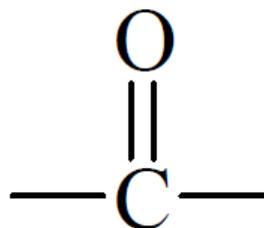


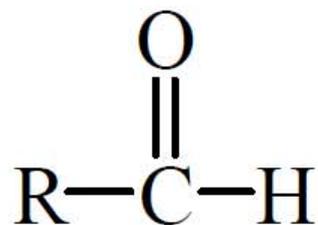
Chimica Organica

Aldeidi e chetoni (addizioni nucleofile)

Composti organici che contengono legami doppi C=O e legami singoli C-H e C-C

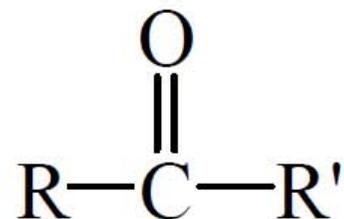


Gruppo Carbonilico



Un' Aldeide

R=Alchile, Arile

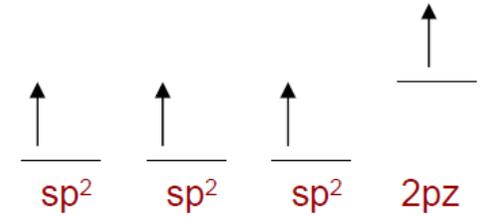


Un Chetone

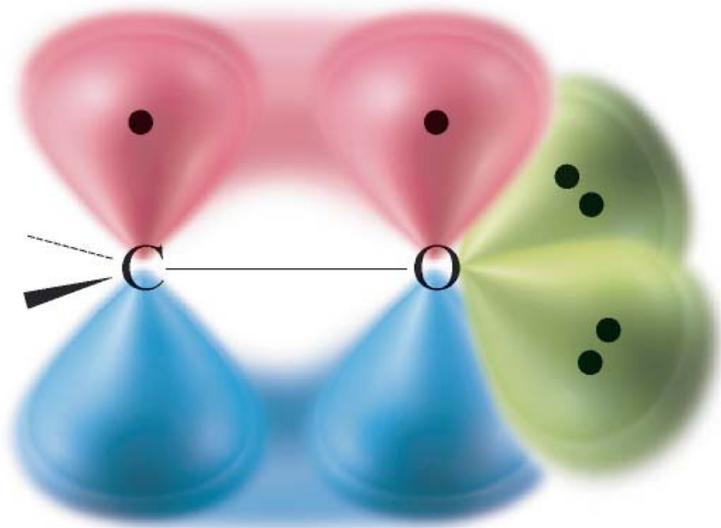
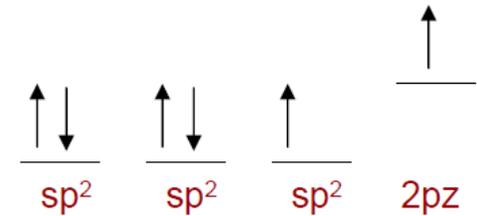
R=R'=Alchile, Arile

il gruppo carbonilico

Elettroni di valenza del carbonio $2s^2 2p^2$

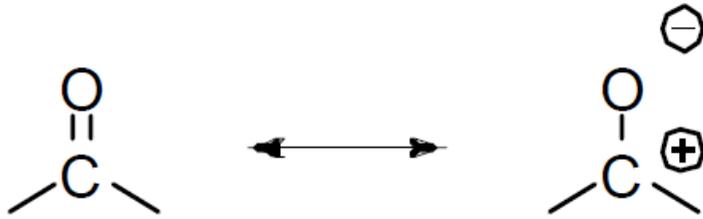


Elettroni di valenza dell'ossigeno $2s^2 2p^4$

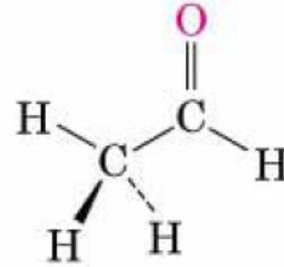


Gruppo carbonilico

gruppo carbonilico

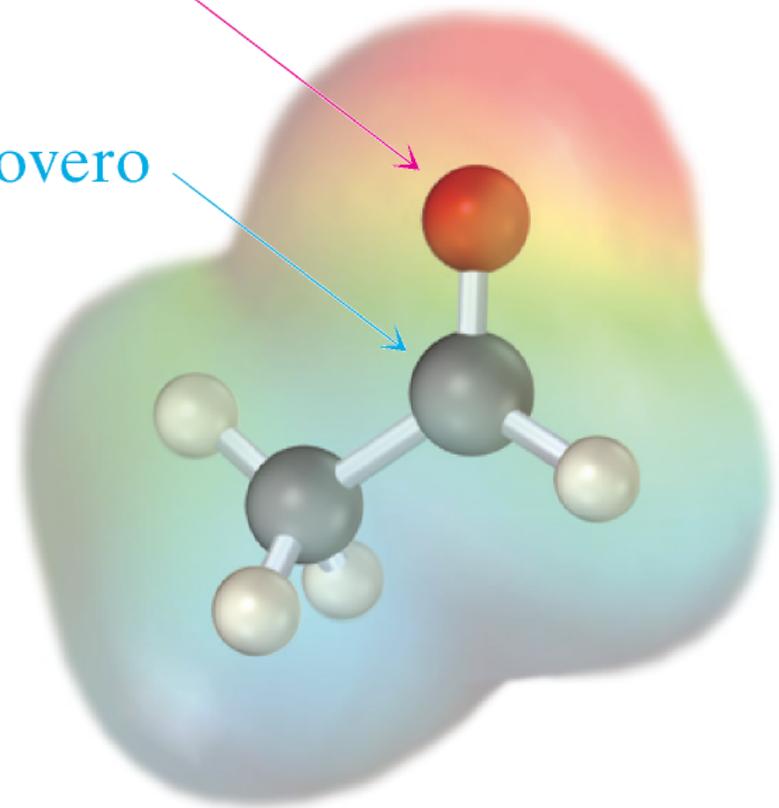


Elettronegatività: C 2,5
O 3,5



Elettron-ricco

Elettron-povero



nomenclatura delle aldeidi

Si individua la catena di atomi di carbonio più lunga **contenente** il gruppo carbonilico e si cambia la desinenza in **-ale**.

