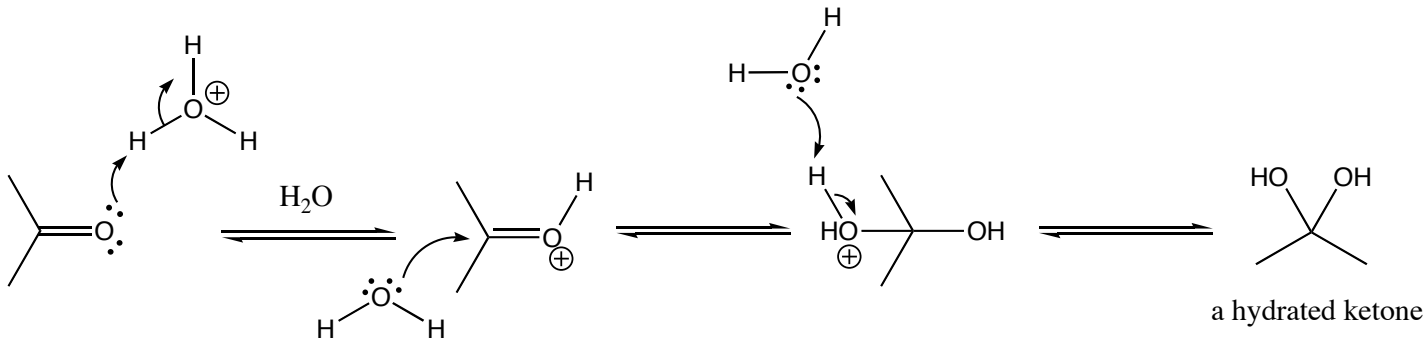
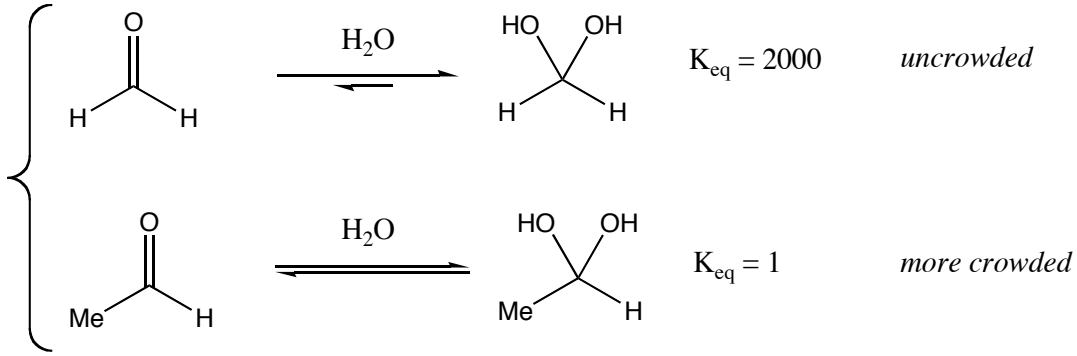
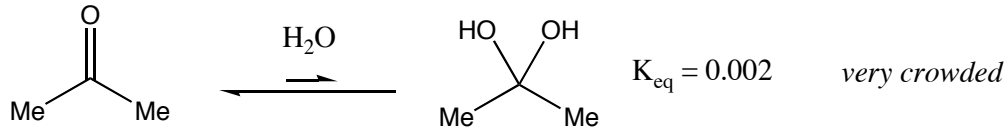
Hydration of Ketones and Aldehydes



