Isomería y estructura de Carbohidratos

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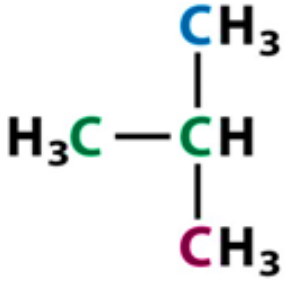
Isómeros: compuestos que poseen la misma fórmula molecular pero diferente estructura.

Ejs:	C_2H_6O	etanol o dimetiléter
	C_3H_6O	acetona o propanal
	C_4H_{10}	butano o isobutano
	$C_4H_{11}N$	dietilamina, butilamina, metil-propilamina
	C_5H_{10}	ciclopentano o 2-penteno
	$C_7H_6O_2$	o-, m-, p-hidroxibenzaldehido o ác. benzoico
	$C_6H_{12}O_6$	glucosa, manosa, galactosa, fructosa

Isómeros estructurales

- **de esqueleto o cadena**

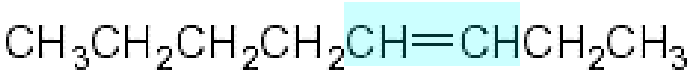


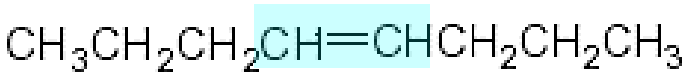
- **de posición**

- **de función**

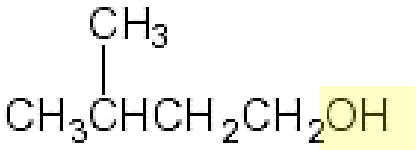
Isómeros de posición

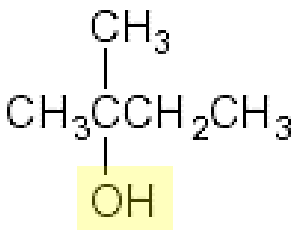
C_8H_{16}

