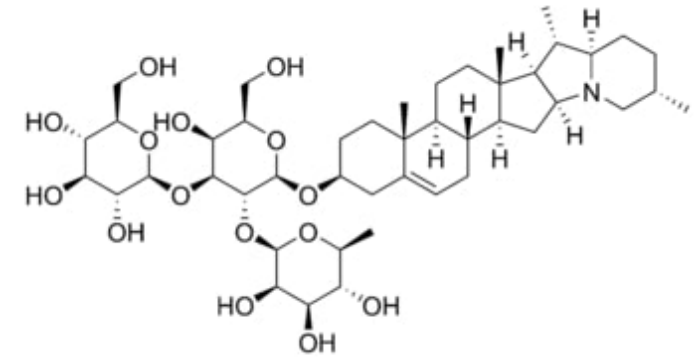
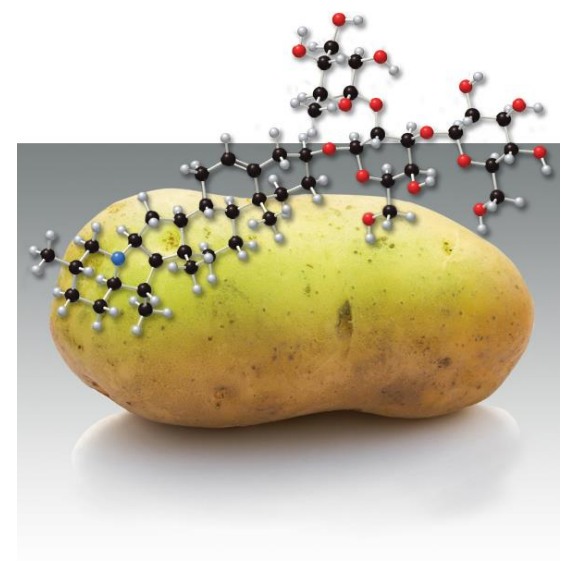


Carboidrati

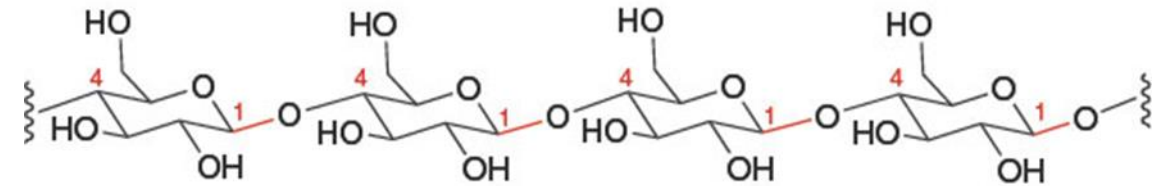
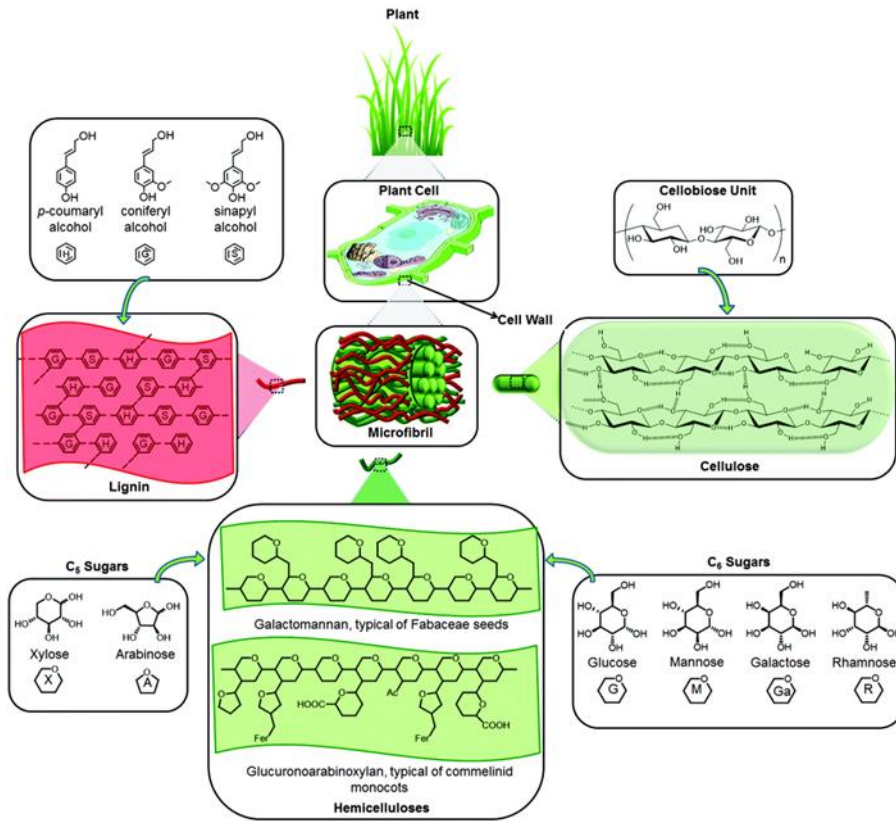
- **Monosaccaridi**
- **La famiglia dei D-aldosi e D-chetosi**
- **Le forme cicliche dei monosaccaridi**
- **Glicosidi**
- **Reazioni dei monosaccaridi ai gruppi OH**
- **Reazioni al gruppo carbonile: ossidazione e riduzione**
- **Reazioni al gruppo carbonile: aggiunta o rimozione di un atomo di carbonio**
- **Disaccaridi, Polisaccaridi, altri derivati degli zuccheri**