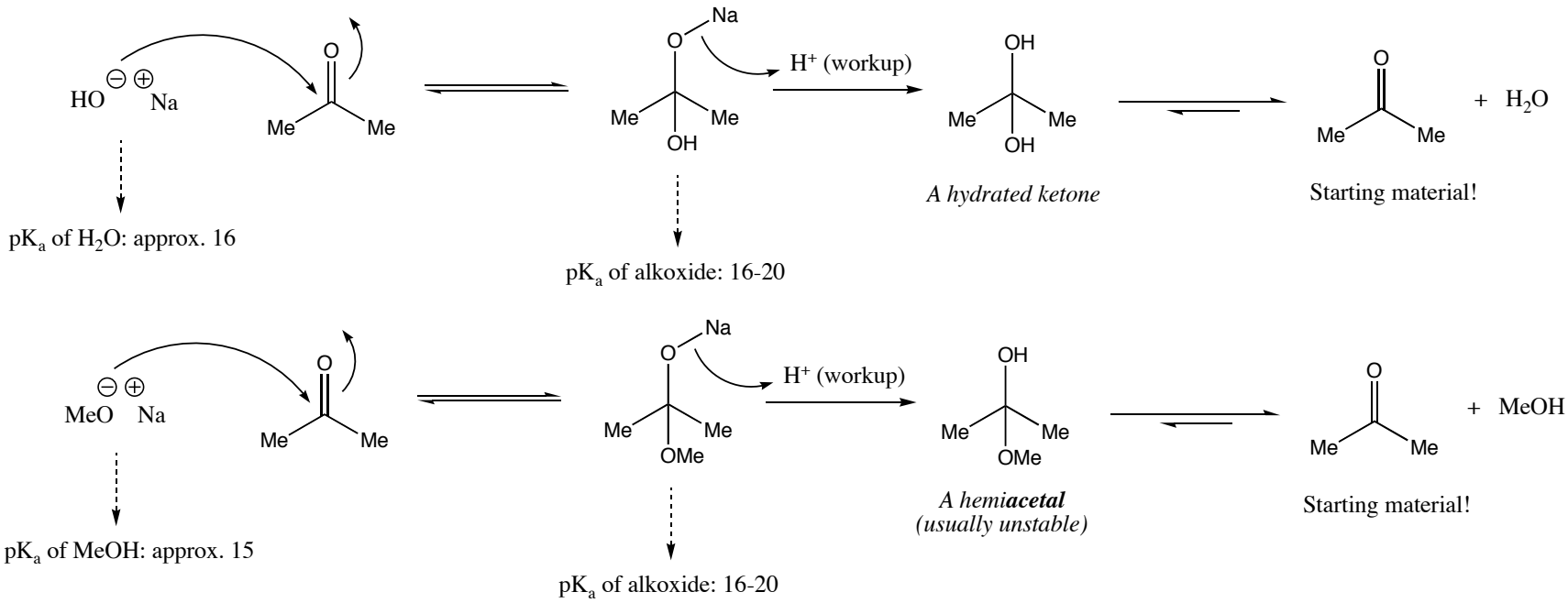
Aldehydes exist as partial hydrates in aqueous solution:



