



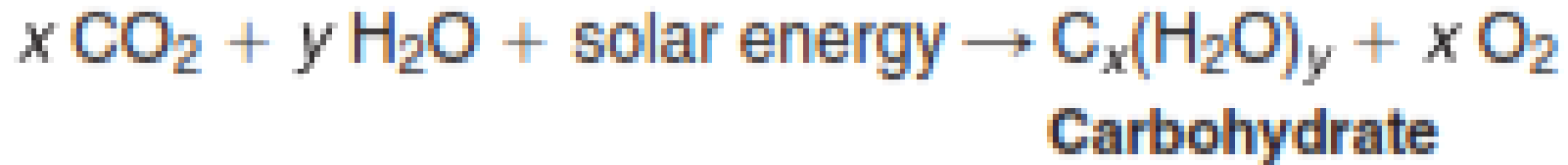
Senyawa

# Karbohidrat

# Karbohidrat

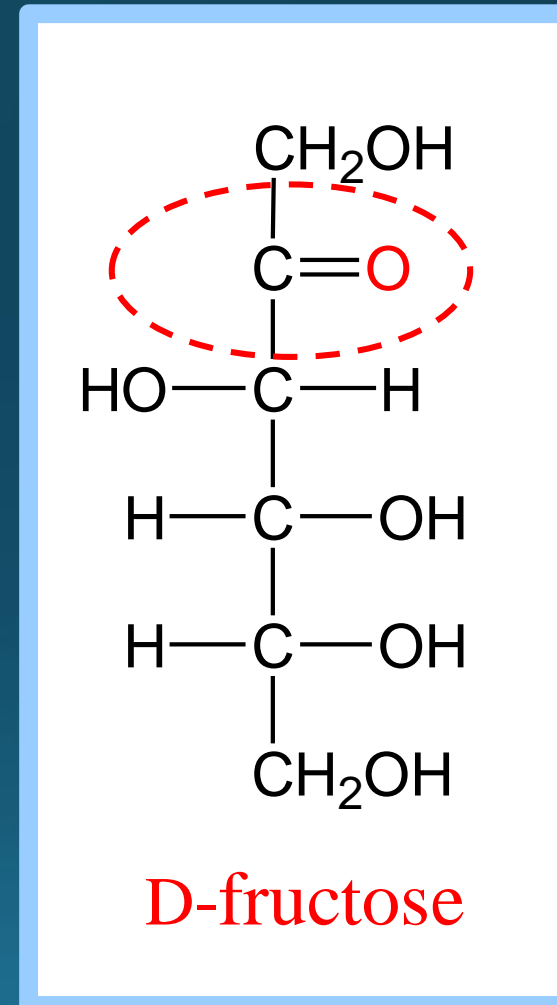
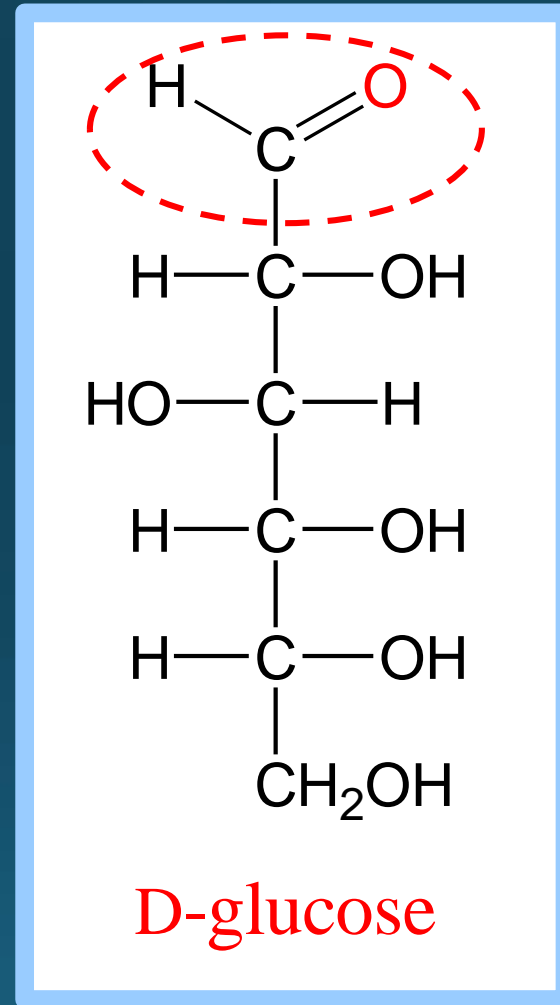
- Memiliki struktur umum  $C_x(H_2O)_y$  sehingga disebut "hidrat" dari "karbon".

Karbohidrat dapat disintesis melalui fotosintesis pada tumbuhan.



- DEFINISI : suatu senyawa yang terdiri atas molekul aldehid dan keton, atau dapat dihidrolisis menjadi aldehid dan keton.

Contoh :



# Pengelompokan senyawa karbohidrat

“sakarida” dari kata “saccharum (gula)”

## MONOSAKARIDA :

1 unit sakarida (5-6 atom C)

Contoh : glukosa

## OLIGOSAKARIDA :

Beberapa (2-10) unit sakarida

Contoh : maltosa

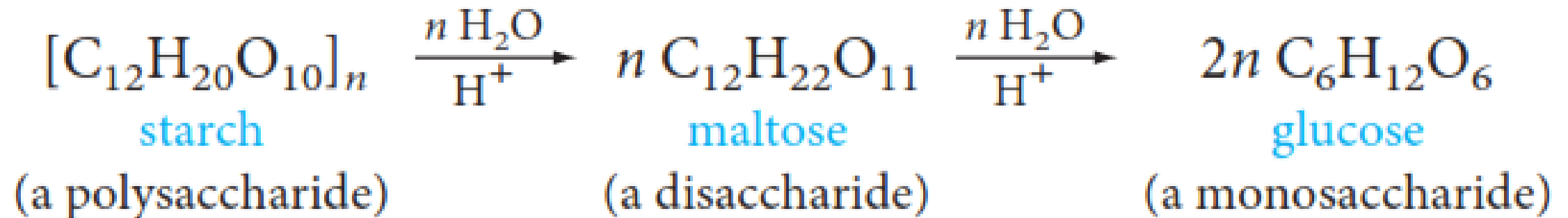
## POLISAKARIDA :

Polimer > 10 (bisa ratusan/ribuan) unit sakarida

Contoh : pati

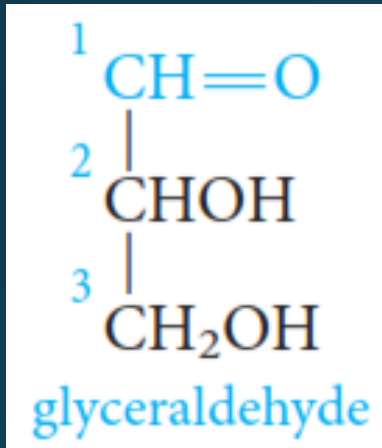


Contoh :

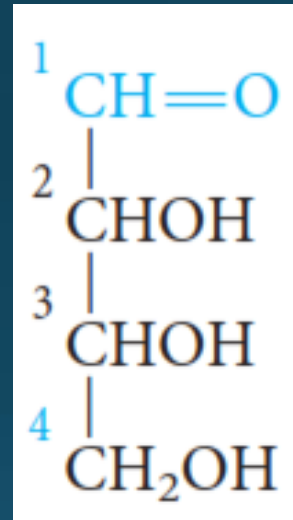


# Monosakarida

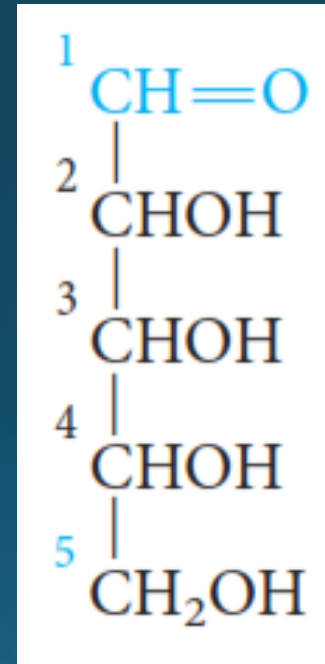
- Diberi nama sesuai jumlah atom C :



