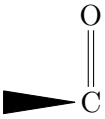
Contents

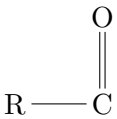
Carbonyl group

- Have  functional unit

Carbonyl compounds

- Have carbonyl group

Acyl Group



List of elements eligible to bond with the acyl group

- Hydrogen
- Carbon
- Nitrogen
- Oxygen
- Halogen

Structure of carbonyl group

Type of hybridization exhibited by carbon and oxygen of carbonyl group

sp_2 hybridization

Angle between hybrid orbitals of carbon and oxygen of carbonyl group

120°

Process of formation of bonding in carbonyl group

- Bond carbon with alkyl , aryl, H atoms
- Bond of carbon with oxygen atom
- Remain two sp^2 hybridized orbitals of oxygen

Lone pairs of oxygen in carbonyl group

- Unpaired sp^2 hybridized

Number of lone pairs of oxygen in carbonyl group

2

Type of bond carbon exhibits to bond with alkyl groups in carbonyl compounds

Sigma bond

Number of sigma bonds carbon exhibits to bond with alkyl groups in carbonyl compounds

2

Type of bond carbon exhibits to bond with oxygen in carbonyl compounds

- Sigma bond
- Pi bond

Number of sigma bonds carbon exhibits to bond with oxygen in carbonyl compounds

1

Number of pi bonds carbon exhibits to bond with oxygen in carbonyl compounds

1

Polarization in carbonyl group

Cause of polarization in carbonyl group

Oxygen more electronegative than carbon

Type of charge developed in carbonyl carbon due to polarization

- Positive

$$\delta+$$

Type of charge developed in carbonyl oxygen due to polarization

- Negative

$$\delta-$$

Magnitude of range of dipole moment of carbonyl compounds

2.7 - 2.8 D

Type carbonyl carbon exhibits in terms of lewis interpretation

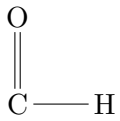
Electrophile

Type carbonyl oxygen exhibits in terms of lewis interpretation

Nucleophile

Aldehydes and ketones

Aldehydic group



Ketonic group

Nomenclature of aldehydes

Common name system

Branching in aldehyde chain notation

$$\alpha, \beta, \delta, \gamma$$

Expression for relation of common name of aldehydes

$$\text{Name of Aldehyde} = \text{ Alkyl - ic/oc acid } + \text{aldehyde}$$

- The common name of aldehydes is structured in relation with their preparation. The parent of common name of aldehyde is of that acid which the aldehyde gives on oxidation. Formaldehyde on oxidation yields formic acid.

$$\mathrm{HCHO} \xrightarrow{\text{Oxidation}} \mathrm{HCOOH}$$

Nomenclature of ketones

Branching notation in aldehyde ketone chain in common name system

$$\alpha, \beta, \delta, \gamma$$

Order of priority between aldehyde and ketones

1. Aldehyde
2. Ketone

Ketone as substituent

Oxo

Isomerism in aldehydes and ketones

Lists of isomerisms exhibited by aldehydes and ketones

- Chain Isomerism
- Position Isomerism
- Functional Isomerism

Chain isomerism

- The length of carbon chain differs.

Position isomerism in carbonyl compounds

- The position of carbonyl group differs.

Aliphatic aldehydes do not show position isomerism.

Cause of absence of position isomerism in aliphatic aldehydes

- Terminal position of aldehyde

Functional isomerism

- Same molecular formula can represent two compounds of different functional group

Number of carbon atoms needed for aldehydes to exhibit chain isomerism

4

Number of carbon atoms needed for ketones to exhibit chain isomerism

5

Condition for aromatic aldehydes to exhibit position isomerism

- Have substituent