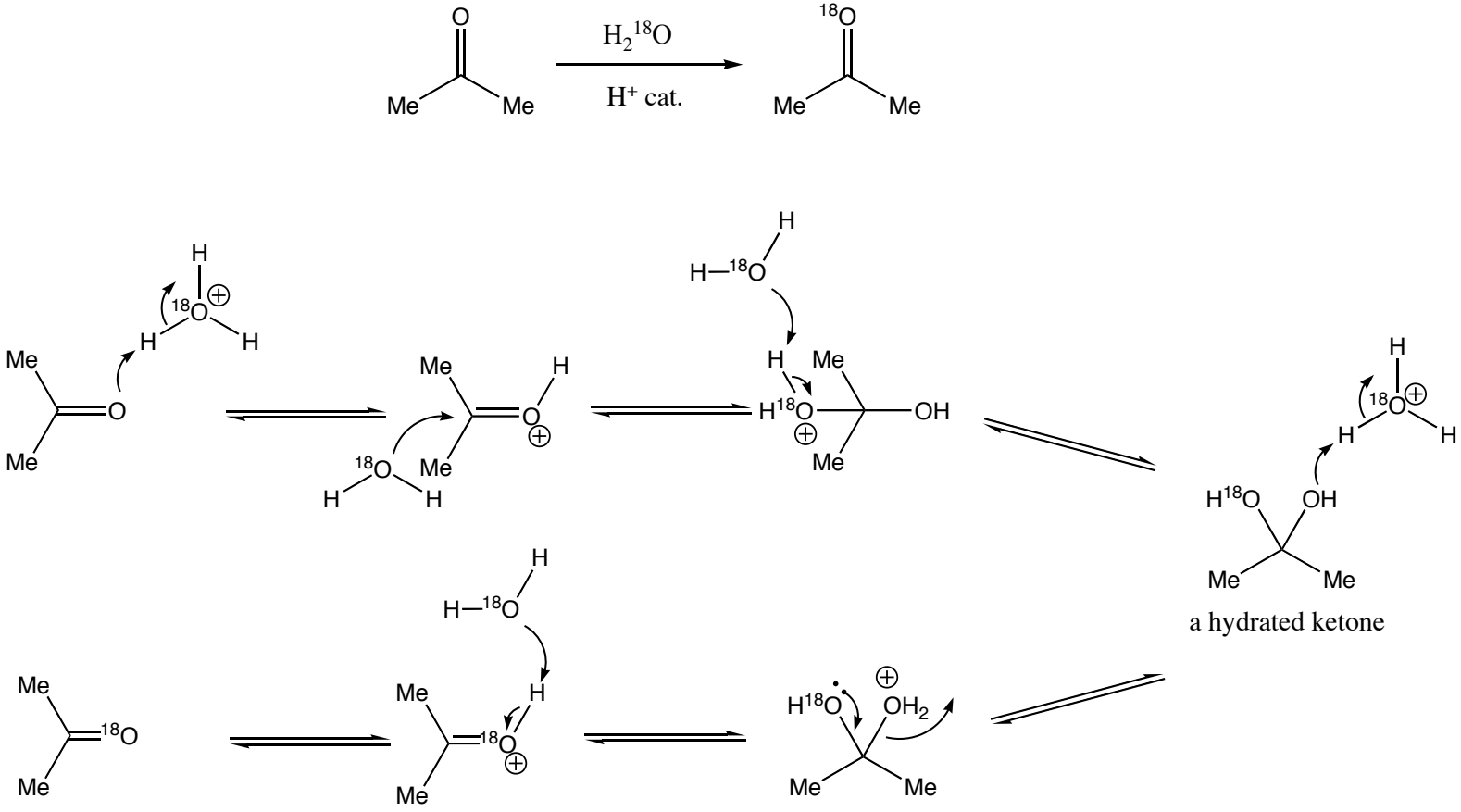
Ketones generally do not favor hydration:



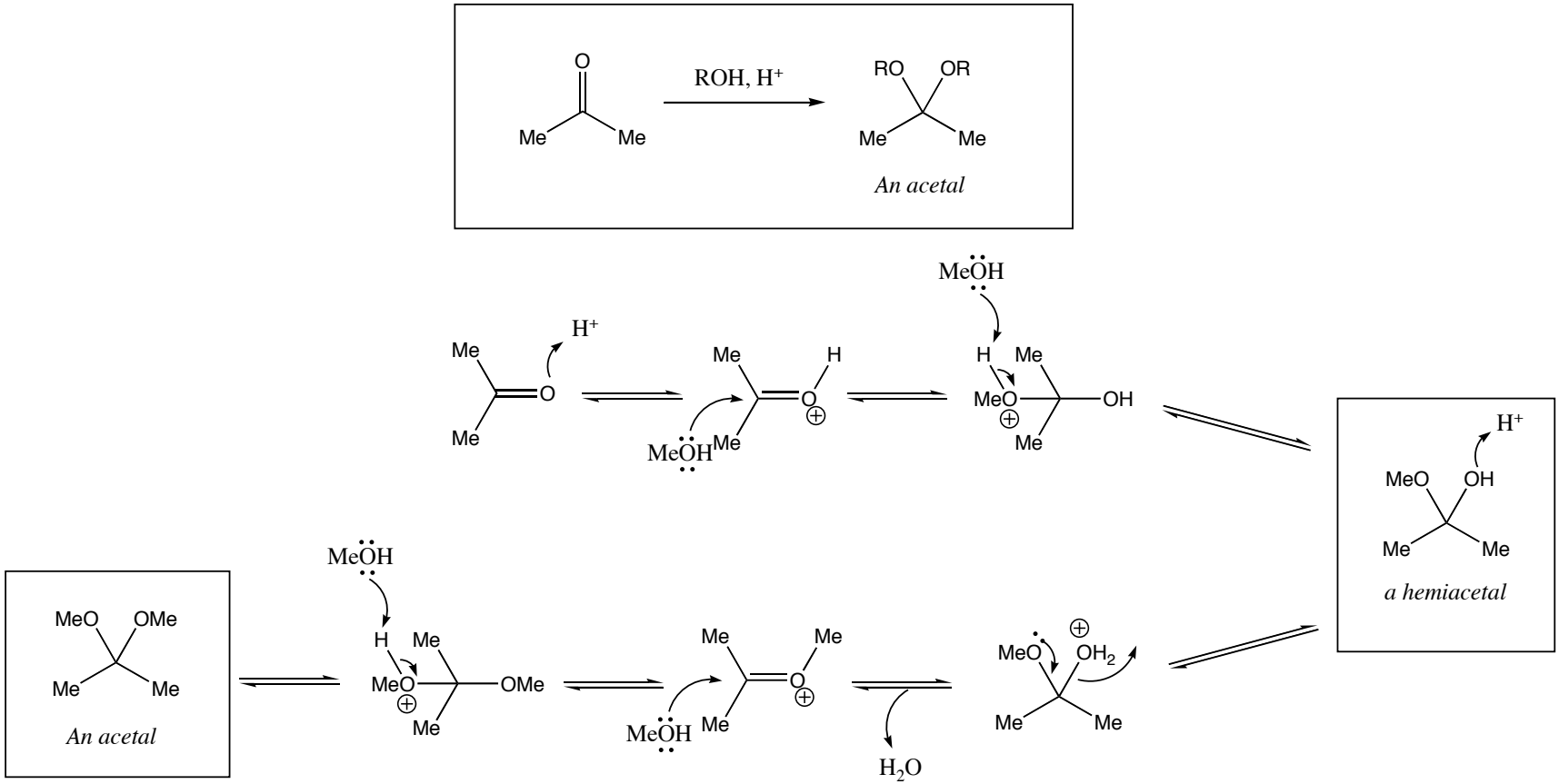
Nucleophilic Addition of "O⁻" to Carbonyl Groups