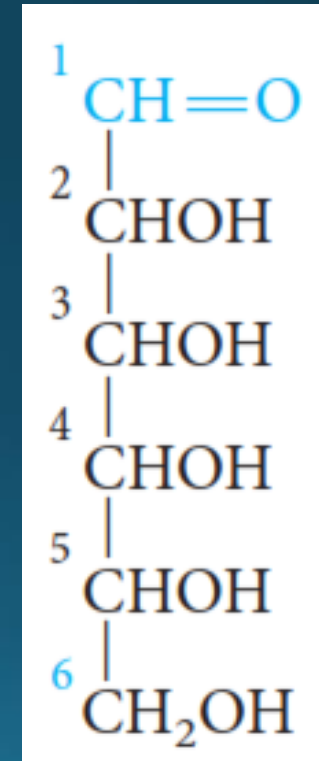
Triose



Tetrose



Pentose



Hexose

# Monosakarida

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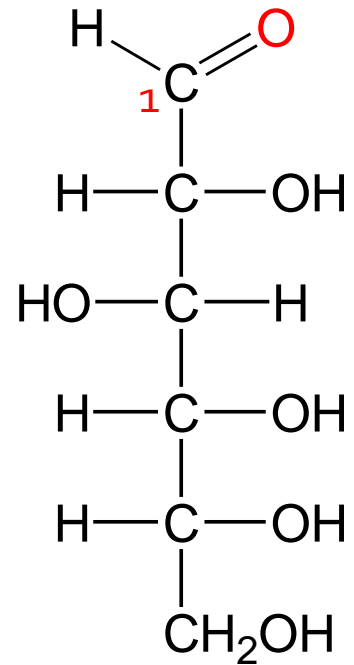
- Memiliki atom karbon 3 sampai 7
- Setiap atom karbon memiliki gugus *hidroksil*, *keton* atau *aldehida*.
- Setiap molekul monosakarida memiliki 1 gugus keton (ketosa) atau 1 gugus aldehida (aldosa).

Gugus aldehida selalu berada di atom C pertama

Gugus keton selalu berada di atom C kedua

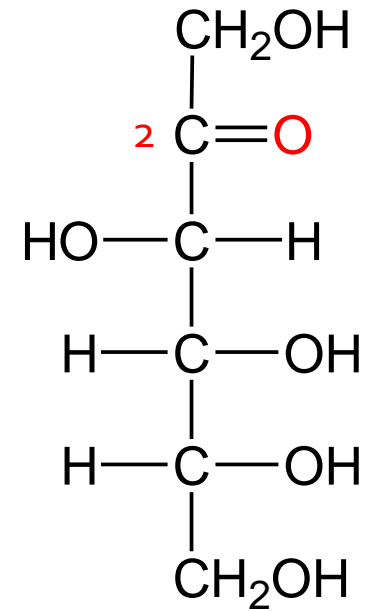
# Monosakarida

Aldosa (mis: glukosa) memiliki gugus aldehida pada salah satu ujungnya.



**D-glucose**

Ketosa (mis: fruktosa) biasanya memiliki gugus keto pada atom C2.



**D-fructose**



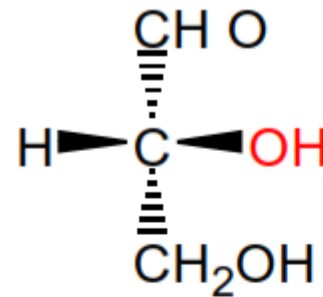
# Notasi D (dekstro) vs L (levo)

Notasi D & L dilakukan karena adanya atom C dengan konfigurasi asimetris.

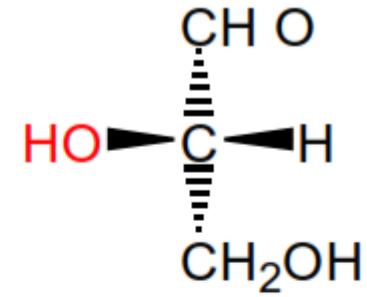
D → OH di kanan

L → OH di kiri

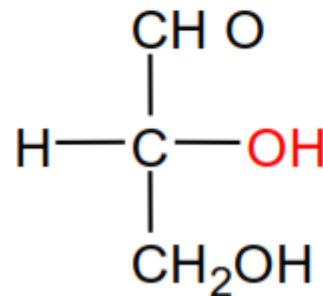
Proyeksi Fischer



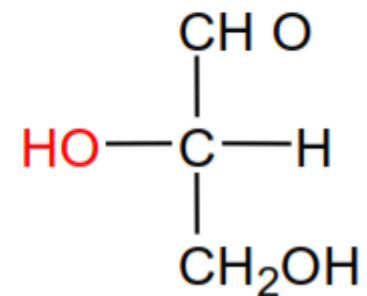
D-gliseraldehida



L-gliseraldehida



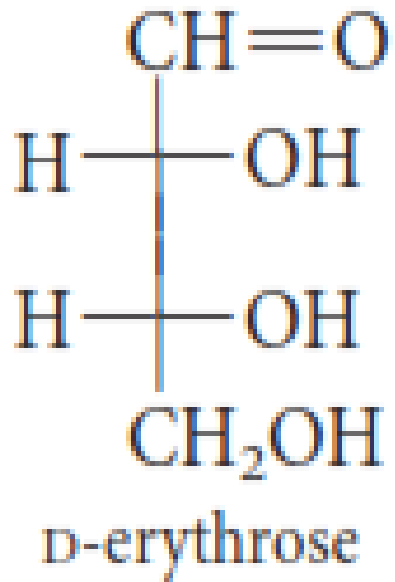
D-glyceraldehyde



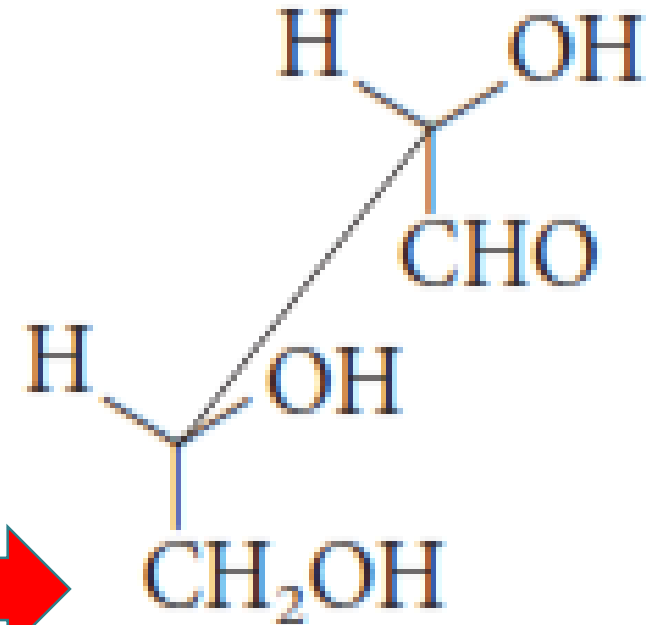
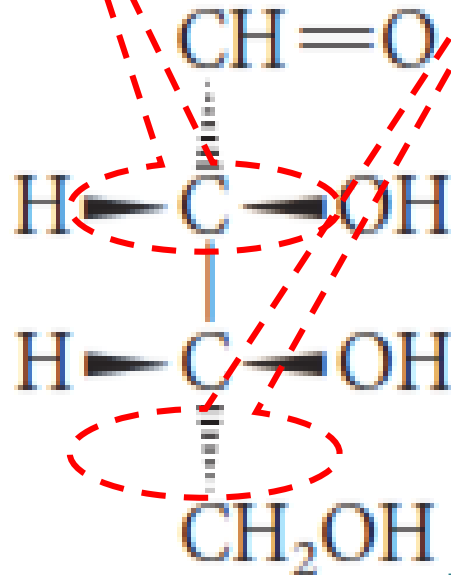
L-gliseraldehida