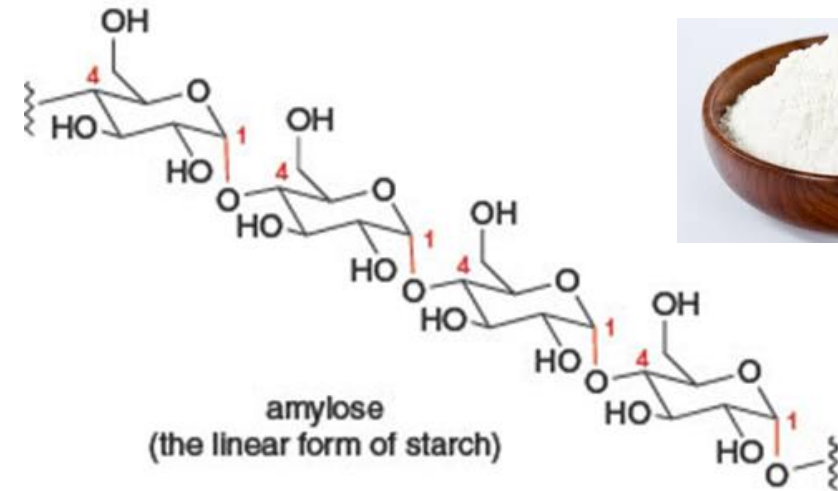
Le foglie, i gambi e le macchie verdi sulle patate contengono la **tossina solanina**, che viene prodotta dalla pianta come difesa contro insetti e predatori. La solanina è un derivato dei carboidrati, formato da un'ammina complessa e tre anelli monosaccarici, che sono uniti tra loro da acetali chiamati glicosidi. I numerosi gruppi idrossi della porzione di carboidrati della solanina aumentano la sua solubilità in acqua, una caratteristica utile nei sistemi biologici acquosi.

Carboidrati

**Lignocellulosic biomass:
polymers of lignin, hemicellulose, and cellulose**



cellulose
1→4-β-glycosidic linkages in red

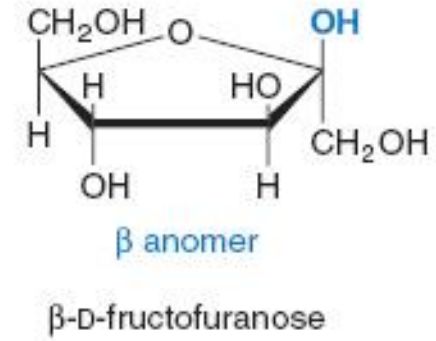
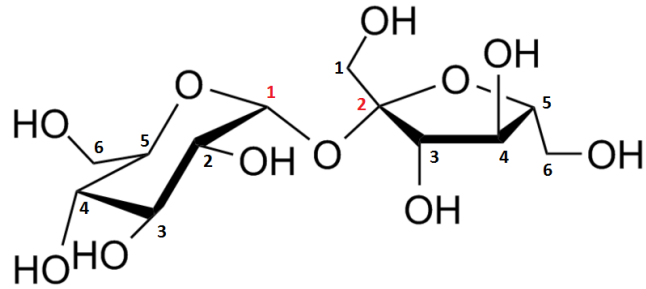


