is formaldehyde in which the carbonyl is attached to hydrogen atom. $H-\overset{\overset{O}{\parallel}}{C}-H$ formaldehyde. Formaldehydes have a wide variety of uses.

(1) It can be used as a tissue preservation or as a very harsh disinfectant.

(2) It's also used as a precursor to various material including plastic and polymer.



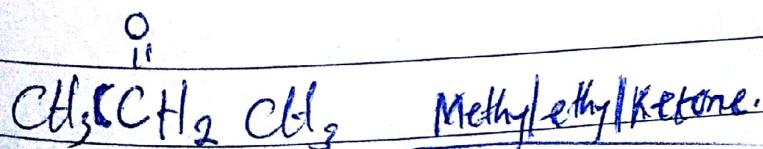
Cinnamaldehydes



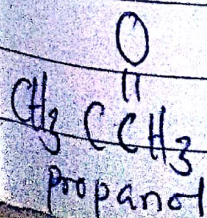
Valerolactone

KEONE (R-CO-R)

It has carbonyl in which the carbon atom make single bond with two R-groups. Ketones undergo most of the same reaction as aldehyde but they tend to be slightly less reactive than aldehyde. The simplest ketone is acetone in which the carbonyl is bonded to two methyl groups. Ketone is commonly used to remove finger nail polish and serve as an industrial solvent. 1) Methyl ethyl ketone is used as paint stripper and a solvent. Ketone are also use in the production of various polymers.



but-2-ene



acetone.

CARBOXYLIC ACID ($R-COOH$)

Another carbonyl containing compound in which the carbon atom is bonded to an $-OH$ on one side and either a carbon or hydrogen atom on the other side. Carboxylic acid also a terminal functional group. As the name implies carboxylic acid are weak acid. An $-OH$ group.

A carboxylate ion is the one in which the negative charge is spread over two different oxygen atoms through resonance structure, is more stable than an isocenter anion.

$$R-\overset{\overset{O}{\parallel}}{C} \longleftrightarrow R-\overset{\overset{O^-}{\parallel}}{C} =$$

USES OF CARBOXYLIC ACID

- (1) Are used in a variety of environments as a protective chemical for many stinging insects and plants.
- (2) Acetic acid is vinegar. It's characterized by its smell and flavour and is a fundamental biological and industrial building block.
- (3) Carboxylic acids with a long carbon chain (fatty acids) are used by animals as a way of storing energy and are widely used in the manufacture of soap.