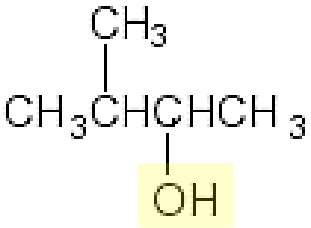


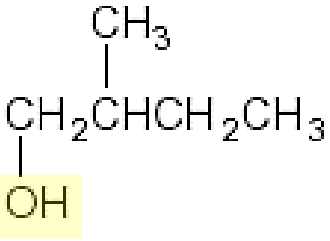


$C_5H_{12}O$

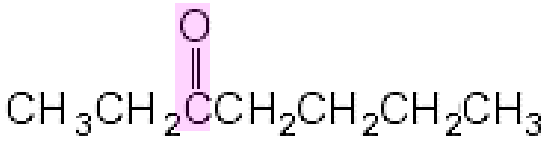


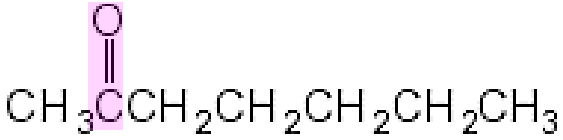


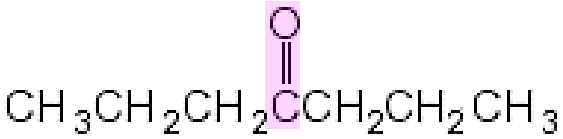




$C_7H_{14}O$

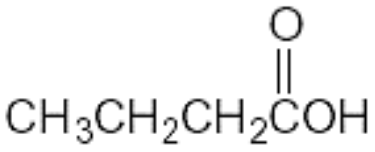




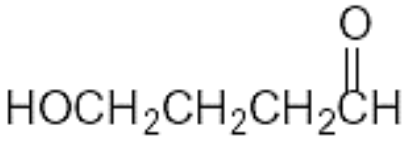


Isómeros de función

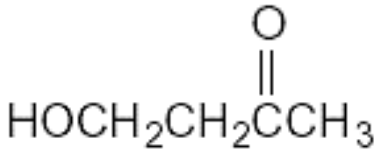
$C_4H_8O_2$



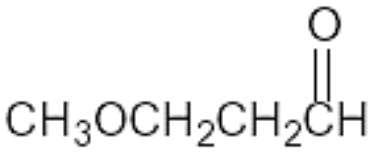
carboxylic acid



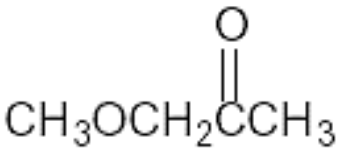
alcohol-aldehyde



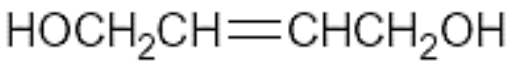
alcohol-ketone



ether-aldehyde

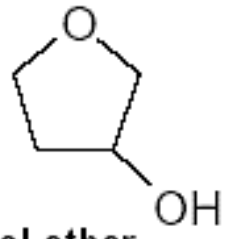


ether-ketone

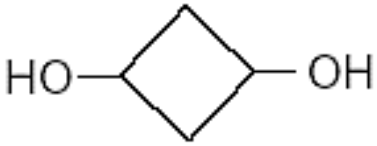


alkene-dialcohol

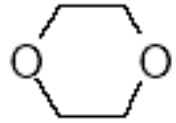
alkene-diether



alcohol-ether



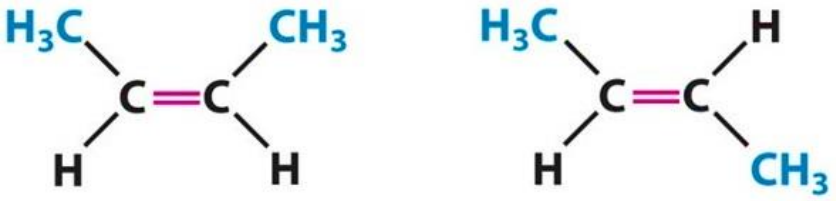