amylose
(the linear form of starch)
1→4-α-glycosidic linkages in red



Carboidrati

Saccarosio e fruttosio



I Carboidrati

Aldoso: Un monosaccaride contenente un'aldeide

Chetoso: Un monosaccaride contenente un chetone

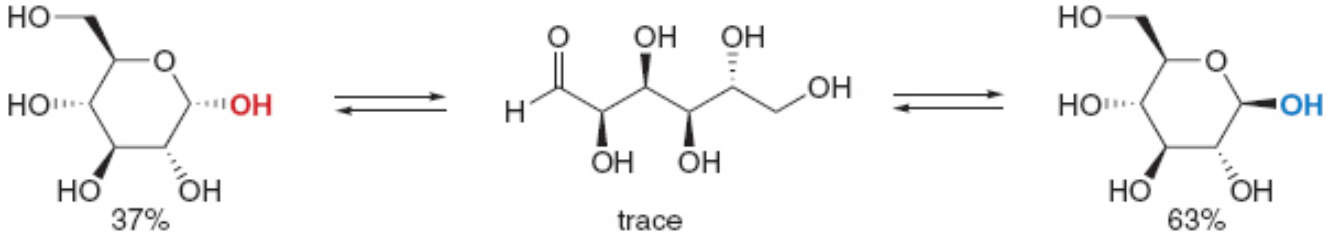
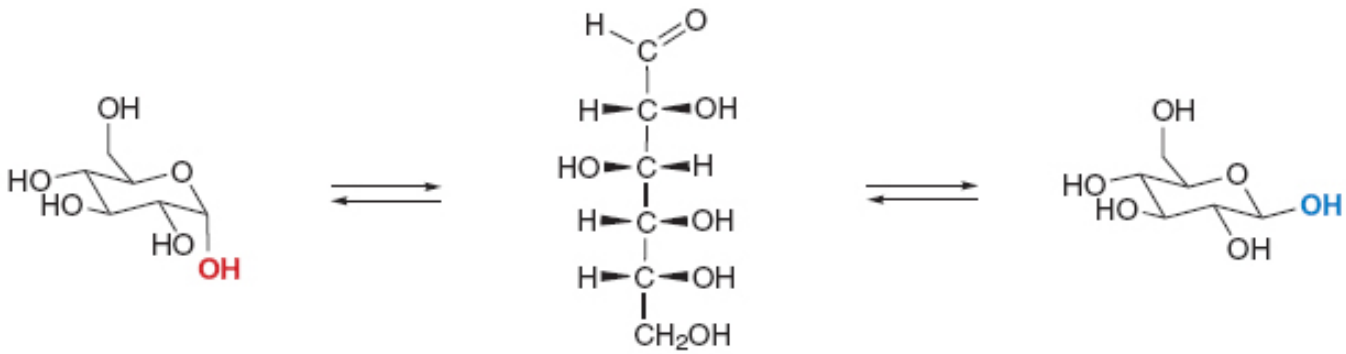
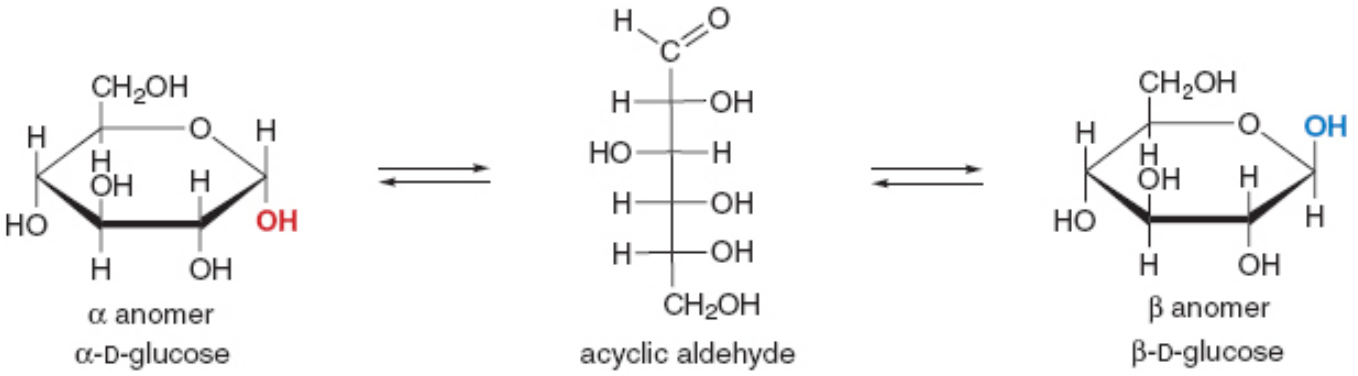
D-Zucchero: Un monosaccaride con l'OH legato al centro stereogenico più lontano dal gruppo carbonile disegnato a destra nella proiezione di Fischer

Epimeri: Due diastereomeri che differiscono nella configurazione attorno a un solo centro stereogenico

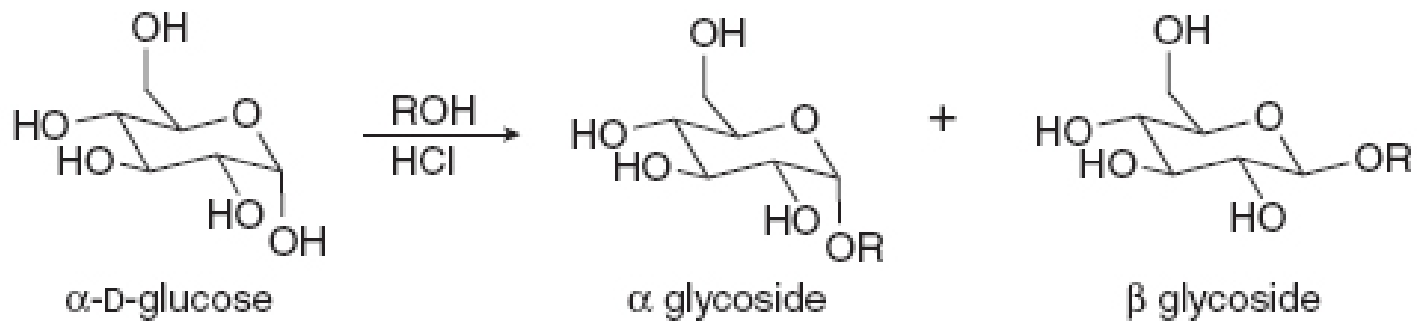
Anomeri: Monosaccaridi che differiscono nella configurazione nel gruppo OH emiacetale