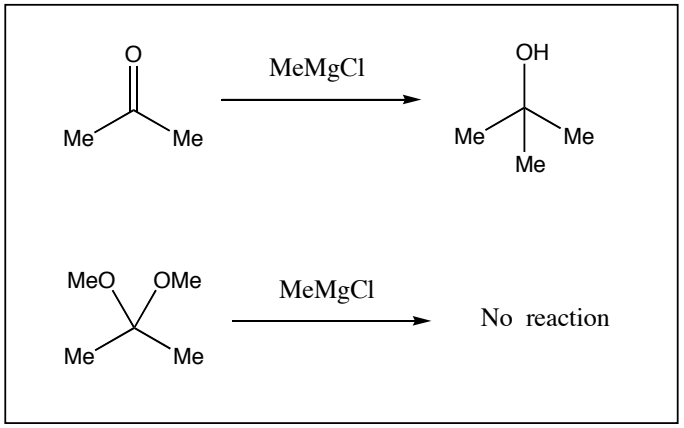
Hydration of Ketones and Aldehydes

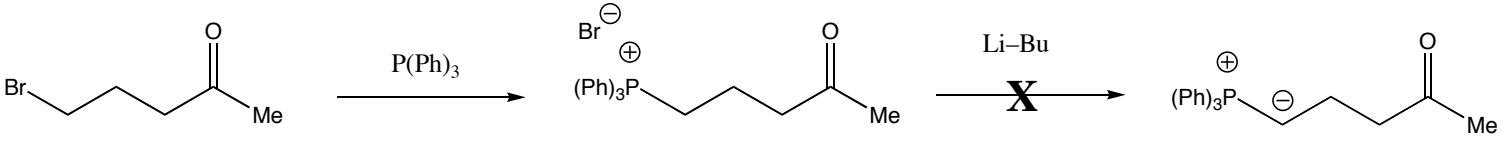


Addition of Alcohols to Carbonyl Groups: Acetal Formation

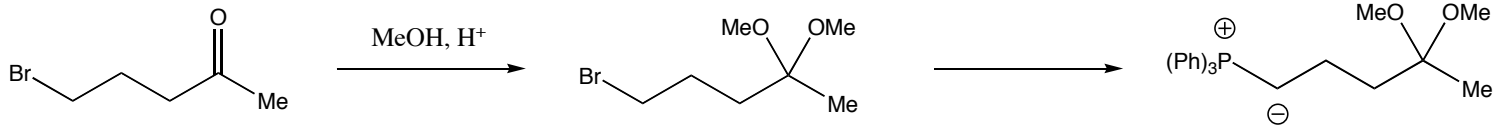


Acetals as Carbonyl Protecting Groups

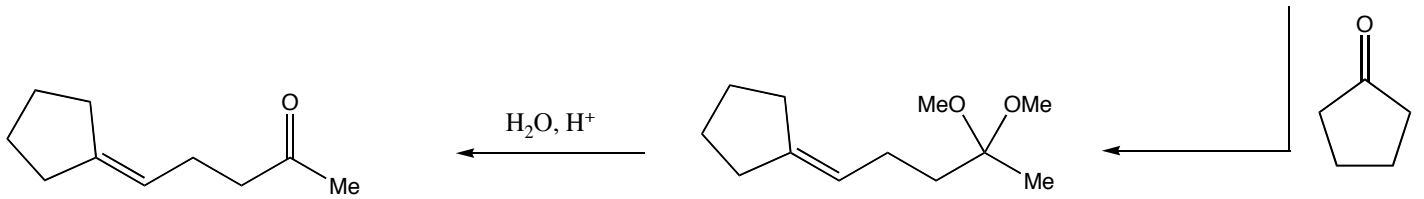




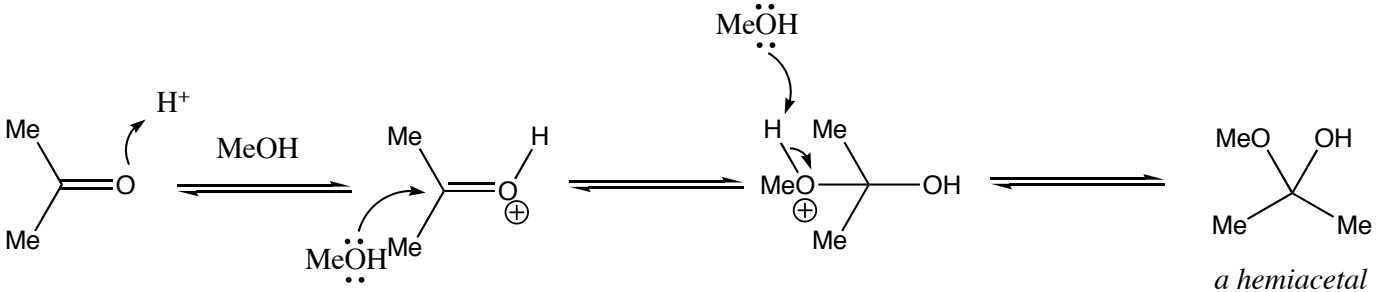
Butyllithium will react with the ketone, and the reagent will react with itself!