ke arah pembaca

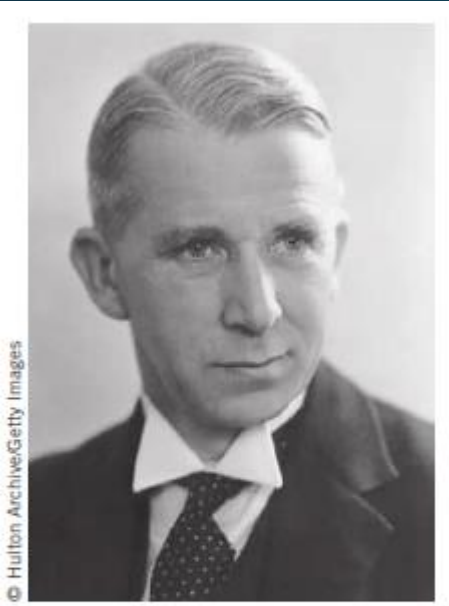
menjauhi pembaca



≡



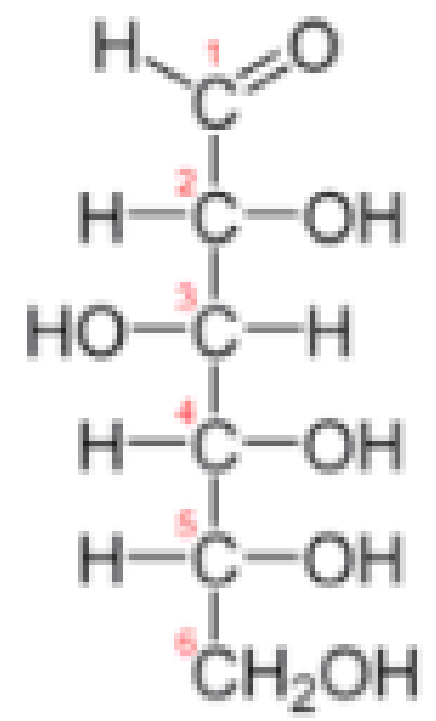
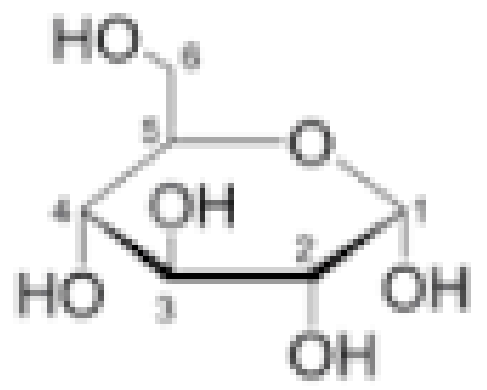
- Penggambaran rumus molekul monosakarida dapat ditampilkan melalui proyeksi Fischer atau Haworth.



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W. N. Haworth was a pioneer in the field of carbohydrate chemistry. For his 1937 Nobel Prize address and other information on Nobel Prizes in chemistry, see <http://nobelprize.org/chemistry/laureates/1937/haworth-bio.html>

**Glucose**



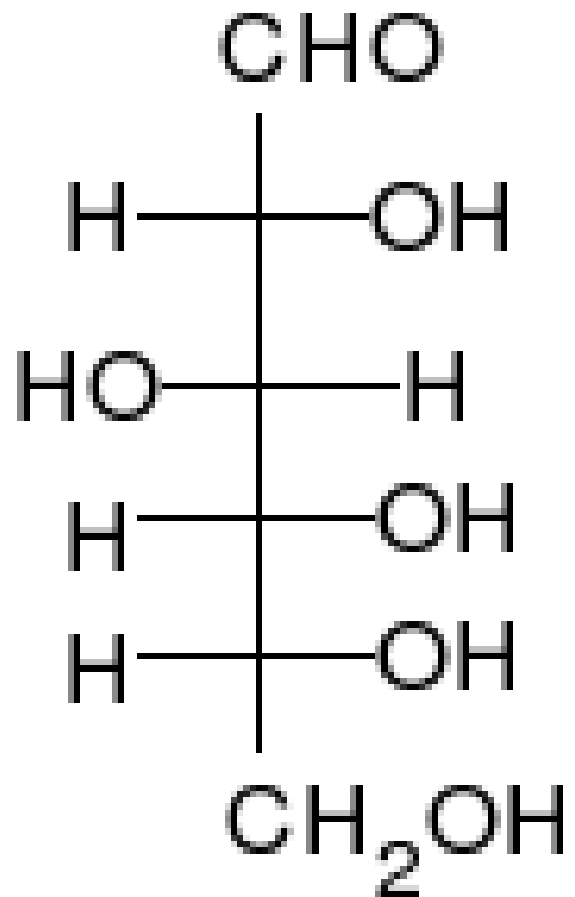
**Haworth Projection**

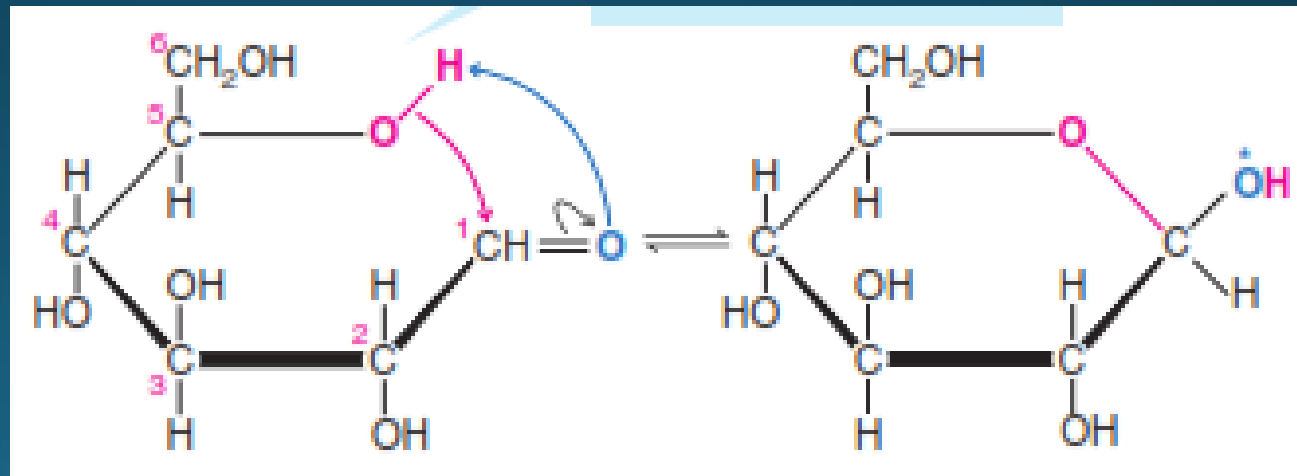
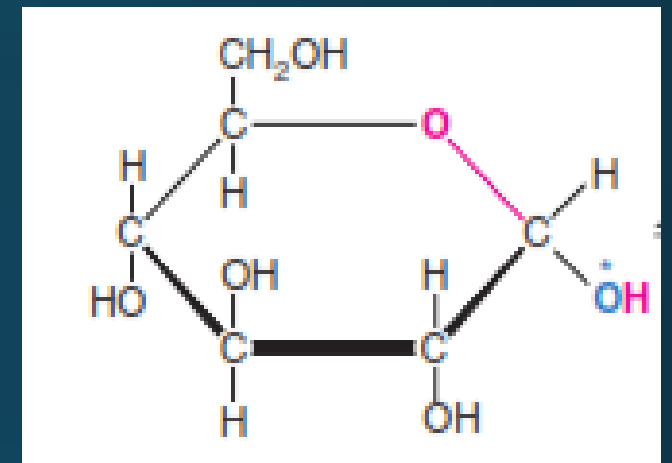
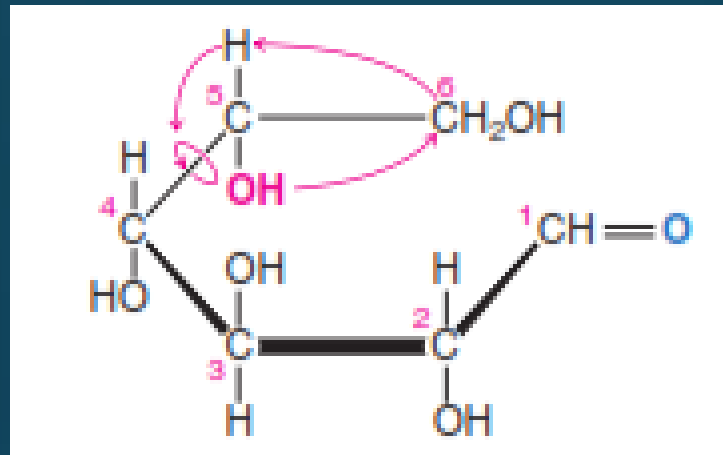
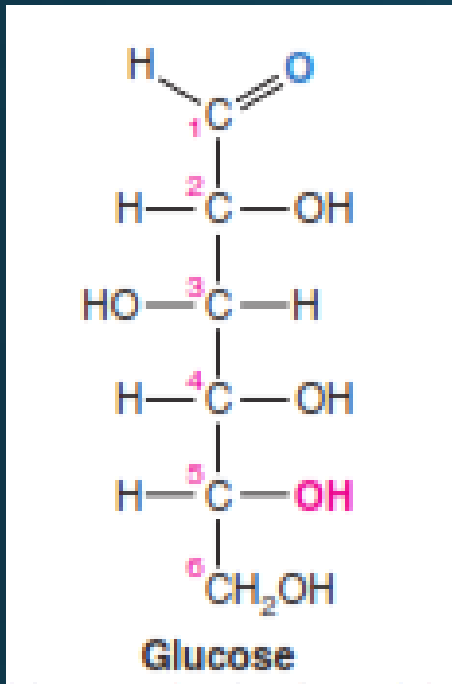
**Fischer Projection**