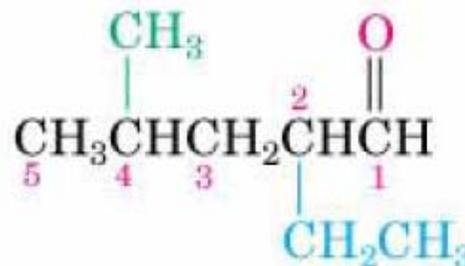
Si numerano i carboni **partendo** dal gruppo aldeide. Si assegnano numero e nome a ciascun sostituito che vengano riportati in ordine alfabetico



Etanale
(Acetaldeide)



Propanale
(Propionaldeide)

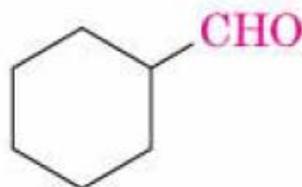


2-Etil-4-metilpentanale

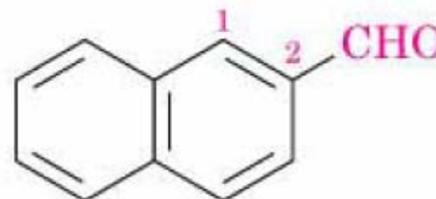


si conta anche
il C del C=O

Per le aldeidi che hanno il -CHO legato a un **anello** si usa la desinenza **-carbaldeide**.



Cicloesancarbaldeide



2-Naftalencarbaldeide

nomi comuni delle aldeidi

FORMULA	NOME COMUNE	NOME SISTEMATICO
HCHO	Formaldeide	Metanale
CH ₃ CHO	Acetaldeide	Etanale
CH ₃ CH ₂ CHO	Propionaldeide	Propanale
CH ₃ CH ₂ CH ₂ CHO	Butirraldeide	Butanale
CH ₃ CH ₂ CH ₂ CH ₂ CHO	Valeraldeide	Pentanale
H ₂ C=CHCHO	Acroleina	2-Propenale
PhCHO	Benzaldeide	Benzencarbaldeide

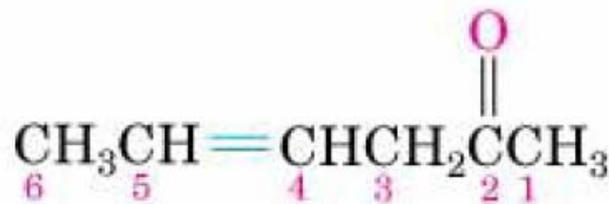
nomenclatura dei chetoni

Si individua la catena di atomi di carbonio più lunga **contenente** il gruppo carbonilico e si cambia la desinenza in **-one**.

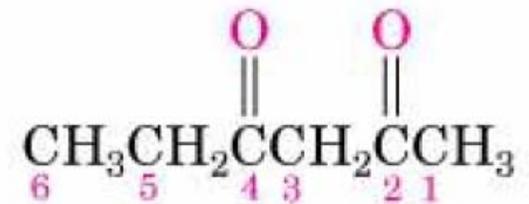
Si numerano i carboni **partendo** dall'estremità più vicina al gruppo carbonilico. Si assegnano numero e nome a ciascun sostituito che vengano riportati in ordine alfabetico



3-Esanone



4-Esen-2-one

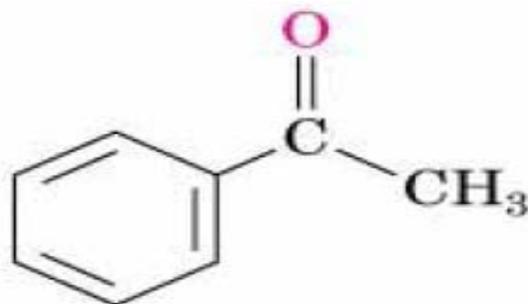


2,4-Eсандione

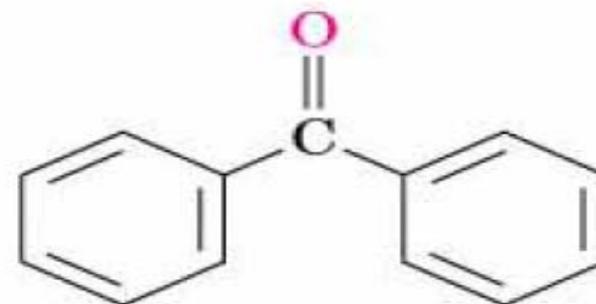
nomi comuni dei chetoni



Acetone

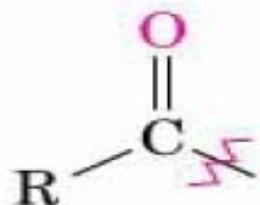


Acetofenone

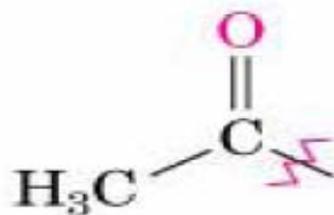


Benzofenone

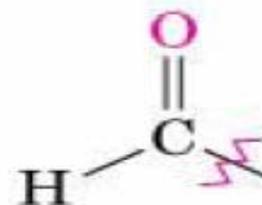
Sostituenti carbonilici



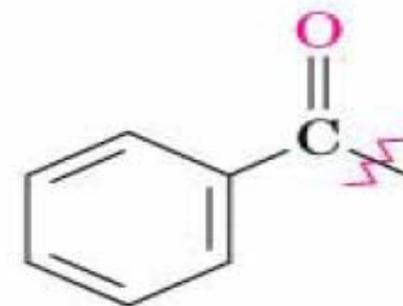
Gruppo acile



Acetile



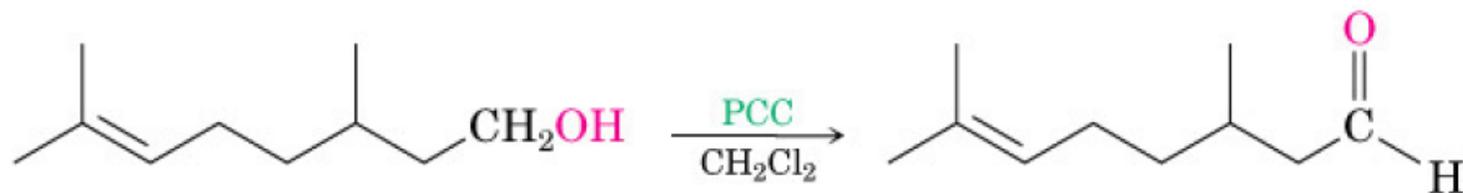
Formile



Benzoile

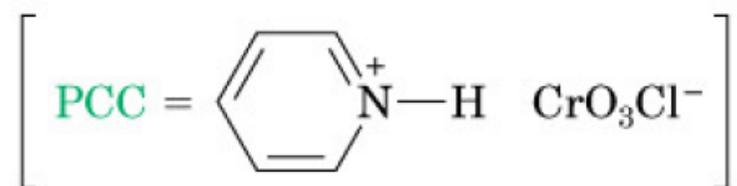
Preparazione di aldeidi e chetoni

Ossidazione di alcoli primari con ossidanti blandi: **aldeidi**



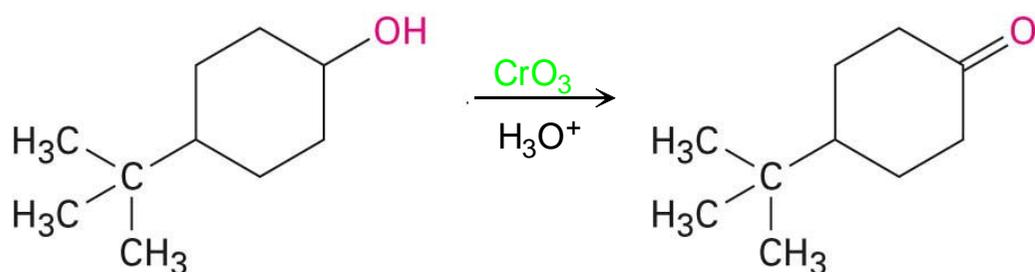
Citronello (dall'olio di rose)