Glicoside: Un acetale derivato da un emiacetale monosaccaride

Rappresentazione aciclica, di Haworth e 3-D del D-Glucosio

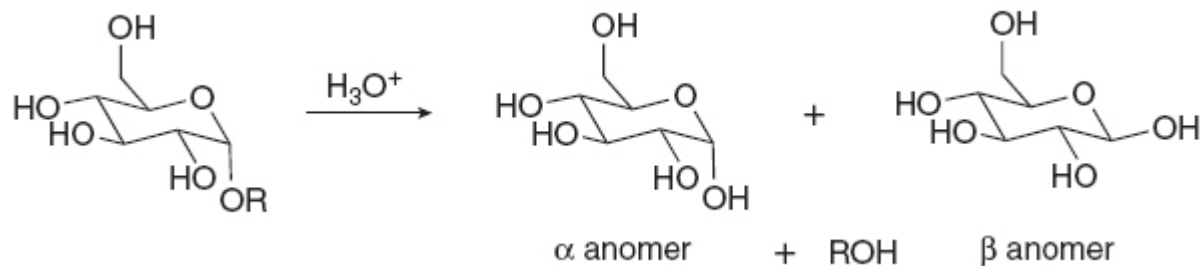


Formazione di Acetali - Glicosidi



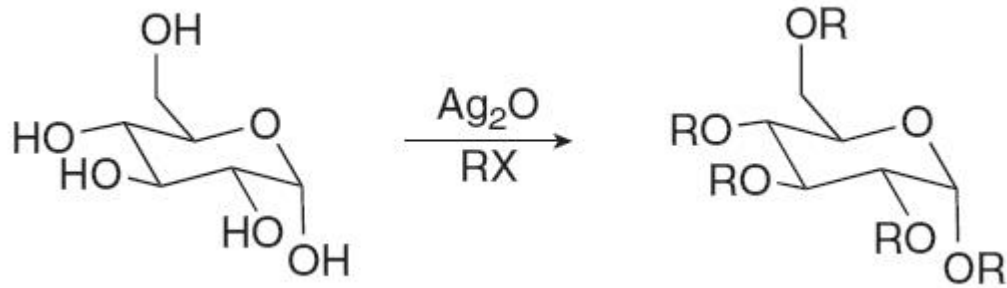
Solo l'OH emiacetale reagisce. Si forma una miscela di glicosidi α e β