*Emil Fischer  
October 1917*

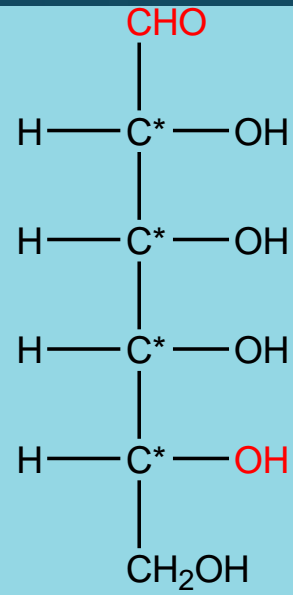
# Perubahan proyeksi FISCHER → HAWORTH pada GLUKOSA



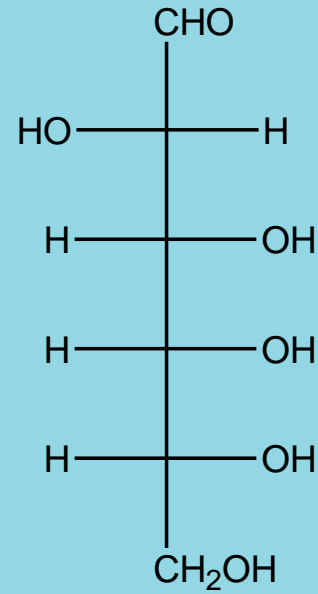




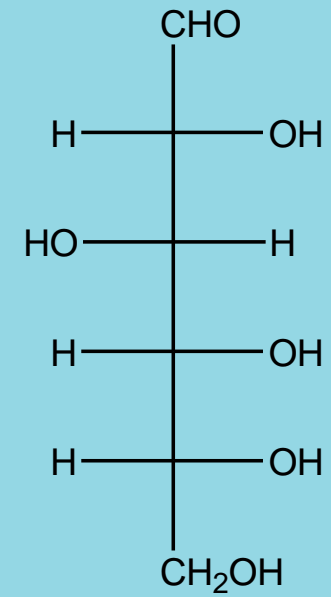
# Aldohexose, $C_6H_{12}O_6$ . Fischer Projection



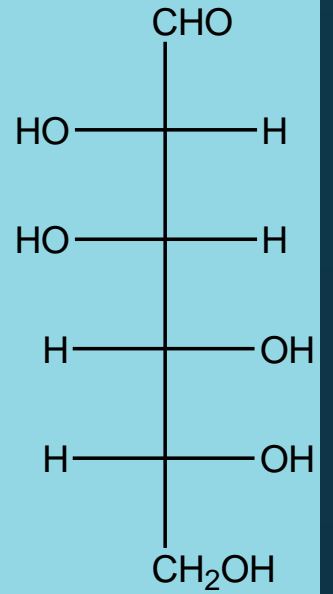
D-Allose



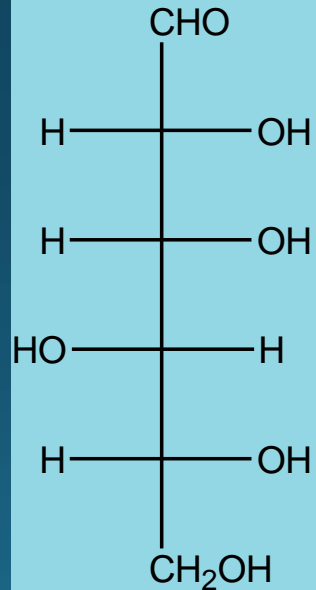
D-Altrose



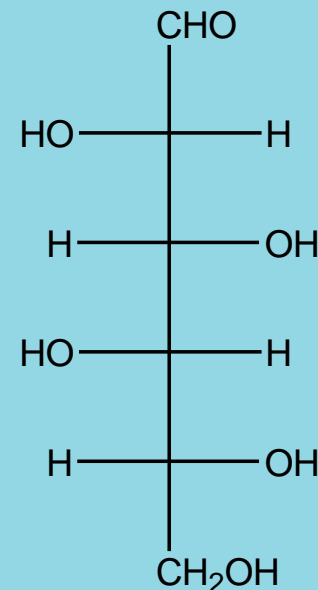
D-glucose



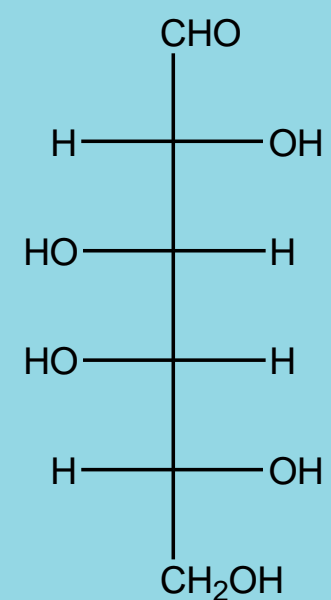
D-mannose



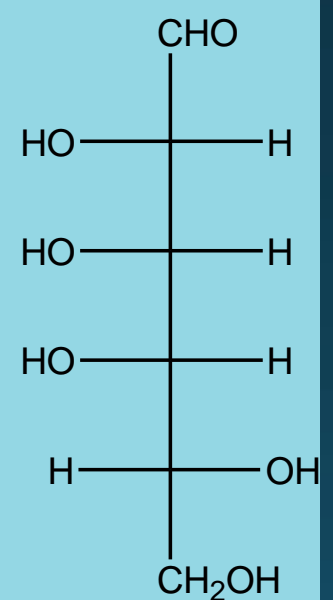
D-gulose



D-idose



D-galactose



D-talose

# Monosakarida yang banyak dijumpai

Glukosa

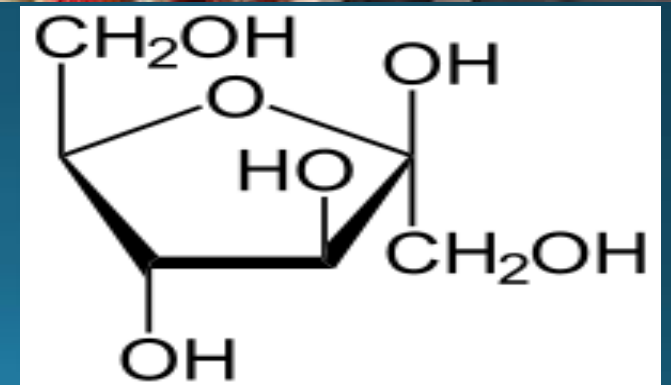
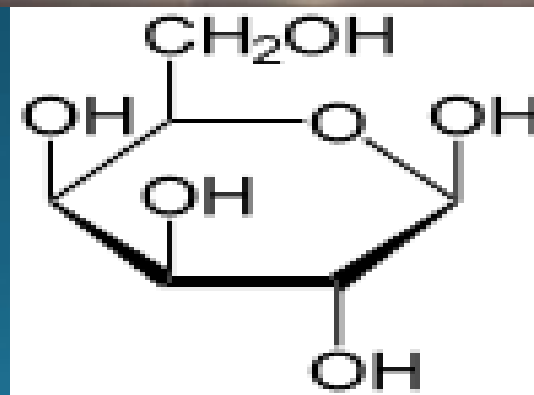
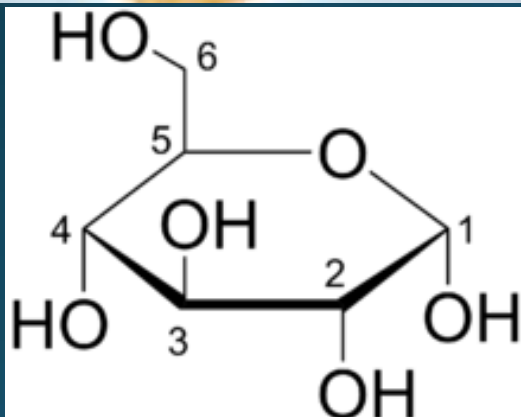
→ roti, biscuit, permen