Citronellale (82%)



piridinio clorocromato

Ossidazione di alcoli secondari: **chetoni**

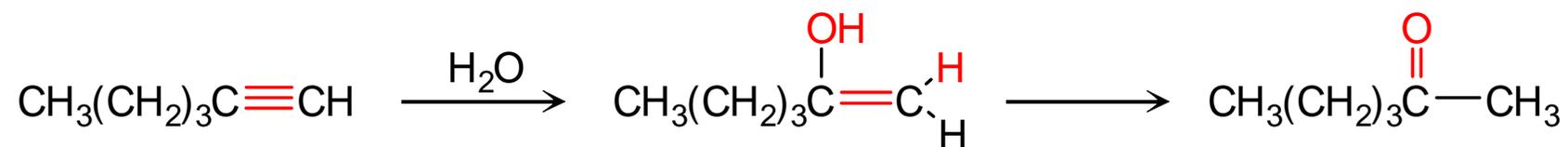


4-terz-butilcicloesanolo

4-terz-butilcicloesanone

Preparazione di aldeidi e chetoni

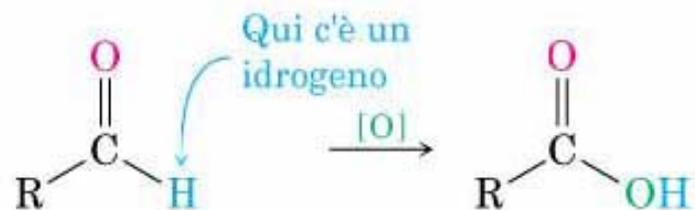
Idratazione di alchini



Acilazione di Friedel-Crafts

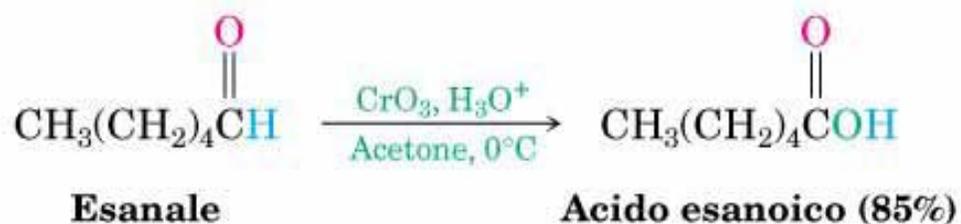


Reazioni di aldeidi e chetoni: ossidazione



Aldeide

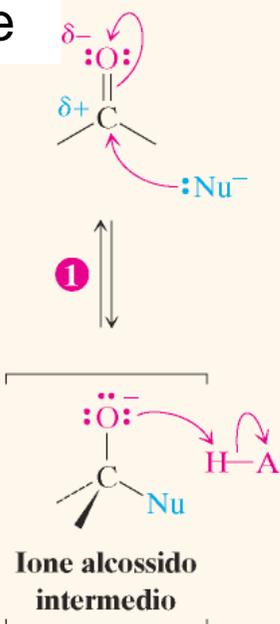
Un **aldeide** può essere ancora ossidata ad acido carbossilico, mentre un **chetone** è già giunto al massimo stato di ossidazione



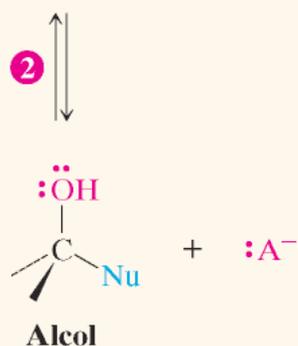
Addizione nucleofila al carbonile

condizioni basiche

- 1 Un nucleofilo carico negativamente $:\text{Nu}^-$ si addiziona al carbonio elettrofilo e spinge gli elettroni π del legame $\text{C}=\text{O}$ sull'ossigeno, formando uno ione alcossido.

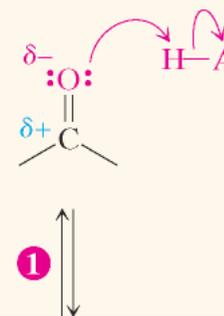


- 2 Lo ione alcossido viene protonato, dall'acido aggiunto HA o dal solvente, per dare un alcol neutro come prodotto di addizione.

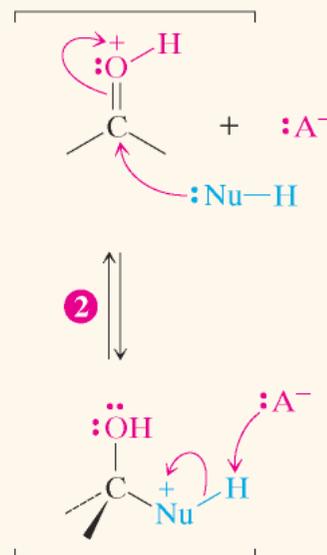


condizioni acide

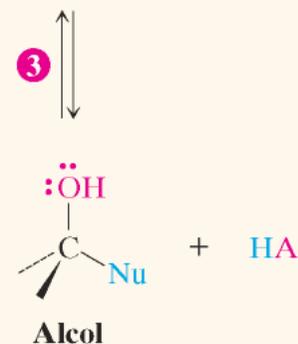
- 1 L'ossigeno del carbonile viene protonato dall'acido HA , ciò rende il carbonio più fortemente elettrofilo.



- 2 Un nucleofilo neutro $:\text{Nu}-\text{H}$ si addiziona al carbonio elettrofilo e spinge gli elettroni π del legame $\text{C}=\text{O}$ sull'ossigeno. L'ossigeno diventa neutro e il nucleofilo assume la carica +.

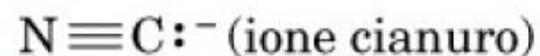
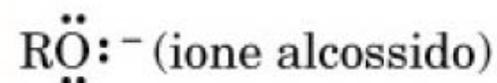
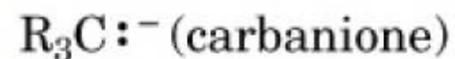
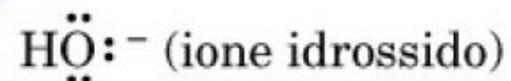


- 3 Una base deprotona l'intermedio per dare un alcol neutro come prodotto di addizione e rigenerare il catalizzatore acido.