A stable reagent

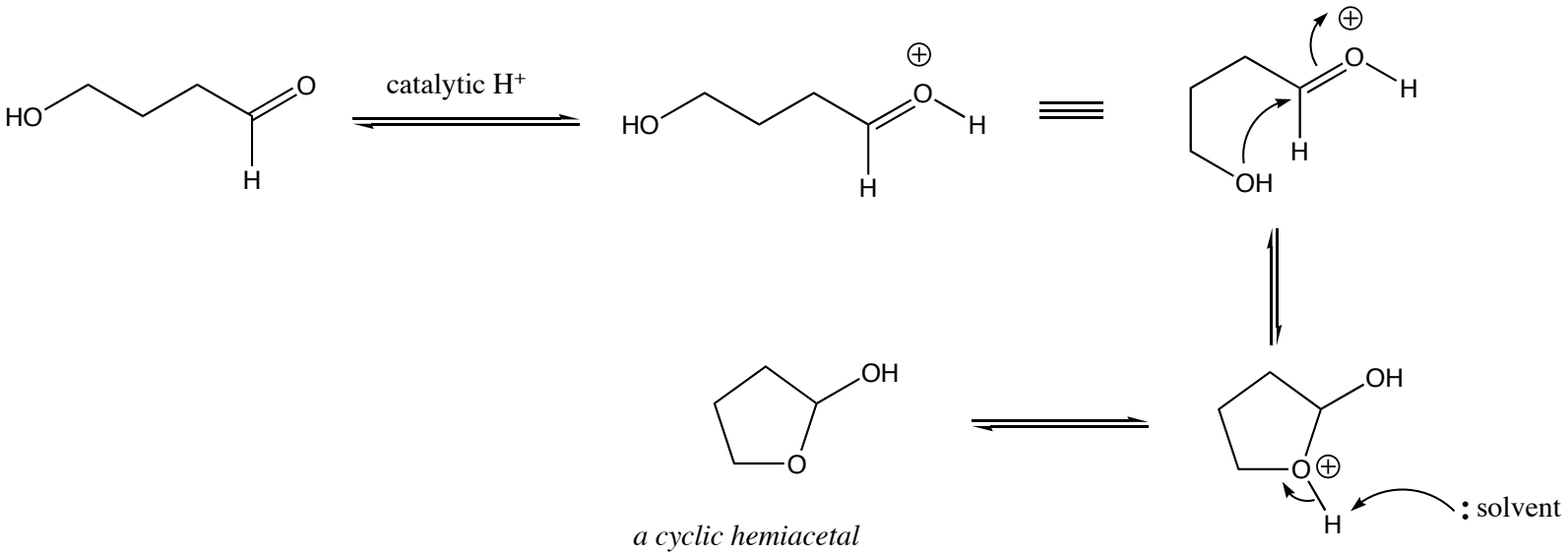


Cyclic Hemiacetals



a hemiacetal

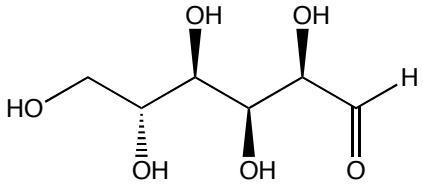
(usually unstable for ketones, sometimes stable for aldehydes)



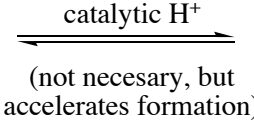
a cyclic hemiacetal

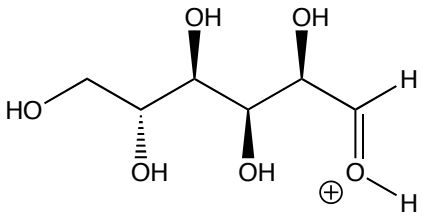
(usually stable for 5- and 6-membered rings)