Galaktosa

→ Hasil hidrolisis gula susu

Fruktosa

→ buah-buahan, madu





# Disakarida yang banyak dijumpai

Maltosa

Laktosa

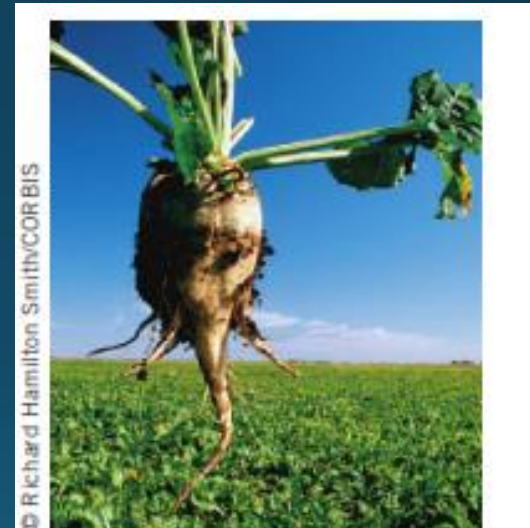
Sukrosa

→ Hidrolisis parsial pati → gula susu

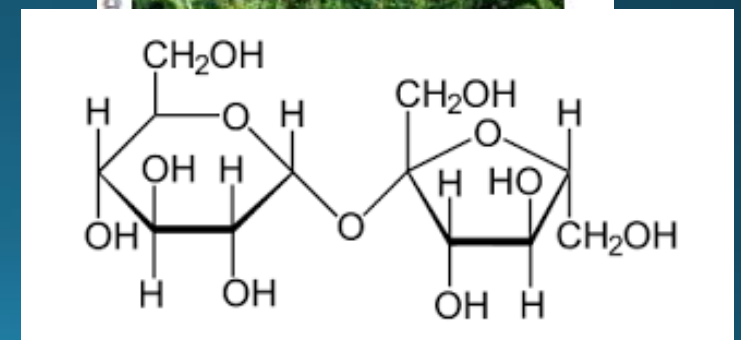
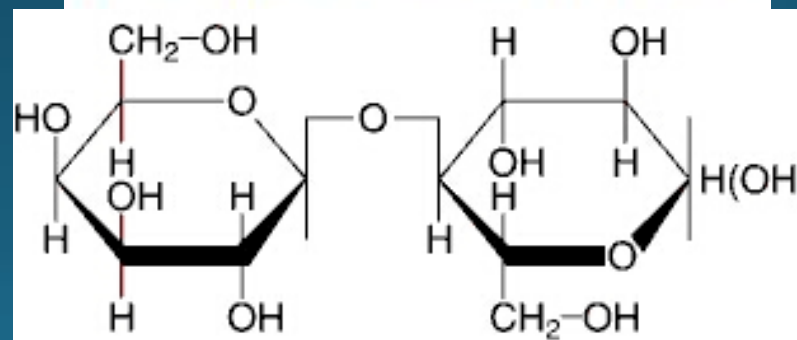
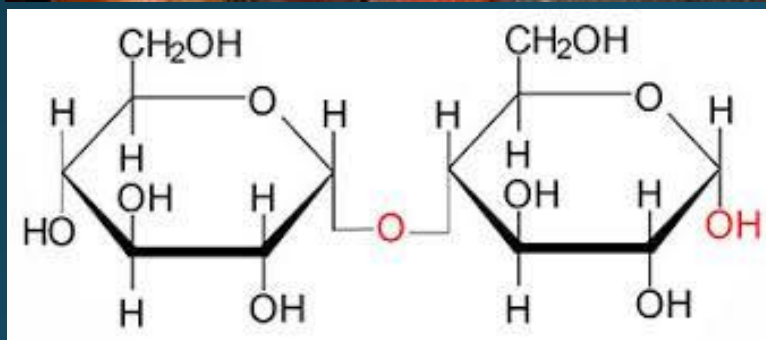
→ Gula pasir (tebu, bit)



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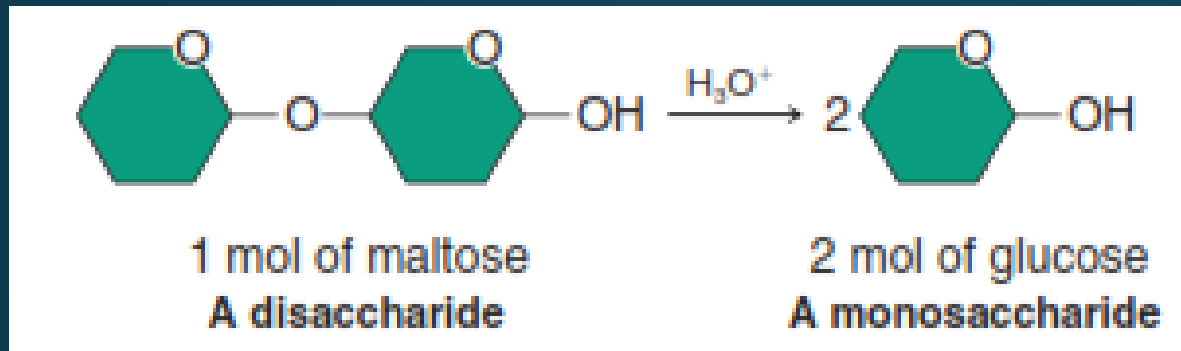


© Richard Hamilton Smith/CORBIS

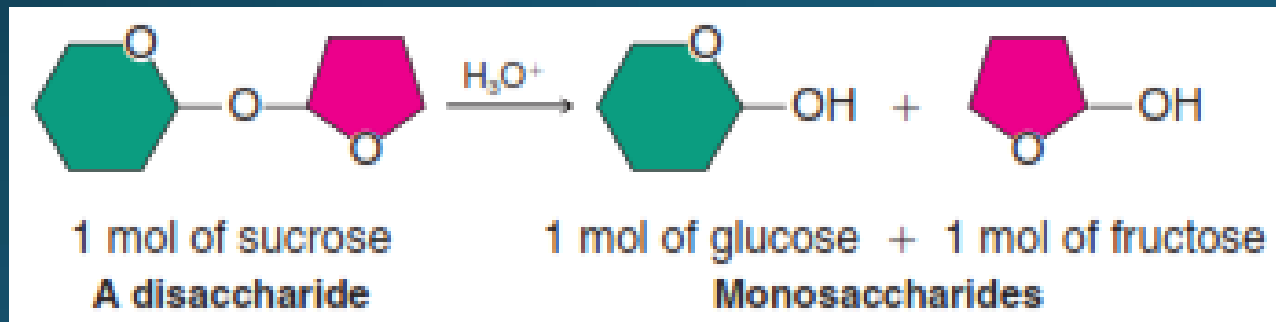


# Hidrolisis disakarida

- Hidrolisis maltosa  $\rightarrow$  glukosa + glukosa



- Hidrolisis laktosa  $\rightarrow$  glukosa + galaktosa
- Hidrolisis sukrosa  $\rightarrow$  glukosa + fruktosa