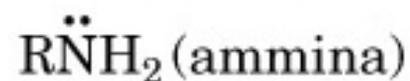
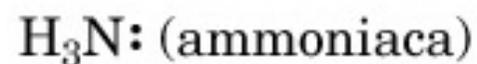
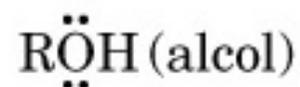
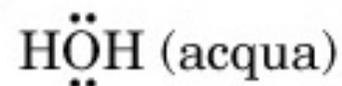


nucleofili che danno addizione al carbonile

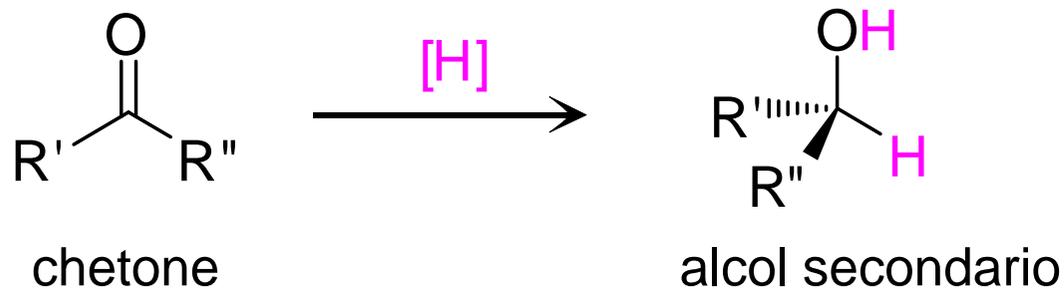
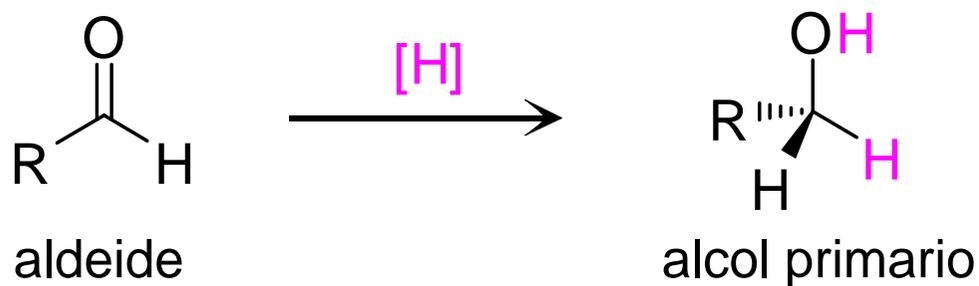
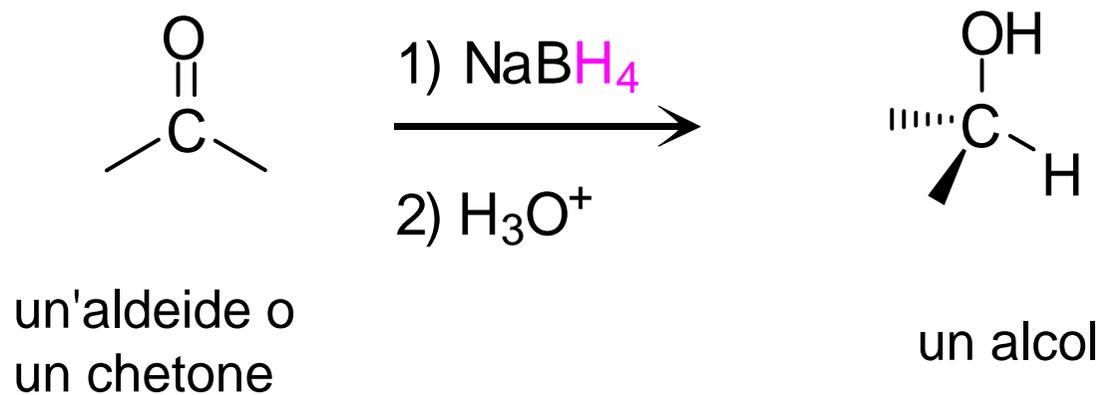
Alcuni nucleofili carichi negativamente



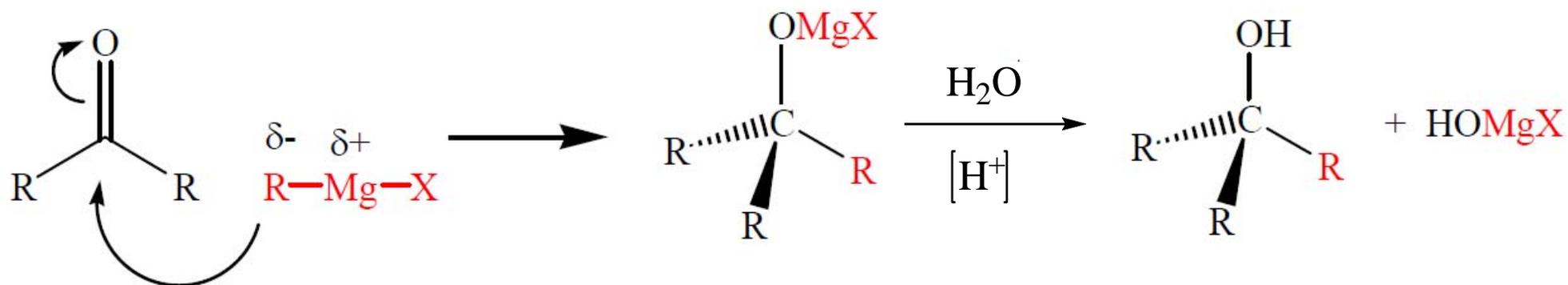
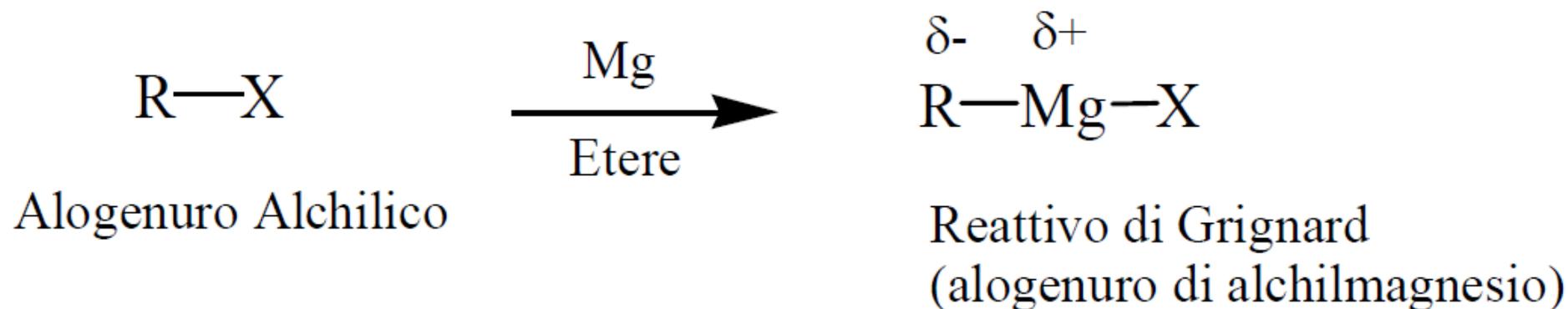
Alcuni nucleofili neutri