Idrolisi dei glicosidi



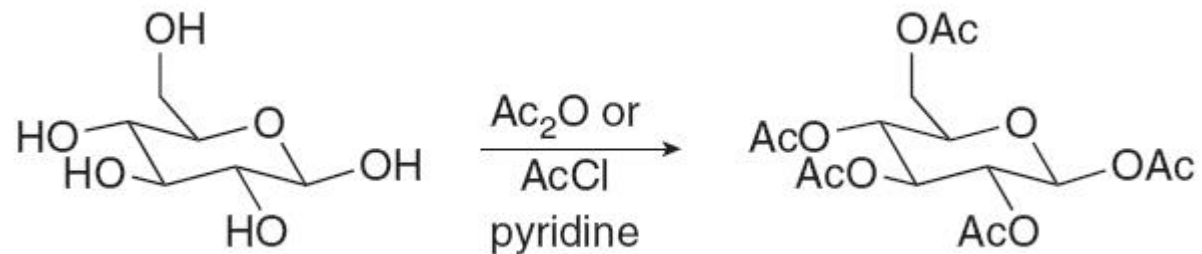
Si forma una miscela di anomeri α e β

Reazioni dei monosaccaridi – formazione di eteri



Sintesi di eteri. Si forma una miscela di glicosidi α e β

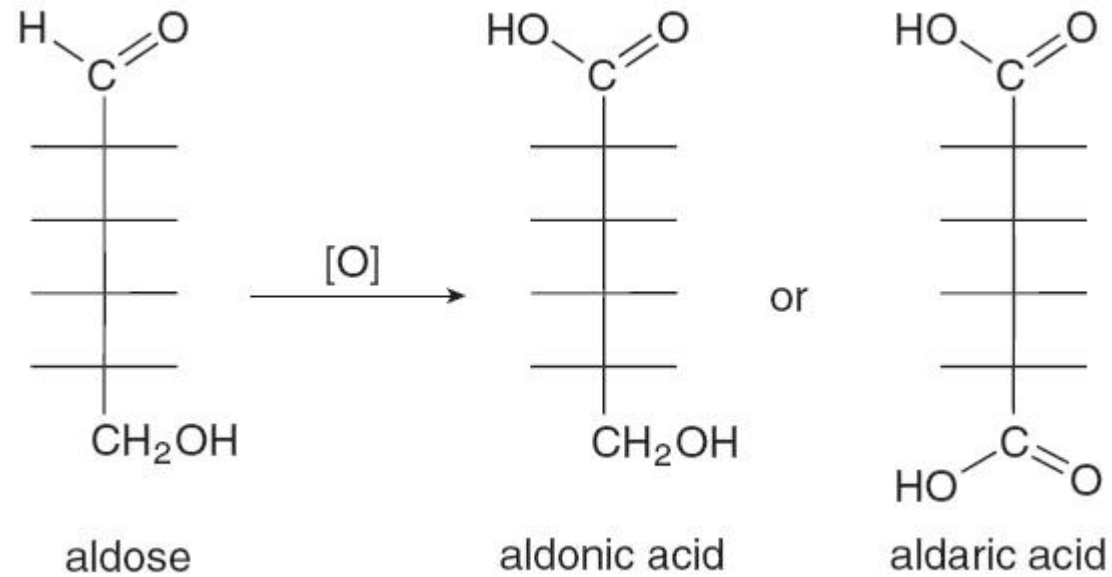
Formazione di acetati



Reagiscono tutte le funzioni ossidriliche, la stereochimica viene mantenuta

Reazioni dei monosaccaridi alla funzione carbonilica

Ossidazione

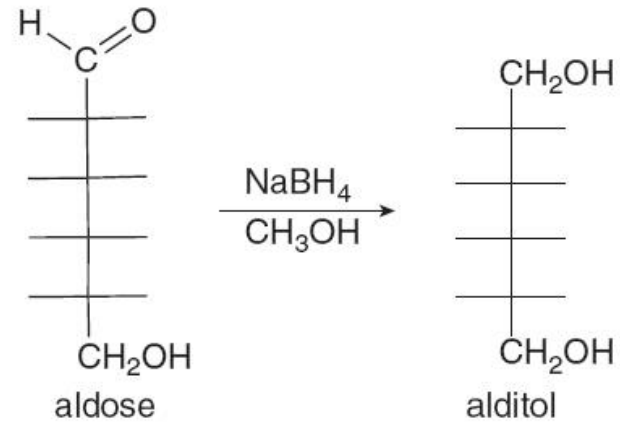


Gli acidi **Aldonici** si formano con: Ag_2O , NH_4OH o Cu^{2+} o Br_2 , H_2O

Gli acidi **Aldarici** si formano con HNO_3 , H_2O .

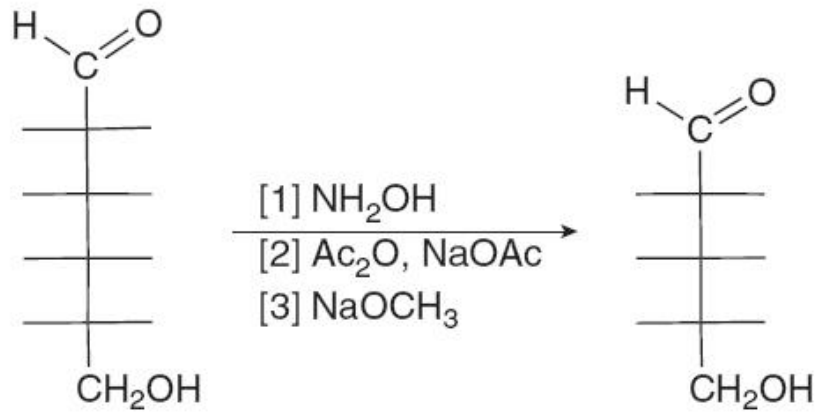
Reazioni dei monosaccaridi alla funzione carbonilica