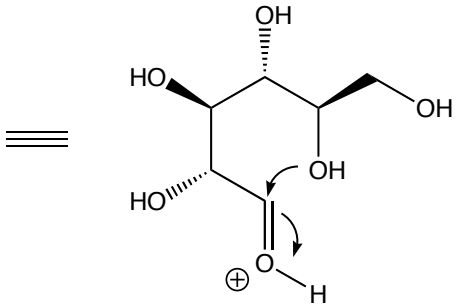
Cyclic Hemiacetals in Biological Systems: Carbohydrates

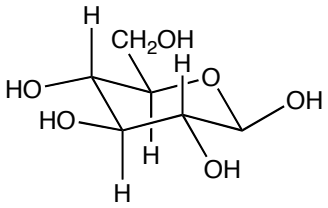


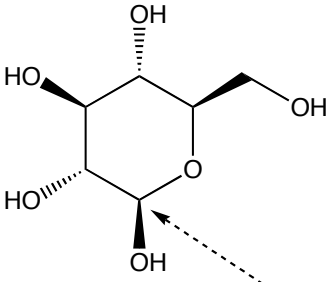
D-glucose (linear form)







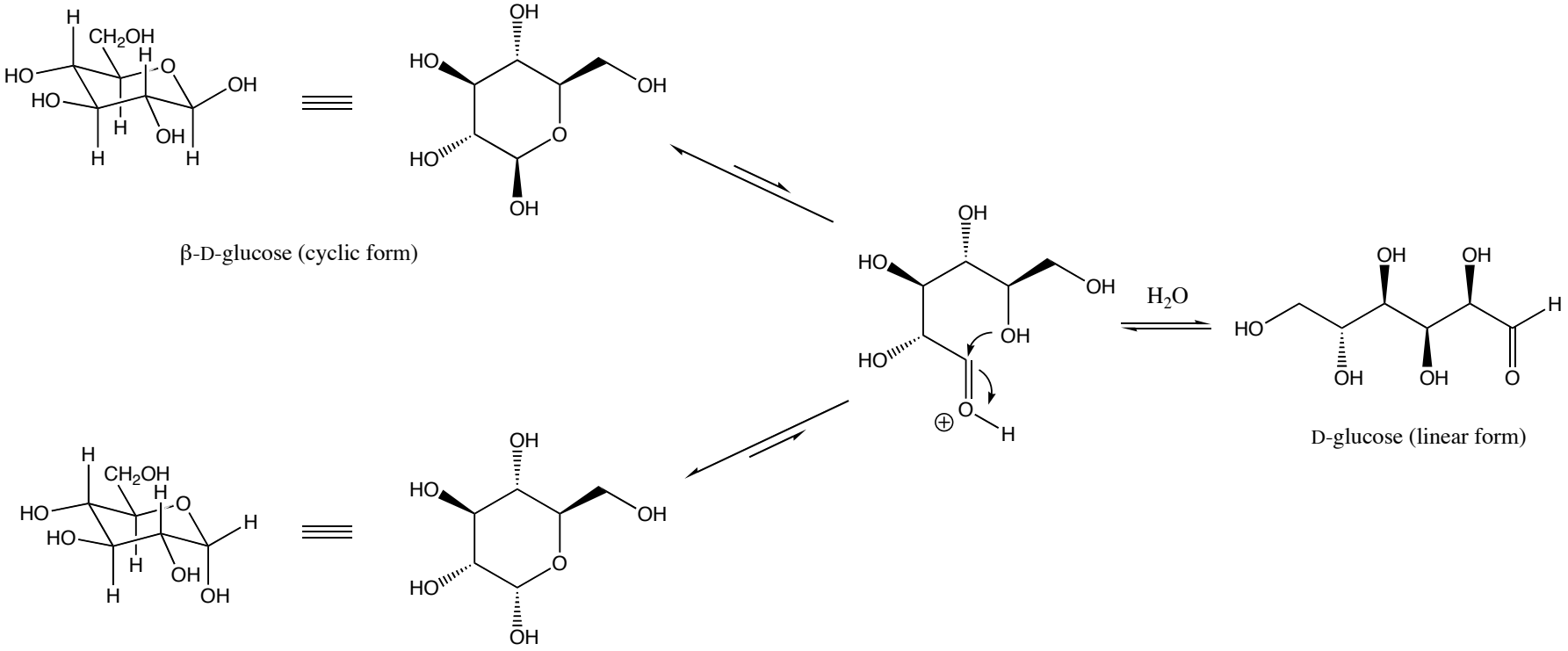




β-D-glucose (cyclic form)