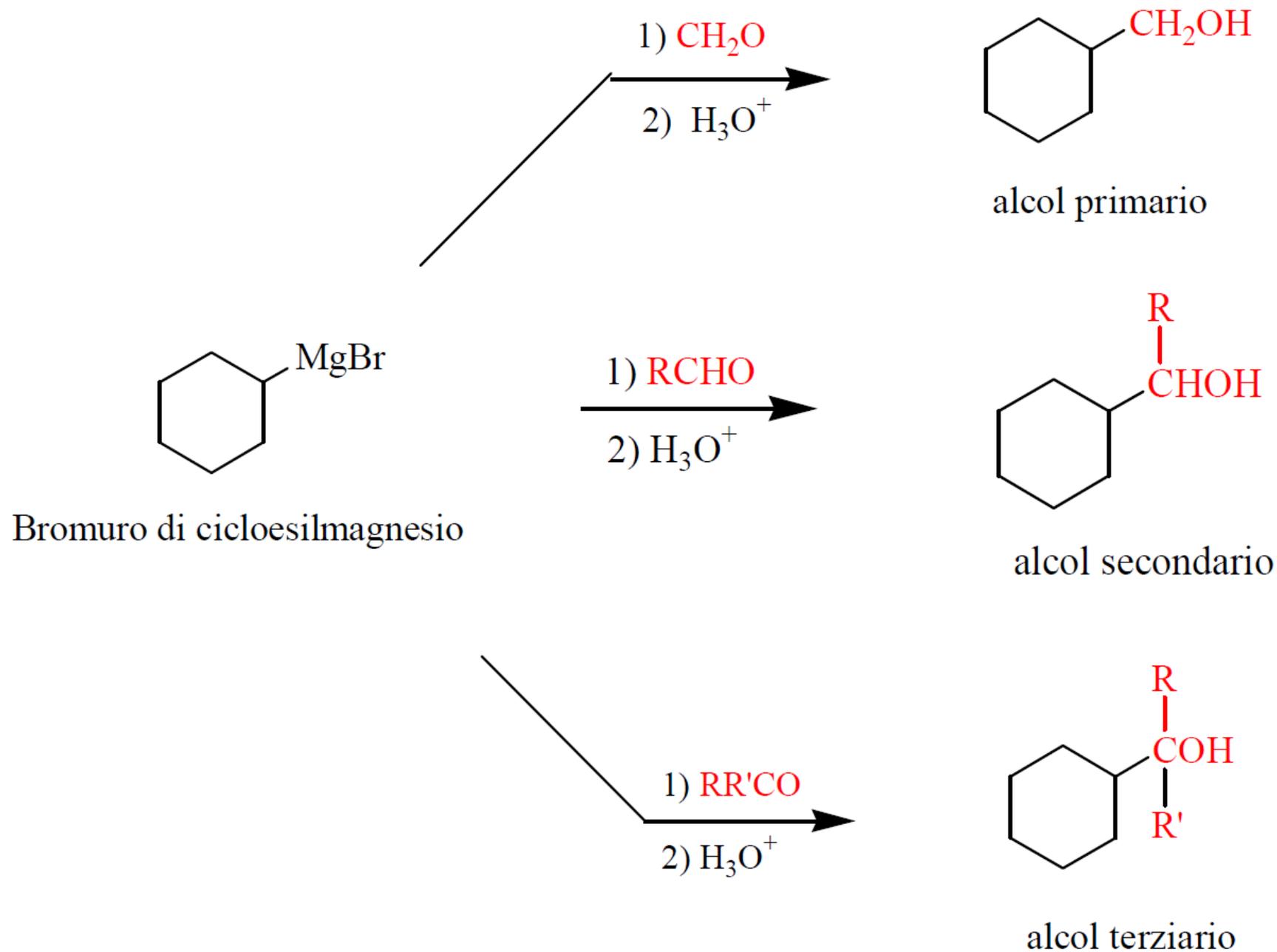
riduzione: addizione di idruro



Alcoli: addizione di reattivi di Grignard

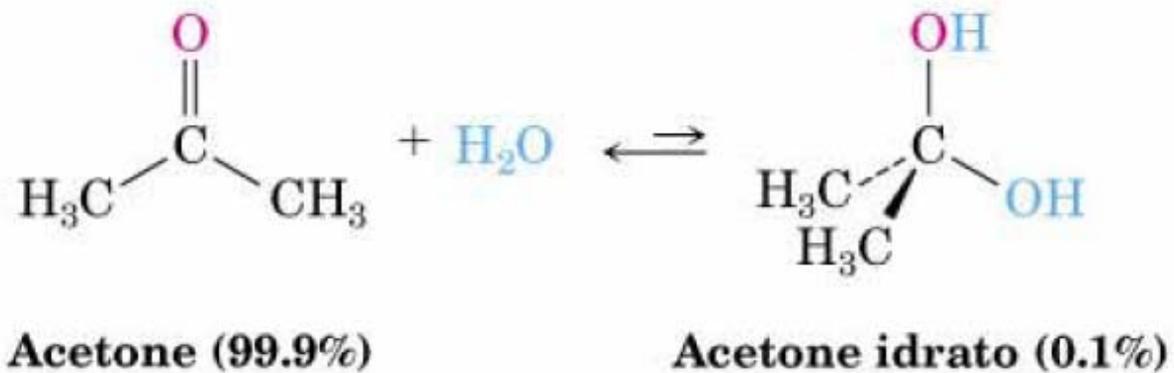


Alcoli: addizione di reattivi di Grignard

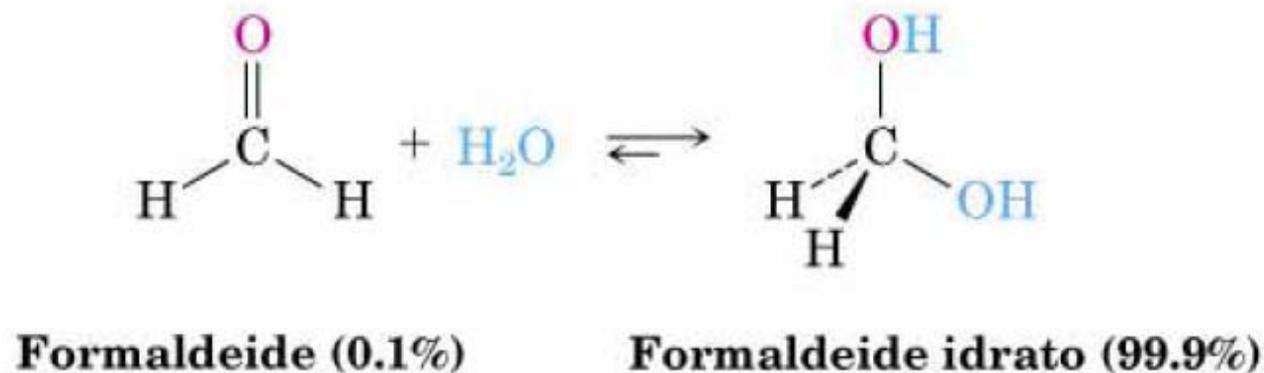


