

Summary

- Primary amines (RNH_2) add reversibly to ketones or aldehydes to give imines (Schiff bases) and related compounds via the intermediate hemiaminals. The position of the equilibrium depends on the structure of the amine and the carbonyl compound. With alkylamines, the equilibrium favors the carbonyl compound, but it can be driven to the imine by removal of water. With hydrazines (R_2NNH_2) and hydroxyl and alkoxyamines (RONH_2), the equilibrium greatly favors the hydrazone, oxime, or oxime ether.
- Secondary amines (R_2NH) can form hemiaminals and iminium ions, but they cannot form imines. Removal of the α -hydrogen from iminium ions gives enamines. The equilibrium can be driven to favor the enamine by removal of water from the reaction mixture.
- Water and alcohols add reversibly to aldehydes and ketones under either acidic or basic conditions to give hydrates, hemiacetals, or hemiketals. Only under acidic conditions can further reaction take place to give acetals and ketals.
- Acetals and ketals are usually thermodynamically unfavorable, so these reactions are usually driven to completion by removing H_2O from the reaction mixture.