# Polisakarida yang banyak dijumpai

## Pati (starch)

Penyimpanan energi pada tumbuhan

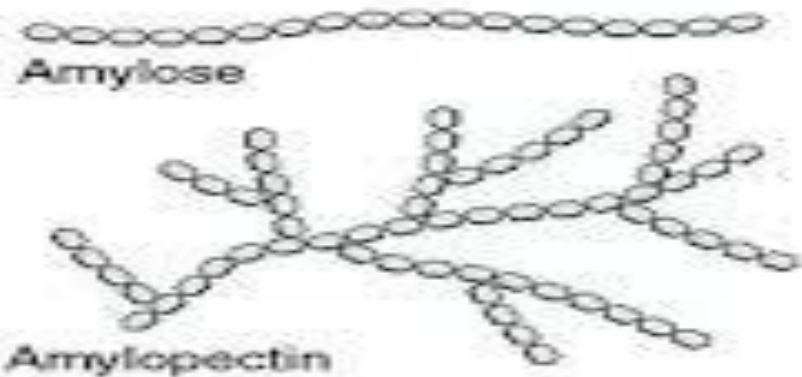


## Glikogen

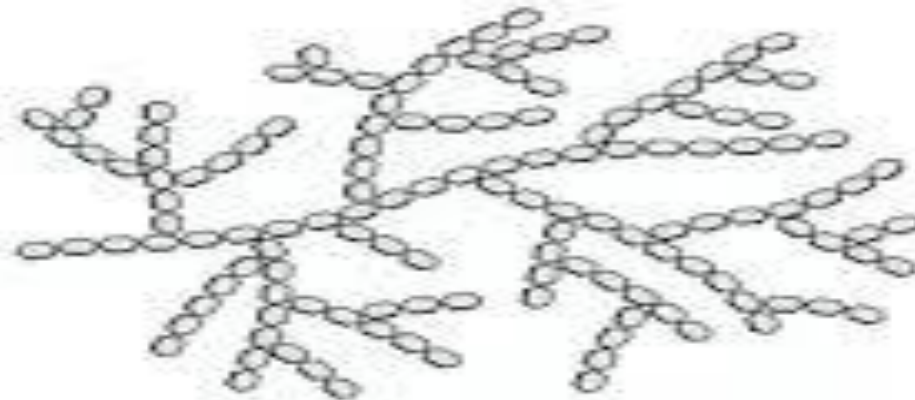
Penyimpanan energi pada hewan dan manusia

## Sellulosa

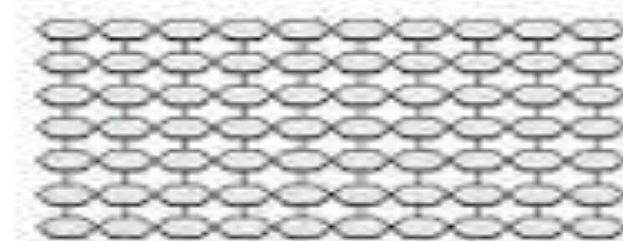
→ kayu, kapas, serat rami



Starch

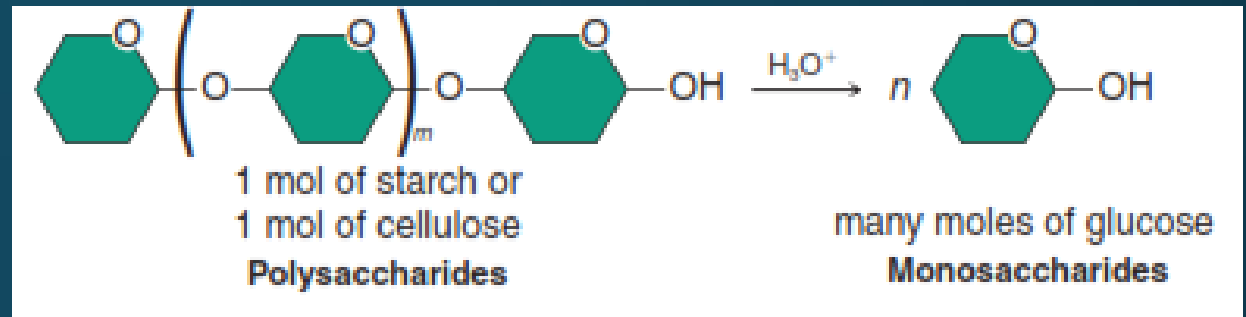


Glycogen



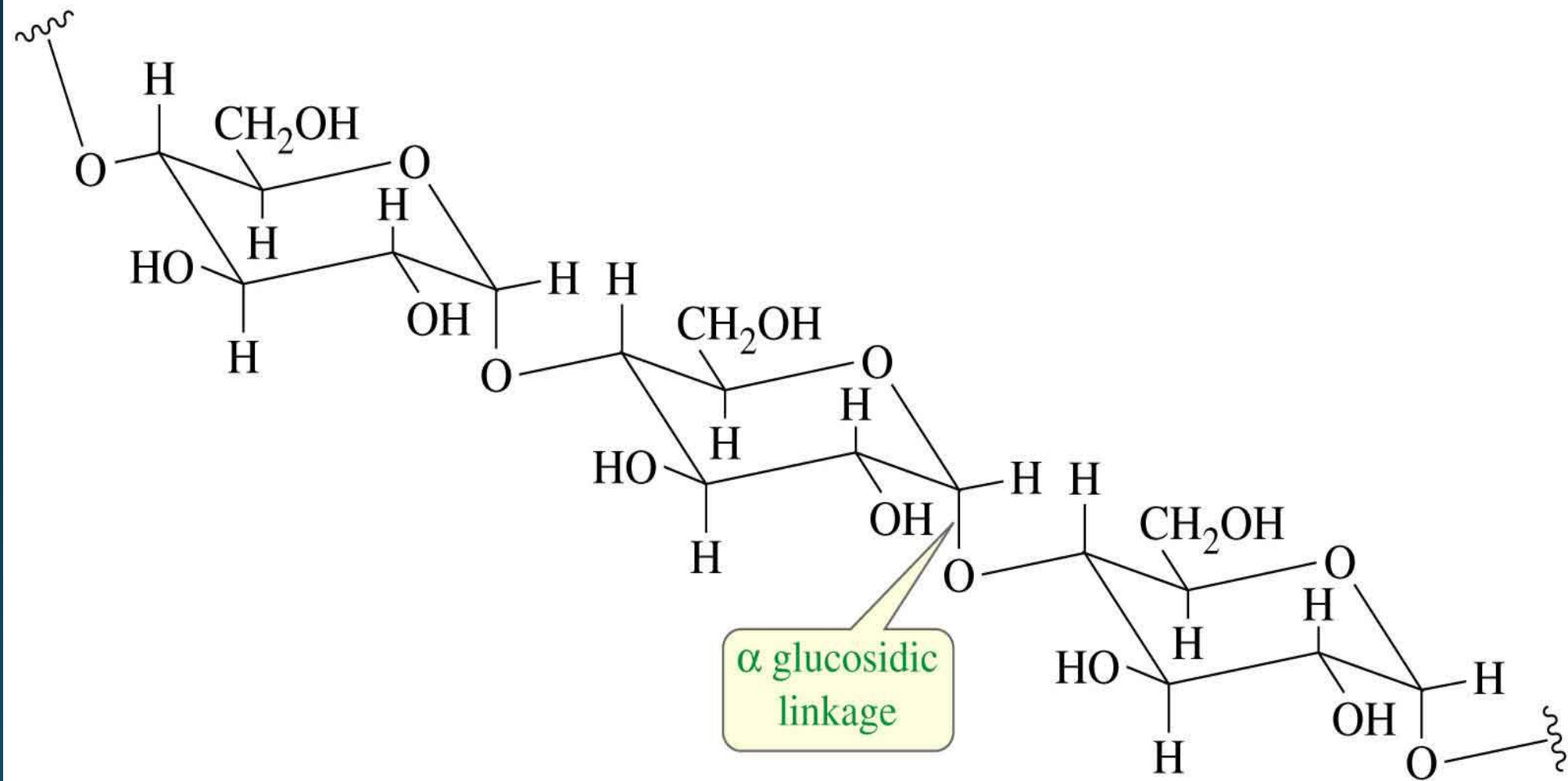
Cellulose (fiber)

