Explain keto-enol tautomerism mechanism.

Keto-enol tautomerism is a chemical equilibrium that exists between two tautomers, or constitutional isomers, of a compound. One tautomer, the keto form, has a carbonyl group (-C=O) in which the carbon atom is bonded to two other atoms, one of which is a hydrogen atom. The other tautomer, the enol form, has a carbon-carbon double bond (-C=C-) in which one of the carbon atoms is bonded to an OH group.

The tautomerism between the keto and enol forms is facilitated by the movement of a proton (H^+ ion) and a pair of electrons. The proton is transferred from the carbon atom that is bonded to the oxygen atom in the carbonyl group to the oxygen atom itself, while the pair of electrons is transferred from the carbon atom to the oxygen atom, forming a double bond between the carbon and oxygen atoms. This process is reversible, so the keto and enol forms can interconvert back and forth in a chemical equilibrium.

Two separate steps are required to convert between a ketone or aldehyde and the enol form. One step is a protonation step, and the other step is a deprotonation step. To protonate means to add a hydrogen ion (H^+) to form the conjugate acid of a compound. To deprotonate means to remove a hydrogen ion (H^+) to form the conjugate base of a compound.