idratazione: addizione di acqua

Chetoni

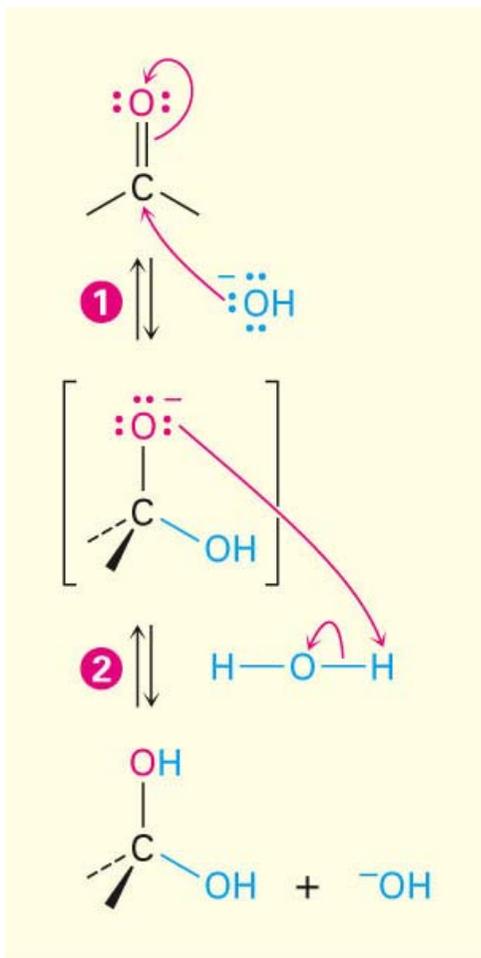


Aldeidi

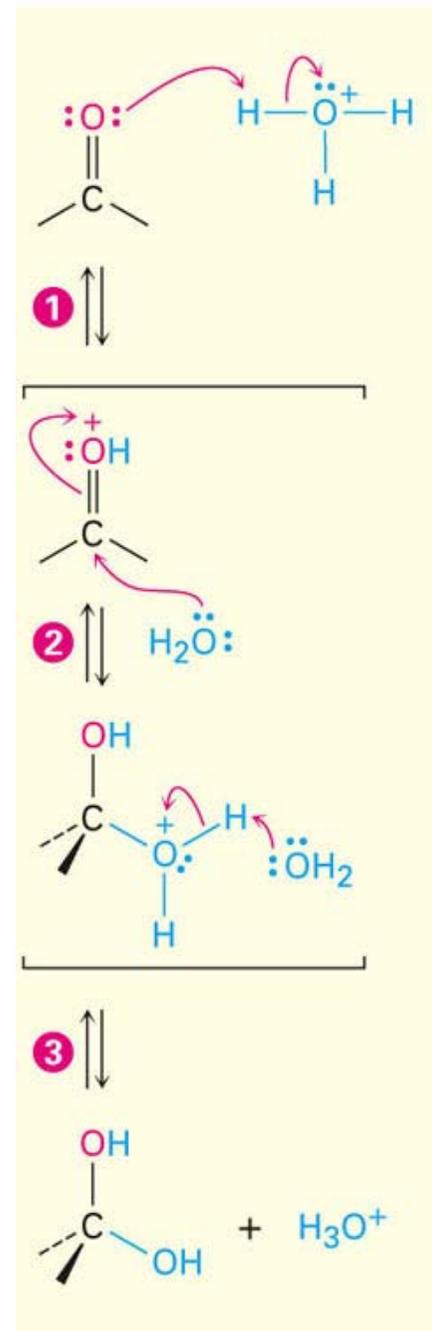


meccanismo dell'idratazione

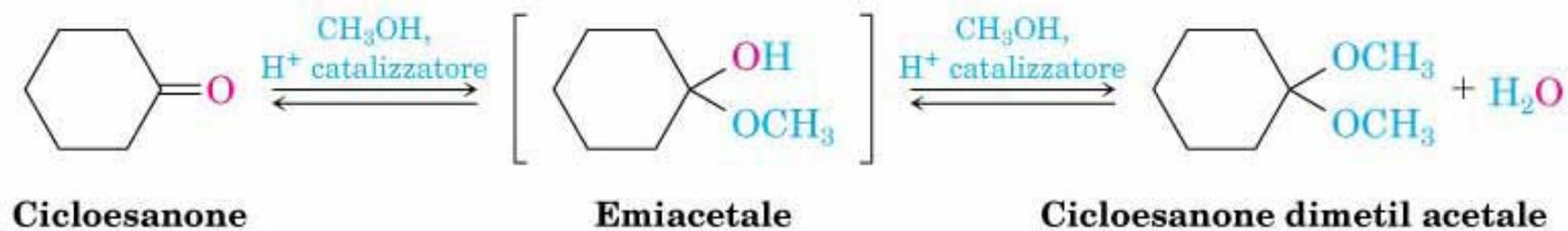
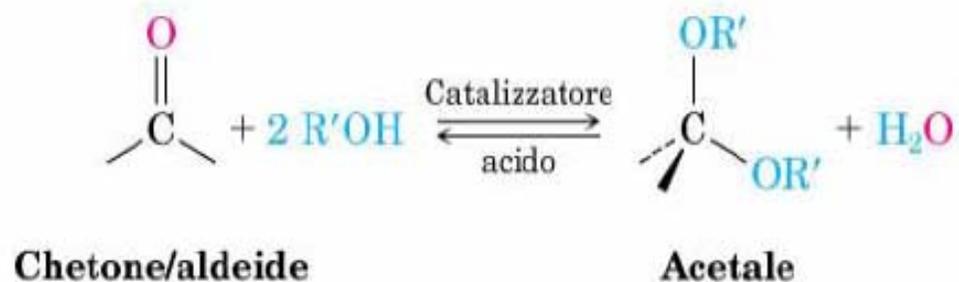
Catalisi basica