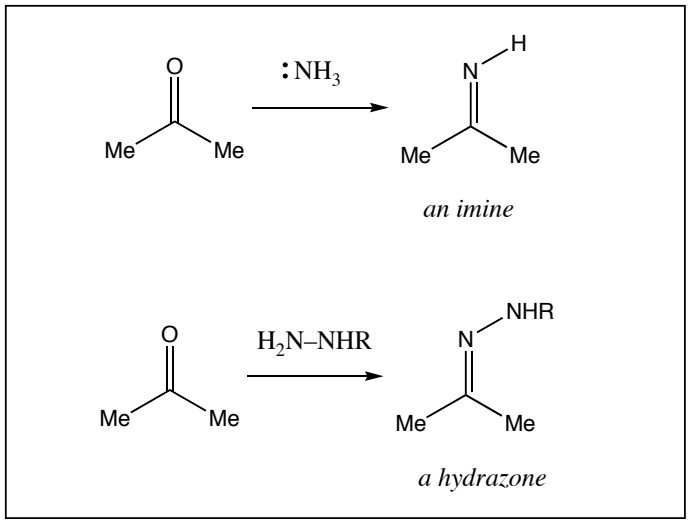
a hemiacetal

Cyclic Hemiacetals in Biological Systems: Mutarotation in Carbohydrates

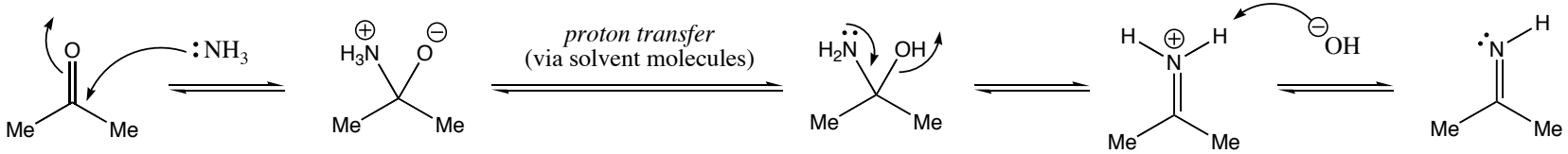


*The process of equlibration (epimerization) at the hemiacedtal (**anomeric**) carbon is called **mutarotation**.*

The Nitrogen-Equivalent of a Carbonyl Group: Imines and Hydrazones

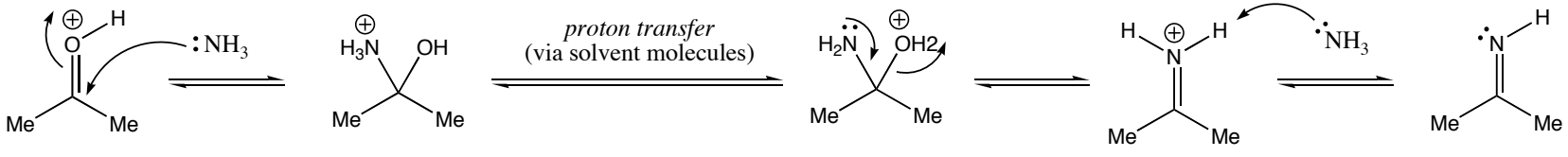


Basic conditions:



a carbinolamine

Acidic conditions:



a carbinolamine

The Nitrogen-Equivalent of a Carbonyl Group: Imines and Hydrazones