Riduzione a alditolo

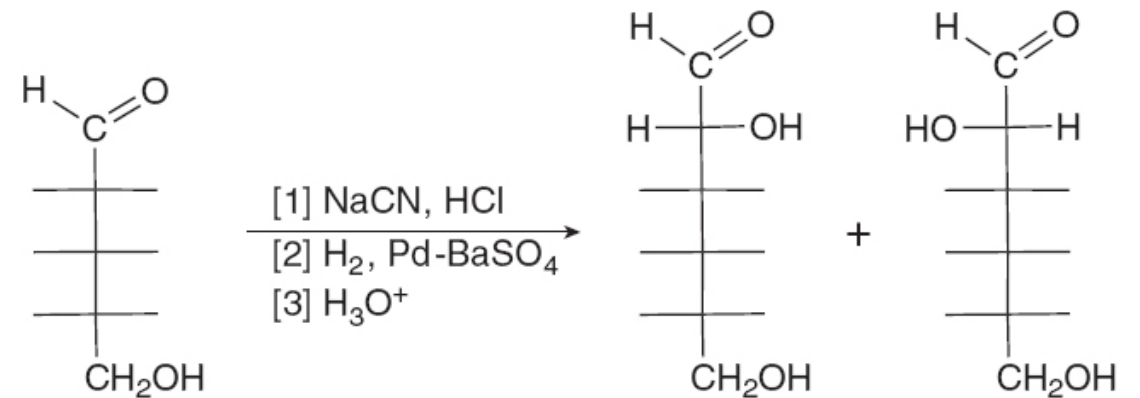


Reazioni dei monosaccaridi alla funzione carbonilica

Degradazione di Wohl

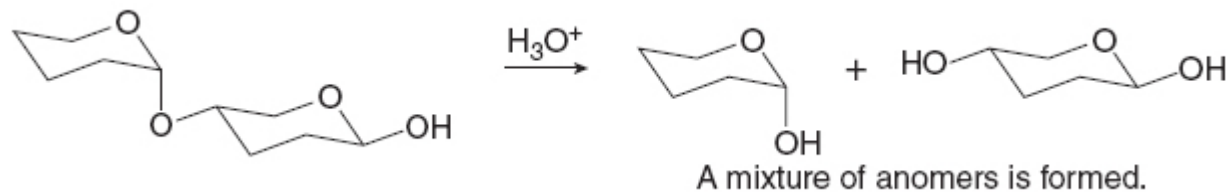


Sintesi di Kiliani—Fischer

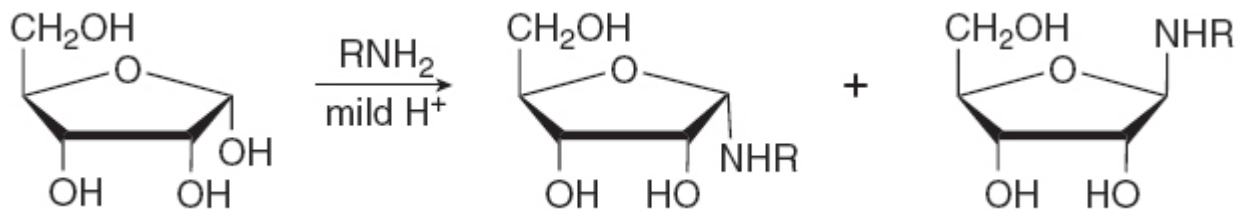


Reazioni dei monosaccaridi alla funzione carbonilica

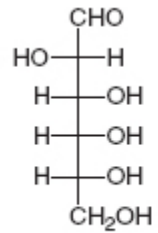
Idrolisi di un disaccaride



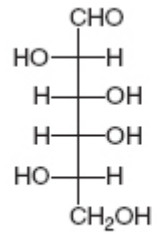
Formazione di un *N*-glicoside



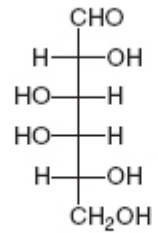
Esercizi



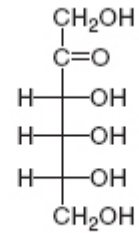
A



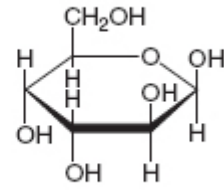
B



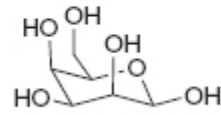
C



D



E

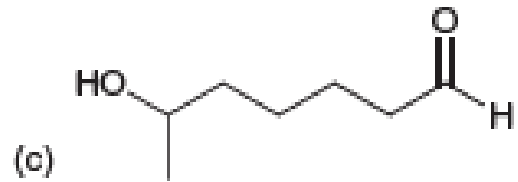
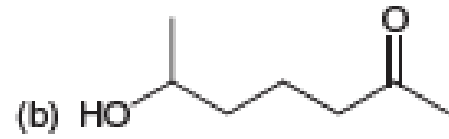


F

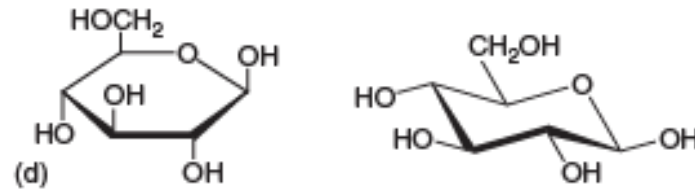
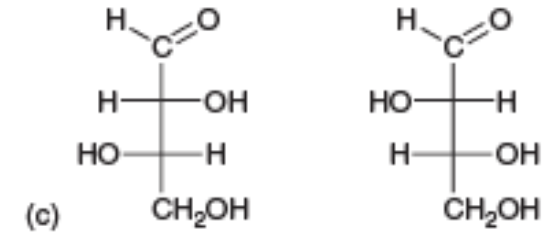
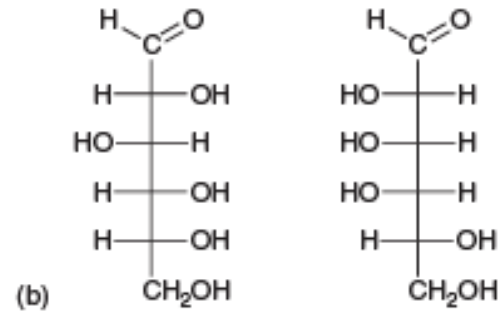
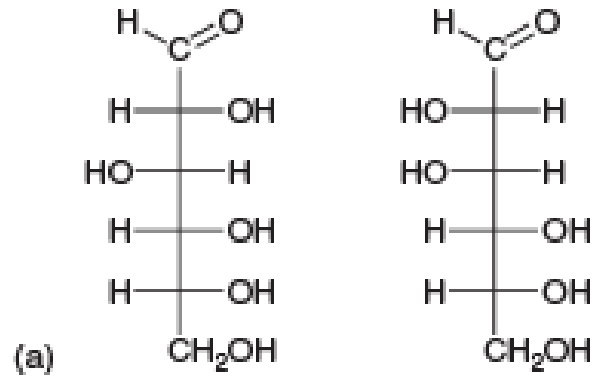
Considerate composti seguenti (A -F). Come è correlate ogni coppia?

