Contents

Cause for inability of carbonyl compounds to show nucleophilic substitution reaction

- Strong covalent bond between carbonyl carbon

Nucleophilic substitution reaction occurs only if carbon atom had a weak bond like with halogen where halogen draws the electron towards itself thereby decreasing strength

Cause for inability of carbonyl compound to show electorphilic reaction

- Electrophiles are less reactive
- Carbonyl units are less reactive

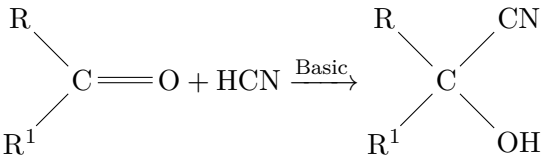
Cause for carbonyl compound to show nucleophilic reaction

Polarity

List of reactions in nucleophilici addition reactions

- Addition of hydrogen cyanide
- Addition of sodium bisulphite
- Addition of Grignard's reagent
- Addition of alcohols

General expression for reaction of carbonyl compounds with hydrogen cyanide



Reactants in expression for reaction of carbonyl compound with hydrogen cyanide

- Carbonyl compound
- Hydrogen cyanide

Products in expression for reaction of carbonyl compound with hydrogen cyanide

- Cyanohydrin

Condition for reaction of carbonyl compound with hydrogen cyanide

- Basic condition (pH 8 - 10)

Expression for reaction of formation of hydrogen cyanide

$$\mathrm{NaCN} + \mathrm{H}^{+} \longrightarrow \mathrm{HCN} + \mathrm{Na}^{+}$$

Reactants in reaction for formation of hydrogen cyanide

- Sodium cyanide or potassium cyanide
- Hydrogen ions (Dilute Mineral acid)

Products in reaction for formation of hydrogen cyanide

- Sodium ions or potassium ions
- Hydrogen cyanide

Cause for need of basic medium in reaction of carbonyl compounds with hydrogen cyanide

- Hydrogen cyanide is neutral and less reactive.
- Cyanide is electronegative and more reactive.
- Basic medium forms cyanide ions

Expression for reaction of hydrogen cyanide in basic medium

$$HCN + OH^- \longrightarrow CN^- + H_2O$$

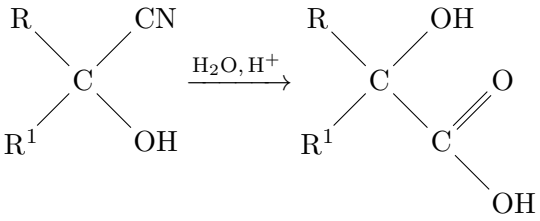
Reactants in reaction of hydrogen cyanide in basic medium

- Hydrogen cyanide
- Hydroxyl ions

Products in reaction of hydrogen cyanide in basic medium

- Cyanide ions
- Water

Expression for reaction of complete hydrolysis of cyanohydrin



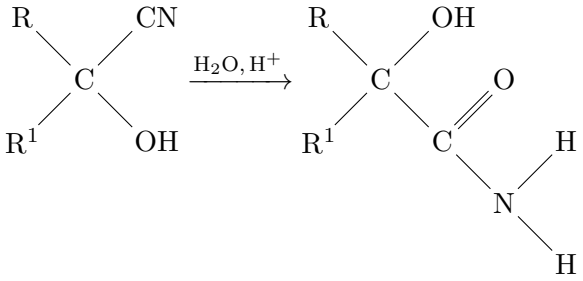
Products in reaction of complete hydrolysis of cyanohydrin

- Carboxylic acid

Condition for reaction of complete hydrolysis of cyanohydrin

- Presence of water
- Presence of hydrogen ions

Expression for reaction of partial hydrolysis of cyanohydrin



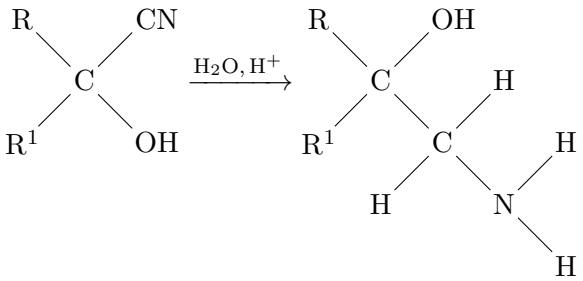
Products in reaction of partial hydrolysis of cyanohydrin

- Amide

Condition for reaction of complete hydrolysis of cyanohydrin

- Presence of water
- Presence of hydrogen ions

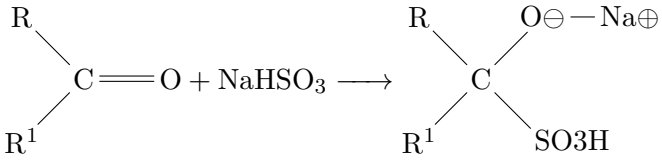
Expresssion for reaction of cyanohydrin with lithium aluminium hydride



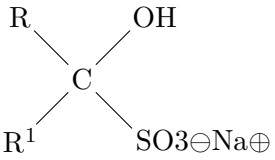
Products in reaction of cyanohydrin with lithium aluminium hydride

- Primary amine

General expression for reaction of carbonyl compounds with sodium bisulphate



Expression for rearrangement of bisulphite product with reaction in sodium bisulphite



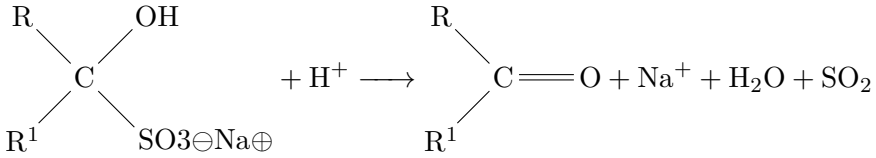
Cause of rearrangement of bisulphide product in reaction of carbonyl compound with Sodium bisulphite

Stability provided by resonance in sulphite

Products in reaction of carbonyl compounds with sodium bisulphate

- Bisulphate addition product

General expression for reaction of bisulphite compounds with mineral acids



Products in reaction of bisulphite compounds with mineral acids

- Carbonyl compound
- Sodium ions

- Water
- Sulphur dioxide

Reaction for identification of carbonyl compounds

Reaction of bisulphite compounds with mineral acids

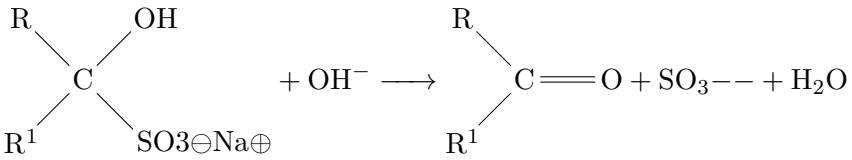
State of carbonyl compounds in reaction of bisulphite compounds with mineral acids

Crystals

List of compounds exhibiting addition of sodium bisulphite reaction in carbonyl compounds

- Lower aldehydes
- Lower ketones without branching
- Benzaldehyde

General expression for reaction of bisulphite compounds with alkali solution



Products in reaction of bisulphite compounds with mineral acids

- Carbonyl compound
- Sulphite ions
- Water