# PATI (Starch)

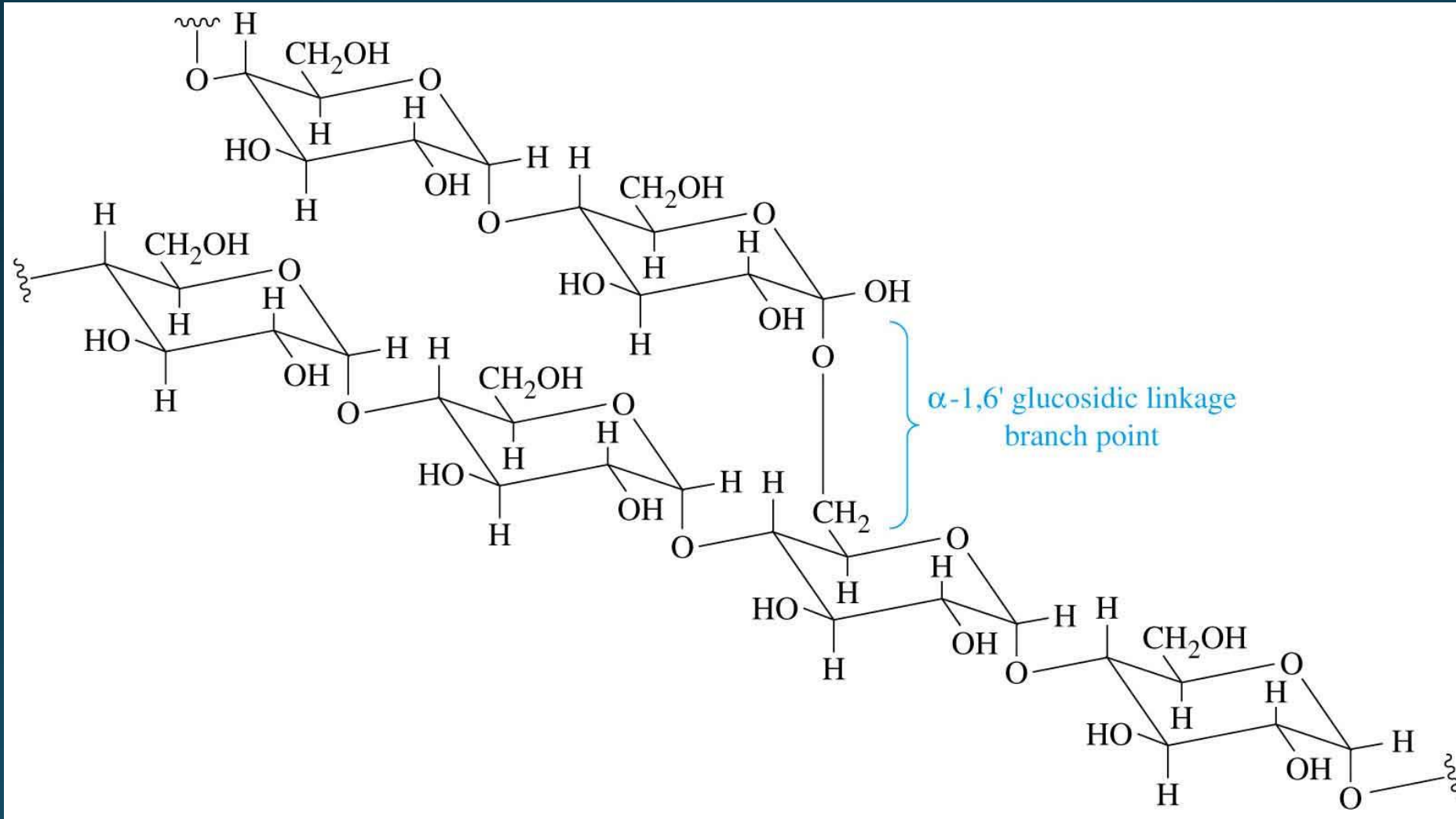


- Pati tersusun atas unit-unit glukosida.
- Hidrolisis parsial pati → maltose
- Hidrolisis total → glukosa
  
- Pati terdiri atas amylum/amilosa (soluble starch) 10-20% & amylopectin (insoluble starch) 80-90%.
- Amylum terdiri atas glukosa yang dihubungkan oleh ikatan 1,4 glikosida
- Amylopectin terdiri atas glukosa yang dihubungkan dengan ikatan 1,6 glikosida.