Scegliere tra enantiomeri, epimeri, diastereoisomeri ma non epimeri, isomeri costituzionali e omomeri

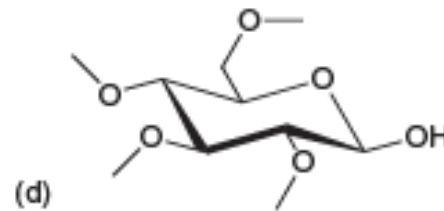
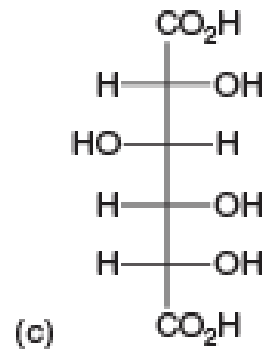
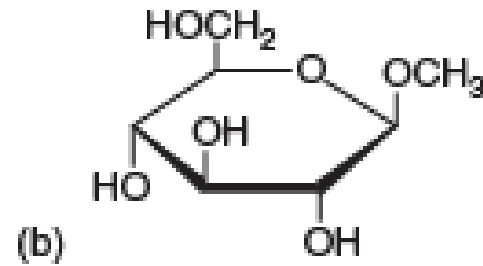
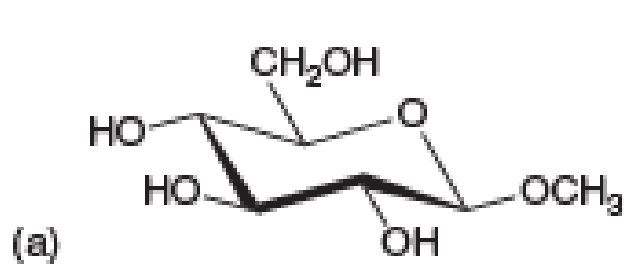
Disegna l'emiacetale ciclico che si forma quando ciascuno dei seguenti composti bifunzionali viene trattato con acido acquoso.



Per ciascuna delle seguenti coppie di composti, determinare se sono enantiomeri, epimeri, diastereomeri, che non sono epimeri o composti identici:



Identifica i reagenti che useresti per convertire il beta-D-glucopiranosio in ciascuno dei seguenti composti:



(a) CH_3OH , HCl

(b) CH_3OH , HCl

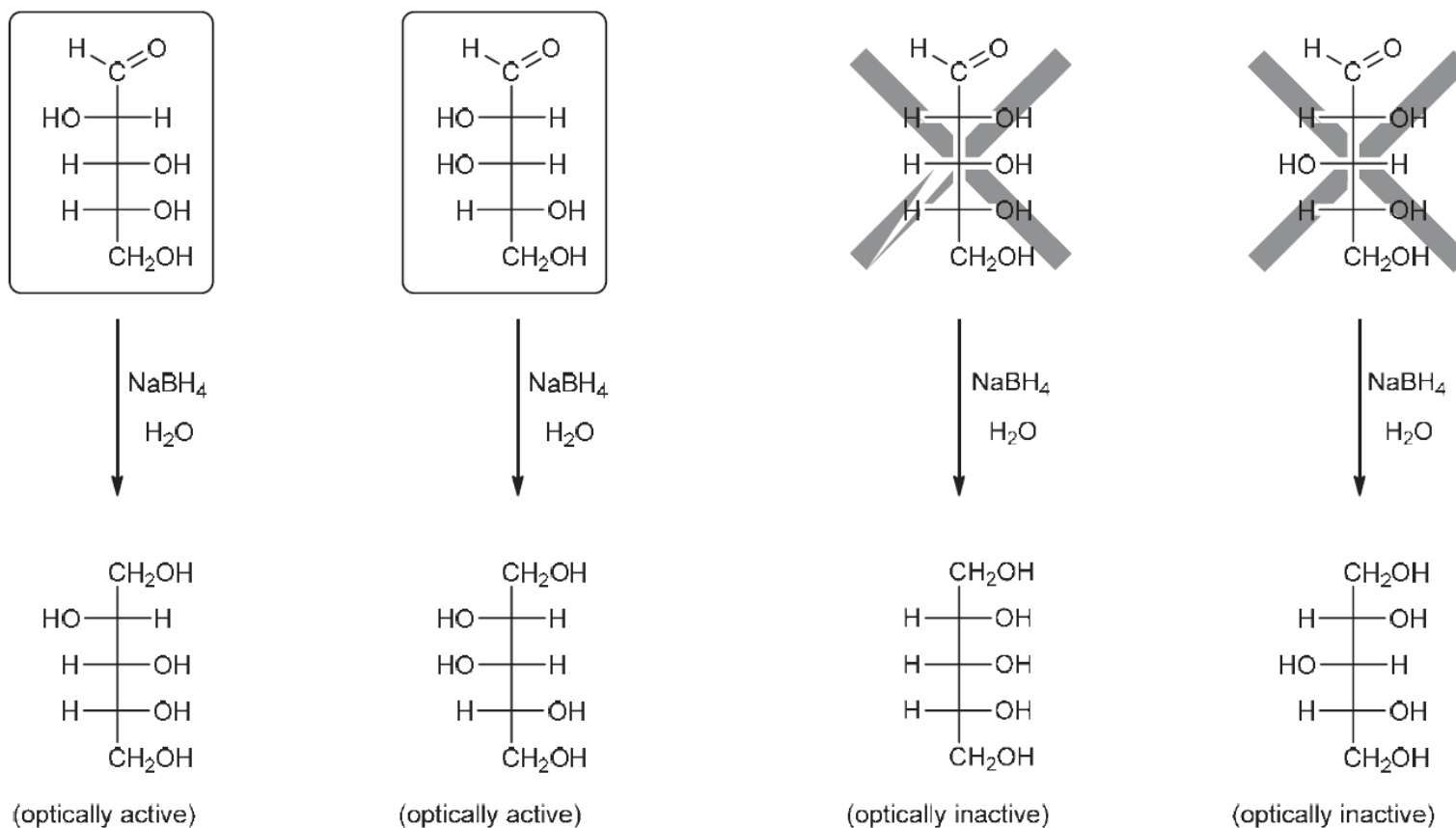
(c) HNO_3 , H_2O , heat

(d) excess CH_3I , Ag_2O followed by H_3O^+

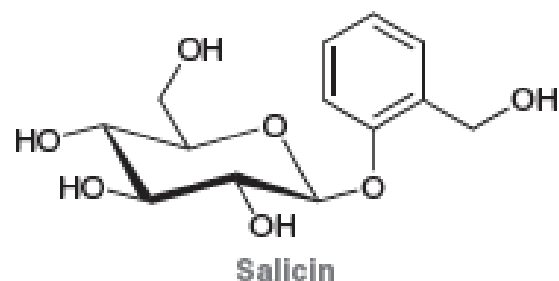
24.84 Explain why glucose is the most common monosaccharide observed in nature.

24.80 Compound **A** is a D-aldopentose that is converted into an optically active alditol upon treatment with sodium borohydride. Draw two possible structures for compound **A**.

24.80 Compound **A** is a D-aldopentose that is converted into an optically active alditol upon treatment with sodium borohydride. Draw two possible structures for compound **A**.



24.76 Salicin is a natural analgesic present in the bark of willow trees, and it has been used for thousands of years to treat pain and reduce fevers.

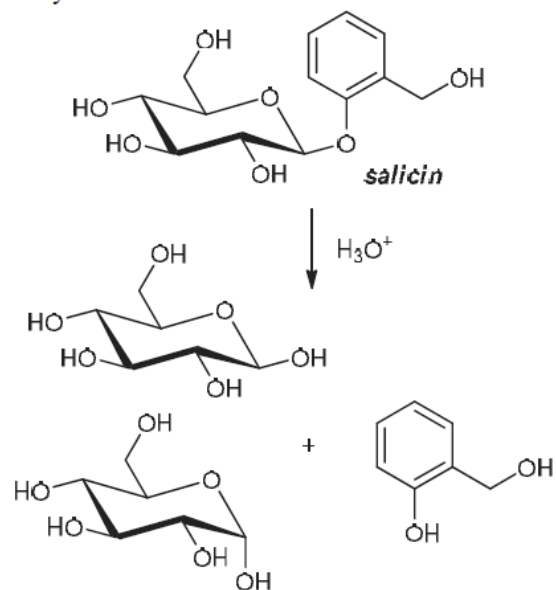


- (a) Is salicin a reducing sugar?
- (b) Identify the products obtained when salicin is hydrolyzed in the presence of an acid.
- (c) Is salicin an α -glycoside or a β -glycoside?
- (d) Draw the major product expected when salicin is treated with excess acetic anhydride in the presence of pyridine.
- (e) Would you expect salicin to exhibit mutarotation when dissolved in neutral water?

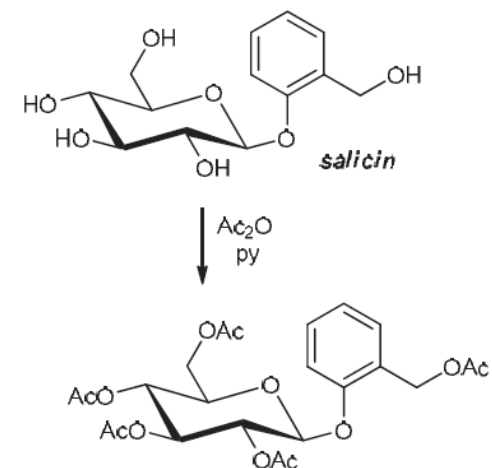
24.76.

(a) No, it is not a reducing sugar because the anomeric position has an acetal group.

(b) The acetal group is hydrolyzed, giving both anomers of the cyclic hemiacetal:



(d) Upon treatment with acetic anhydride and pyridine, all of the OH groups undergo acetylation, giving the product shown:

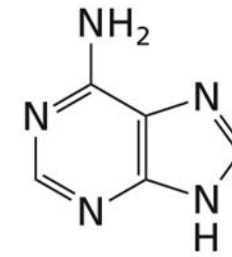


(e) No. In the absence of acid catalysis, the acetal group is not readily hydrolyzed.

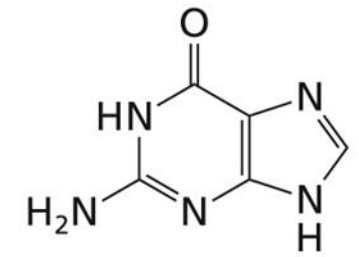
24.79 Draw the nucleoside formed from each of the following pairs of compounds and name the nucleoside:

(a) 2-Deoxy-D-ribose and adenine

(b) D-Ribose and guanine



Adenine



Guanine