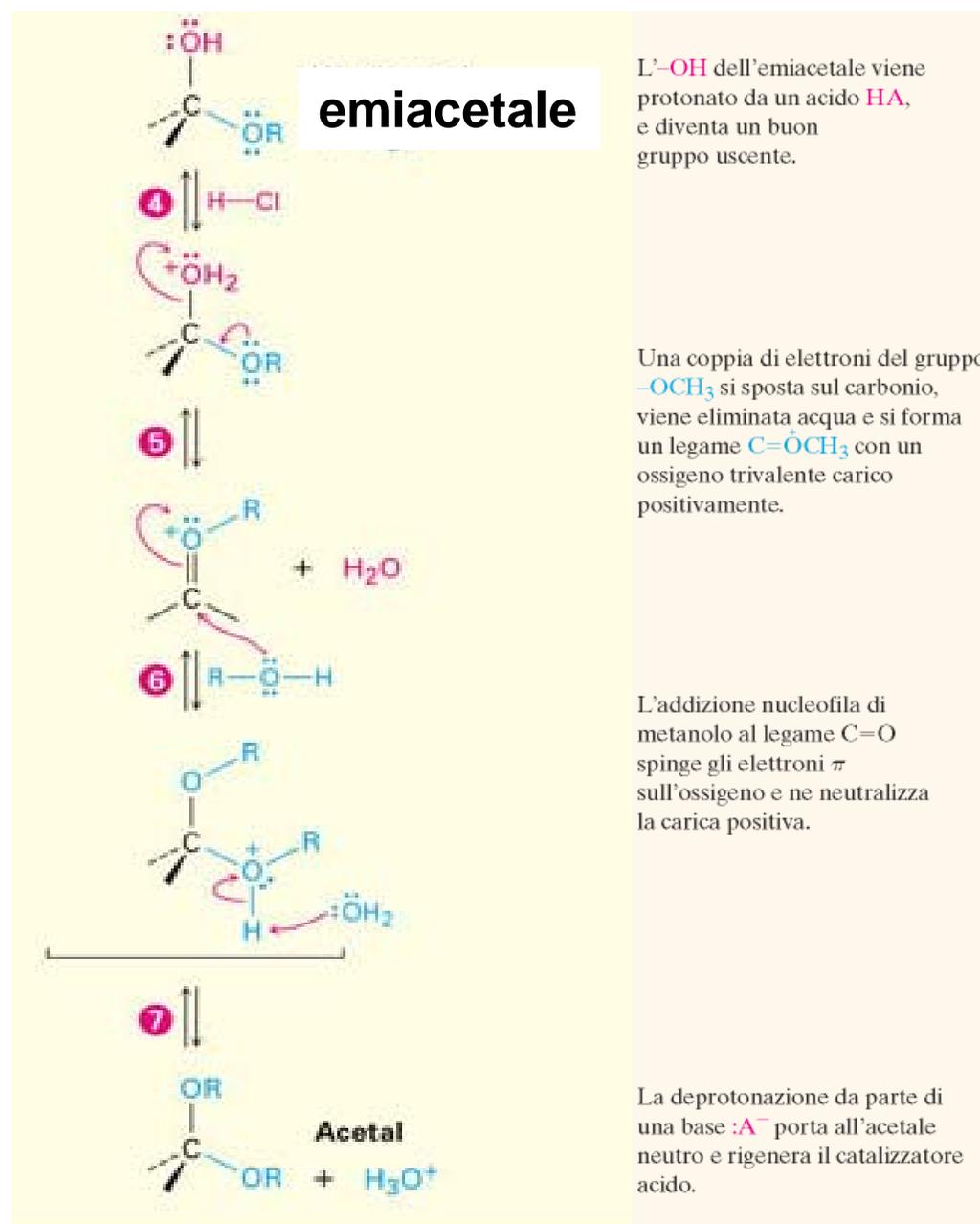
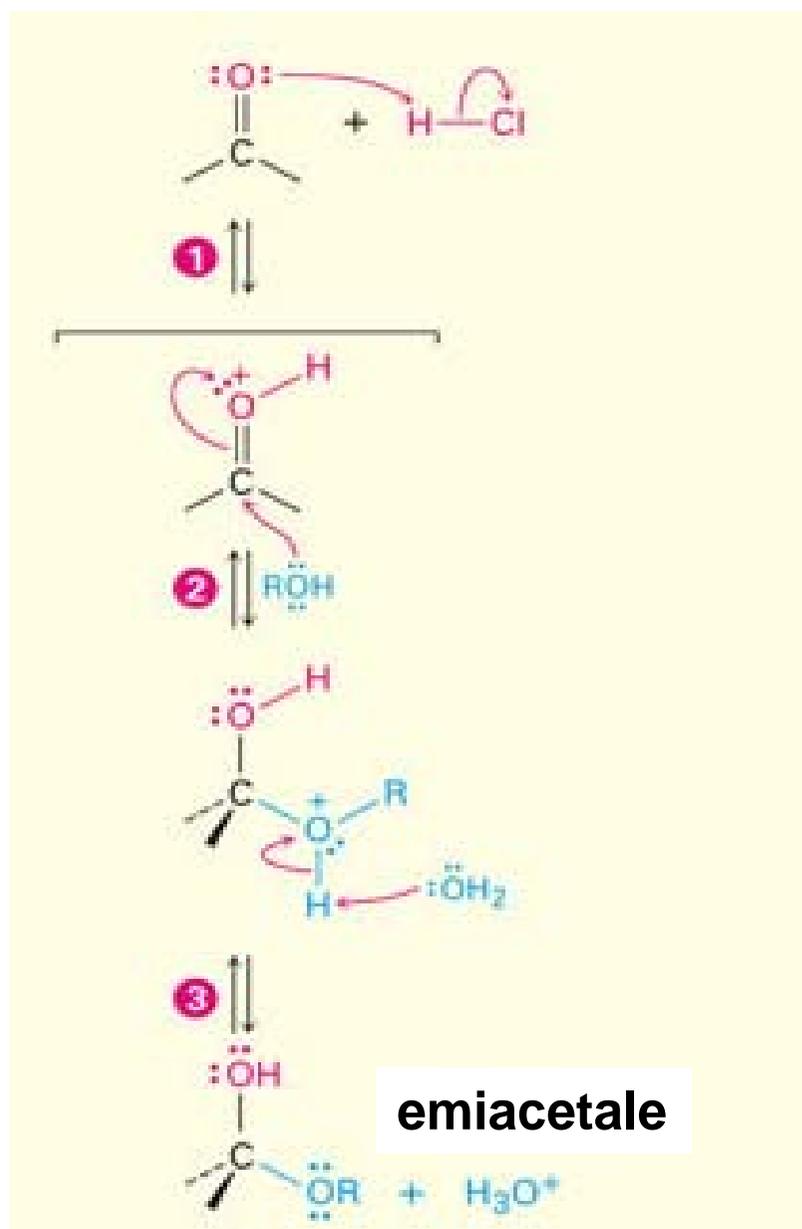
Catalisi acida