# Amylum



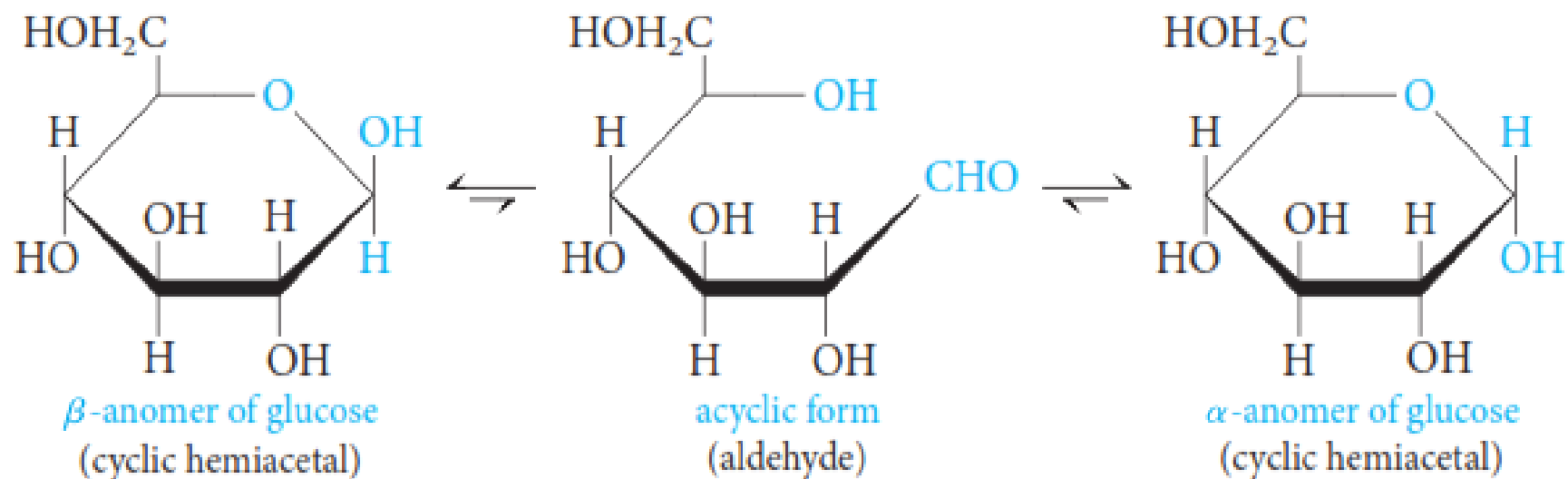
# Amilopektin



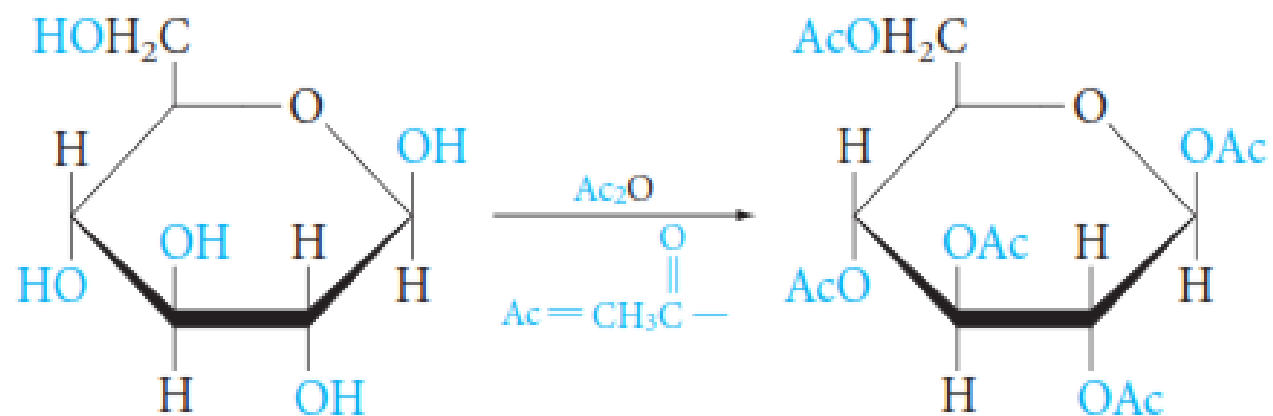


## 1. Reactions of Monosaccharides

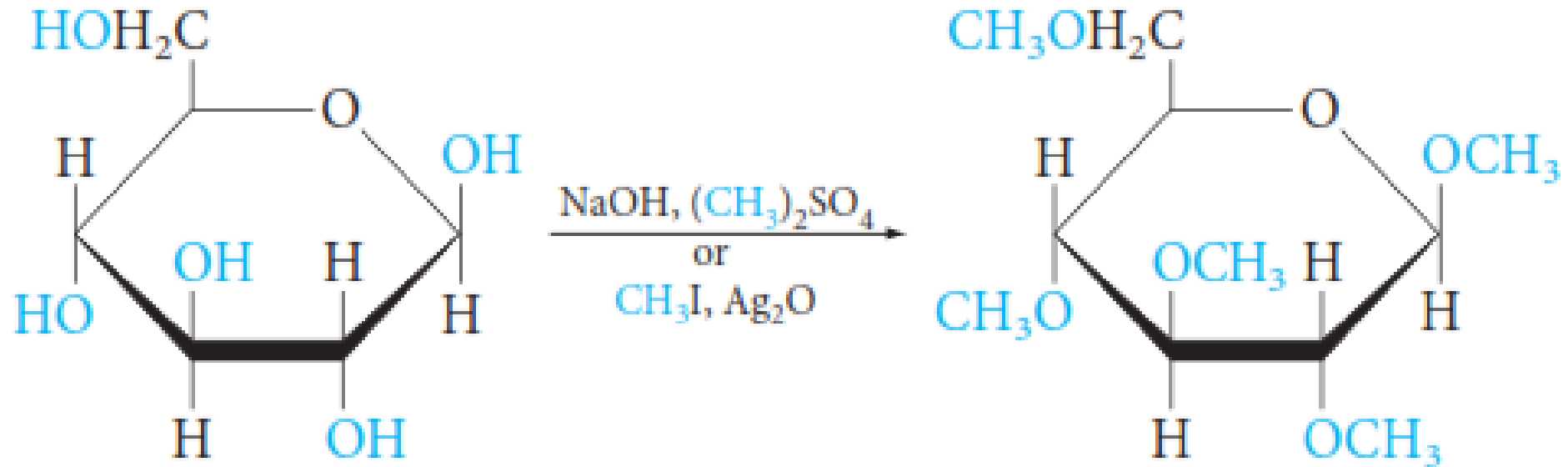
### a. Mutarotation (Sec. 16.5)



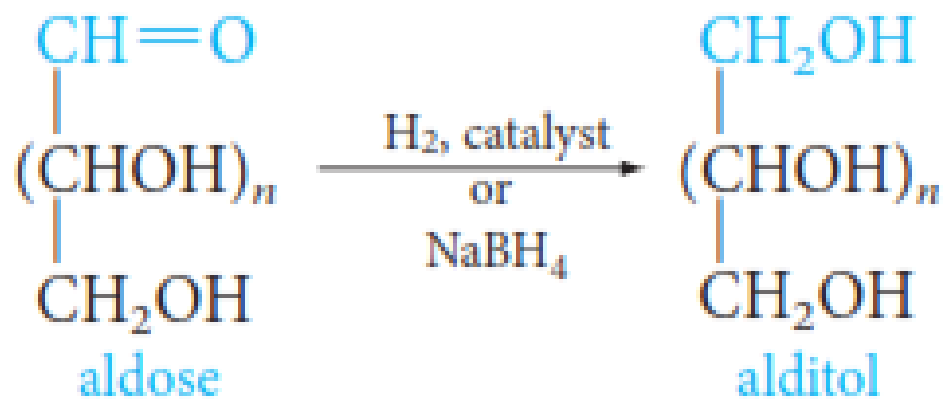
### b. Esterification (Sec. 16.8)



c. Etherification (Sec. 16.8)

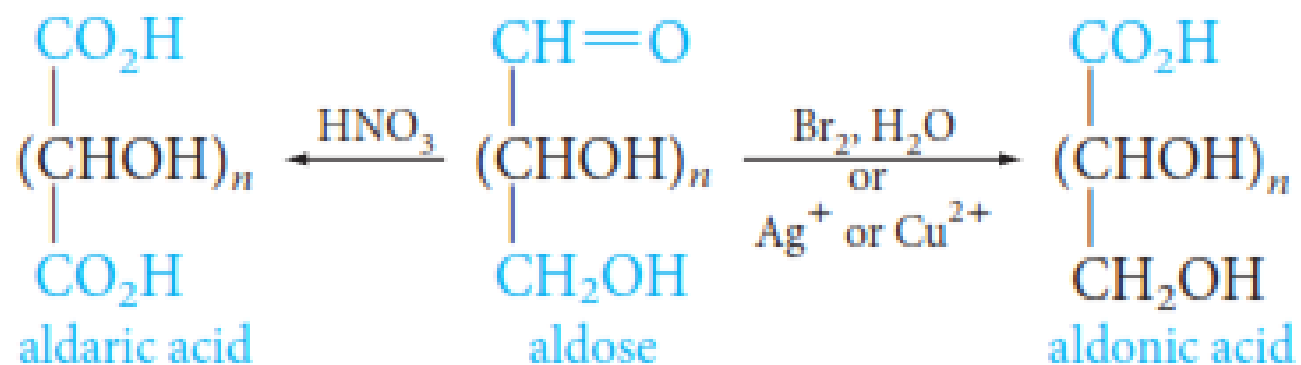


d. Reduction (Sec. 16.9)

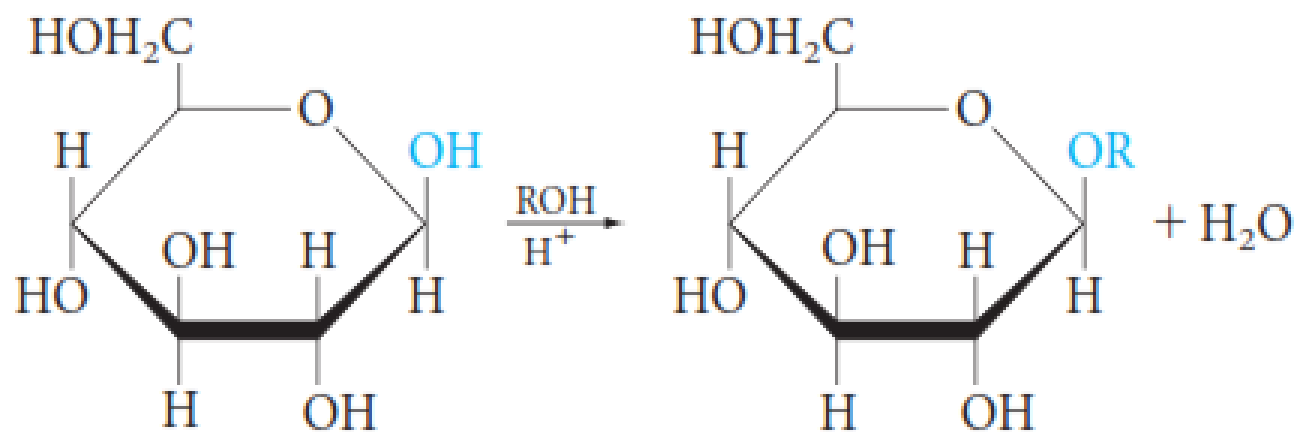




e. Oxidation (Sec. 16.10)



f. Preparation of Glycosides (Sec. 16.11)



glycoside formation

## 2. Hydrolysis of Polysaccharides (Sec. 16.1)



# Carilah informasi tentang :

- Sellulosa
- Saccharin
- Aspartam
- Khitin
- Pektin
- Asam askorbat (vitamin C)