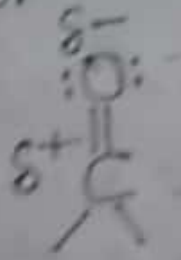
Aldehydes and Ketones

Chemical Properties:

Nucleophilic Addition Reactions:

The Carbonyl group of aldehydes and ketones is a highly polar group. It may be represented as:

or



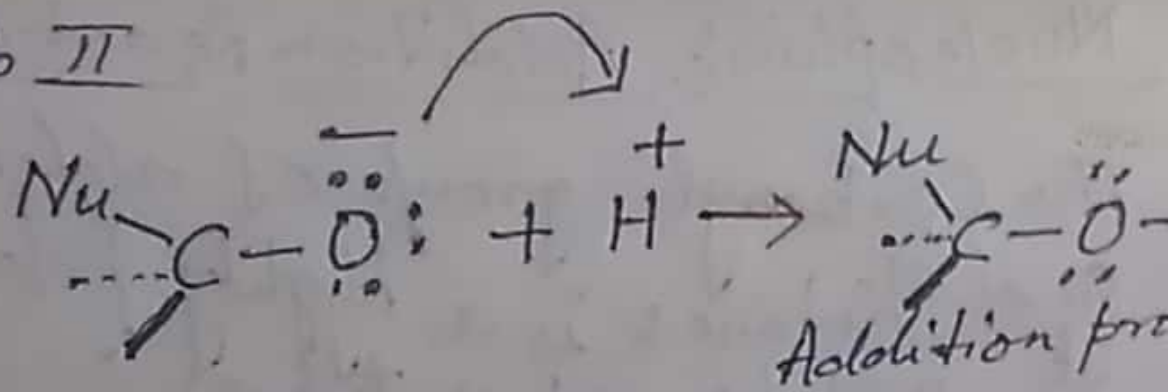
→ Nucleophilic Oxygen reacts with acids and electrophiles.

→ Electrophilic carbon reacts with bases and nucleophiles.

Mechanism:

Step I The Nucleophile ($Nu:^-$) attacks the positively charged Carbonyl Carbon to form a new bond. As the new bond is formed, "π" bond between the carbon and oxygen is broken.

Step II

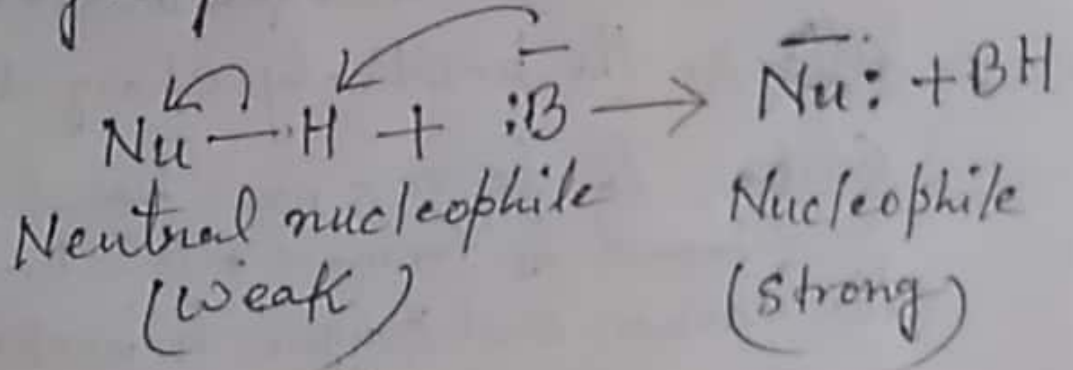


Addition pro

Nucleophilic Addition reactions Carbonyl compounds may be catalysed by acids or bases.

Base catalysed addition.

Bases convert a weak neutral nucleophile to a strong one by removing a proton. The strong nucleophile then adds to the carbonyl group.

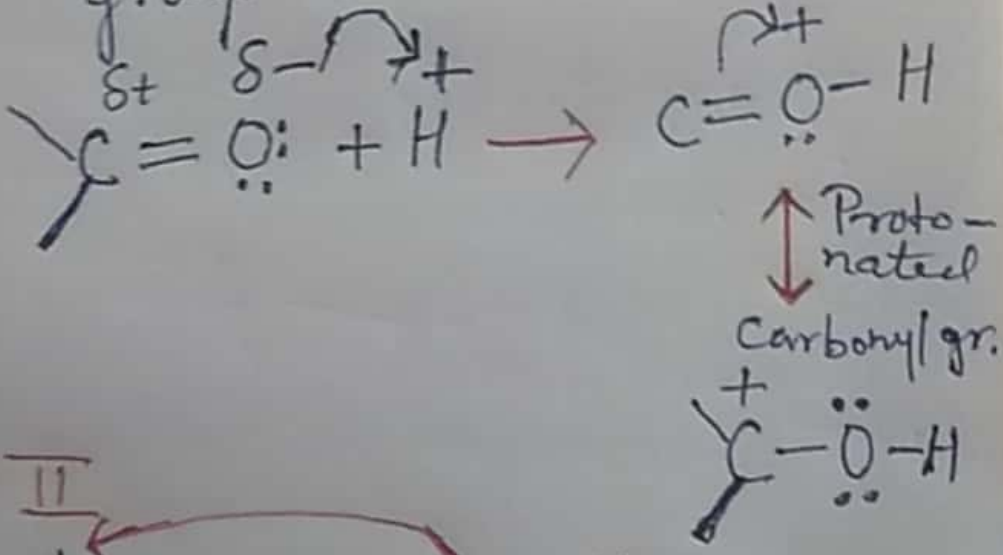


Neutral nucleophile (weak)

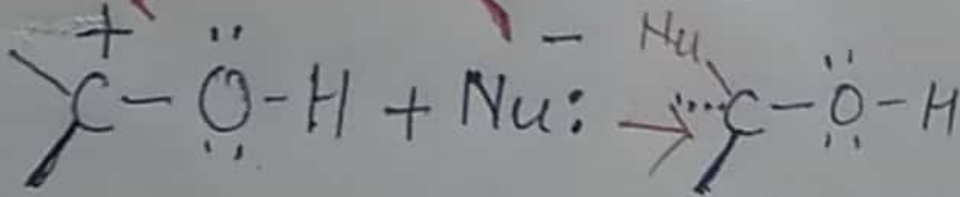
Nucleophile (Strong)

Acid-catalysed adolition :

Step I. The hydrogen ion from the acid attacks the negativity charged carbonyl oxygen to give protonated carbonyl group. The protonated carbonyl group is resonance stabilized



Step II



Adolition Product