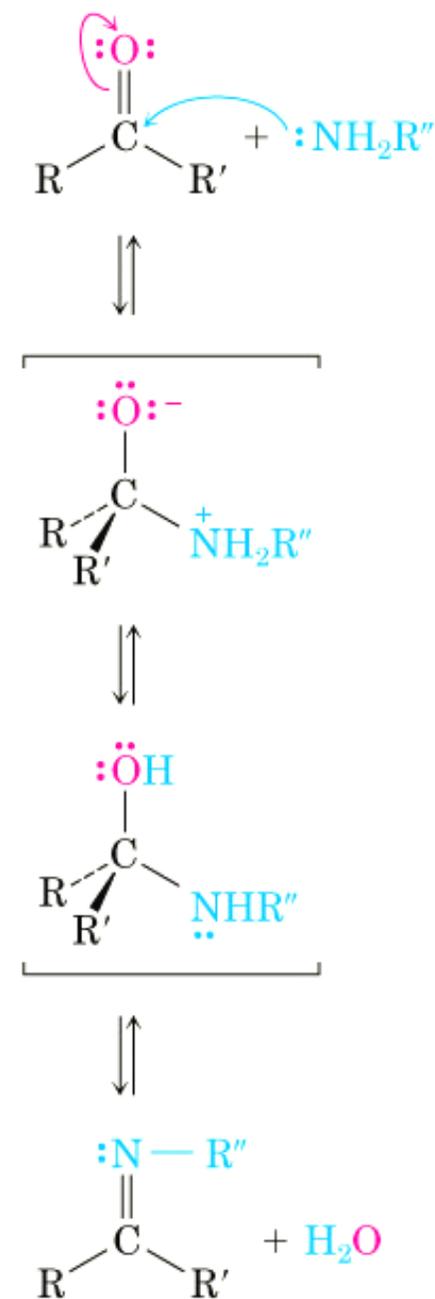
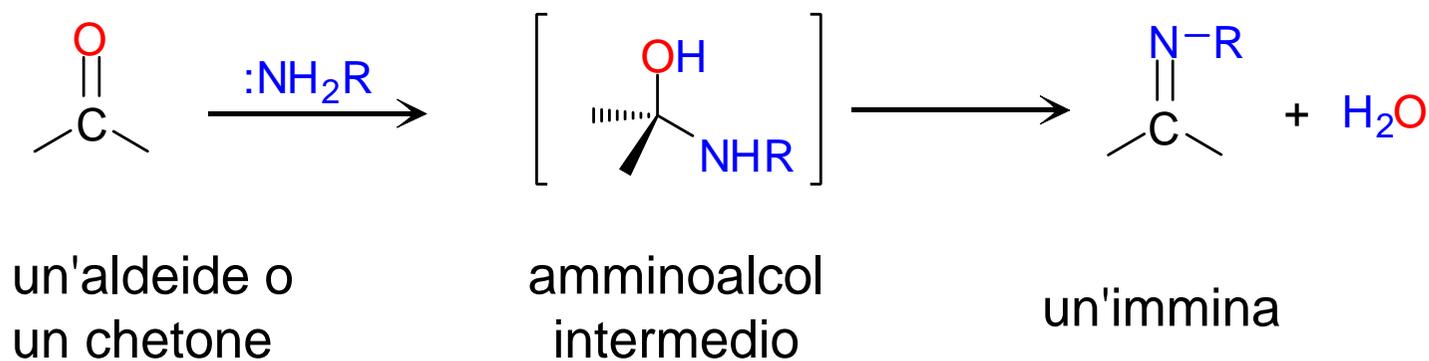
acetali: addizione di alcoli



meccanismo della formazione di acetali

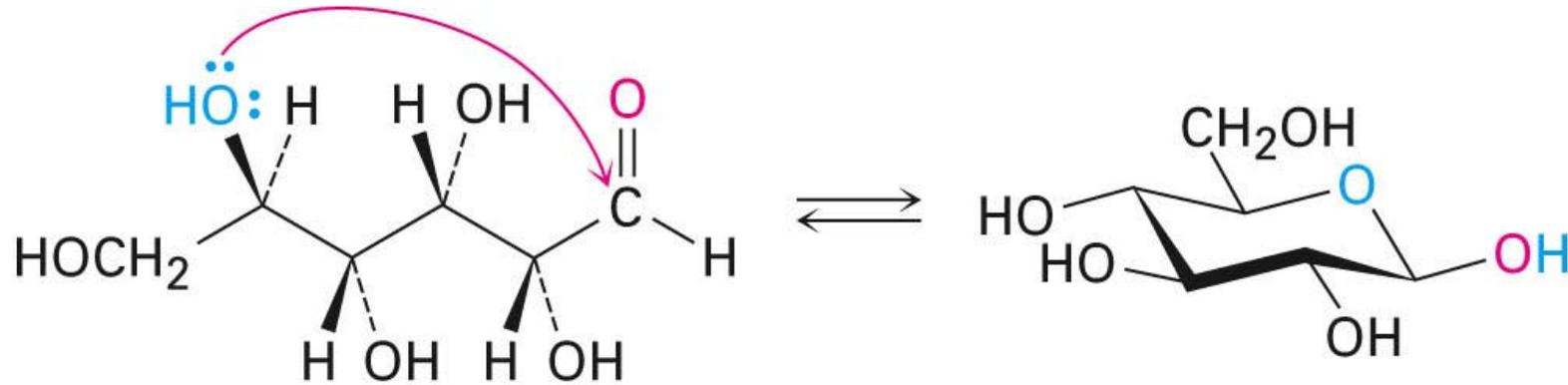


immine: addizione di ammine



addizioni a carbonili in biomolecole

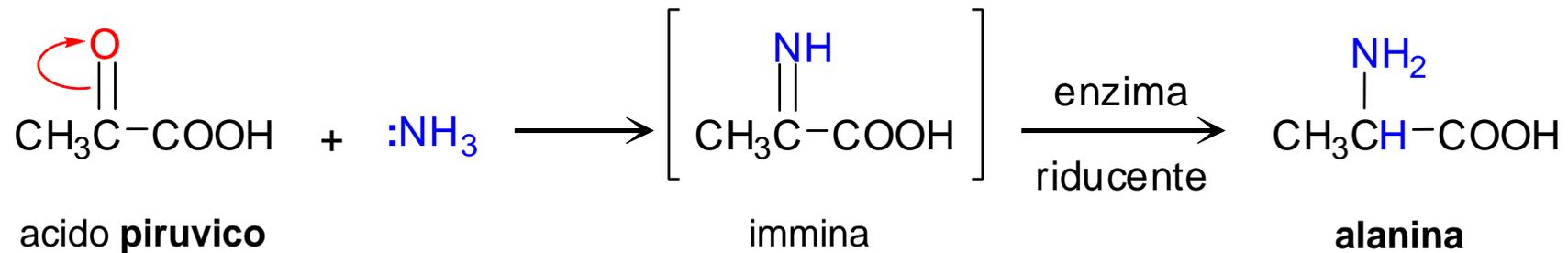
zuccheri



glucosio in forma aperta

glucosio in forma emiacetalica ciclica

sintesi di aminoacidi



acido **piruvico**

immina

alanina

sintesi della vitamina C