dialcohol



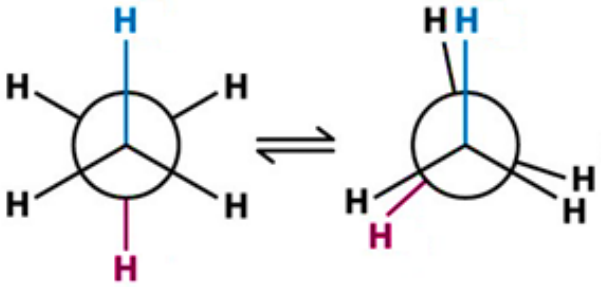
diether

Estereoisómeros

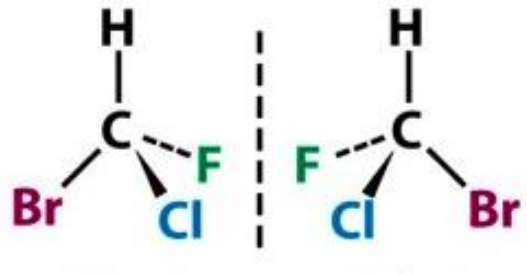
- ***geométricos***



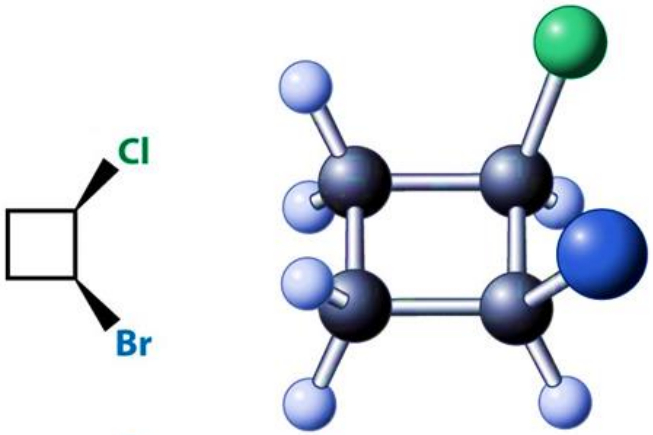
- ***de conformación***



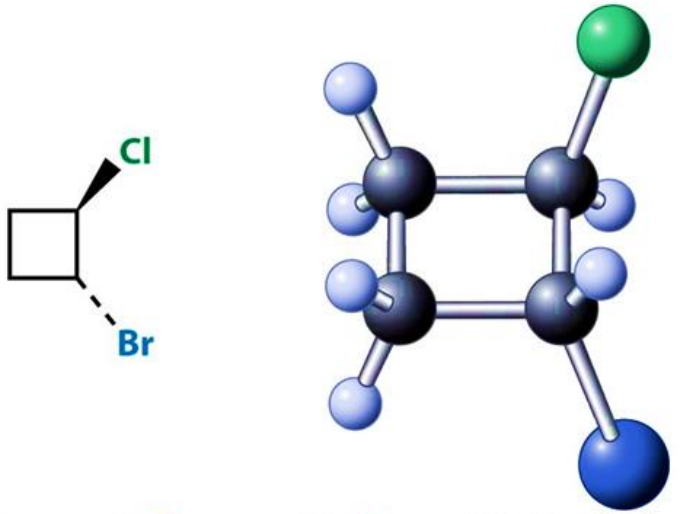
- ***ópticos***



Cicloalcanos disustituidos cis/trans



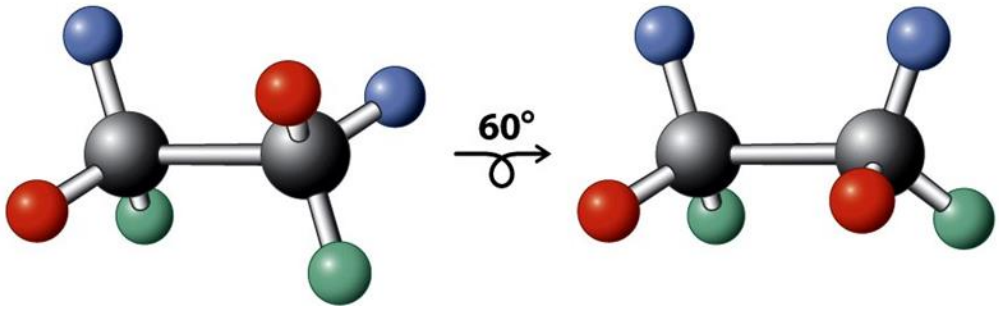
***cis*-1-Bromo-2-clorociclobutano**



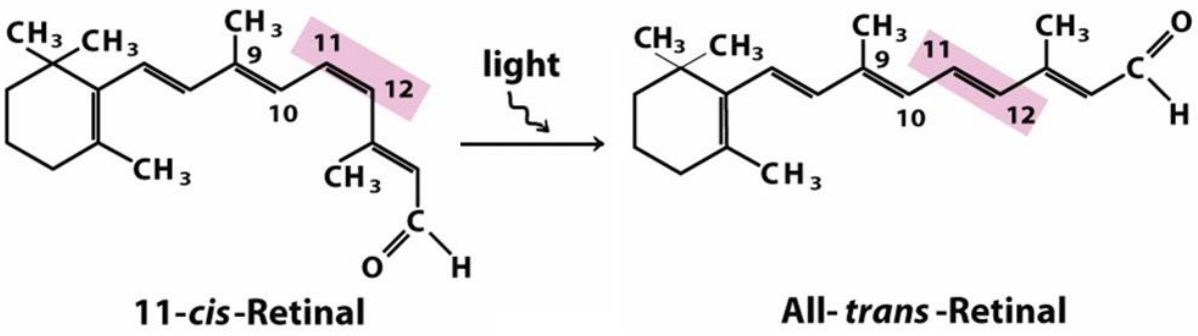
***trans*-1-Bromo-2-clorociclobutano**

Conformación vs configuración

<u>Conformación</u>: los grupos de una molécula cambian de posición sin que ocurra ruptura de enlaces

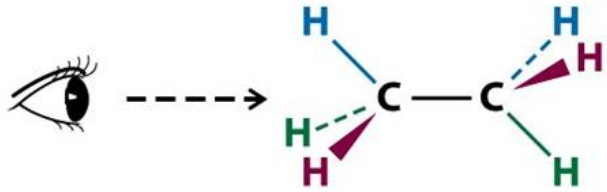


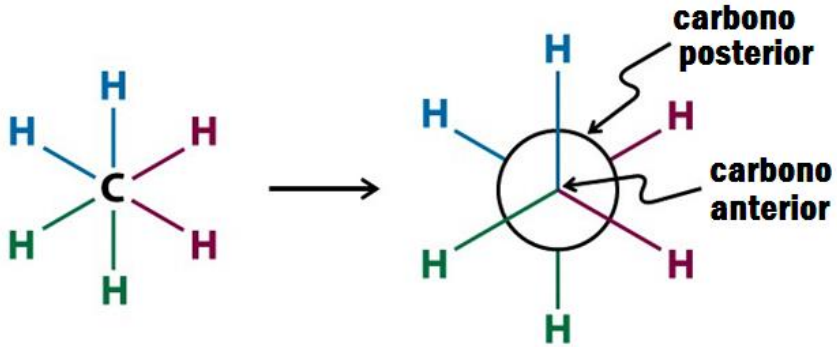
<u>Configuración</u>: la distribución de los grupos cambia sólo si ocurre ruptura y formación de enlaces.

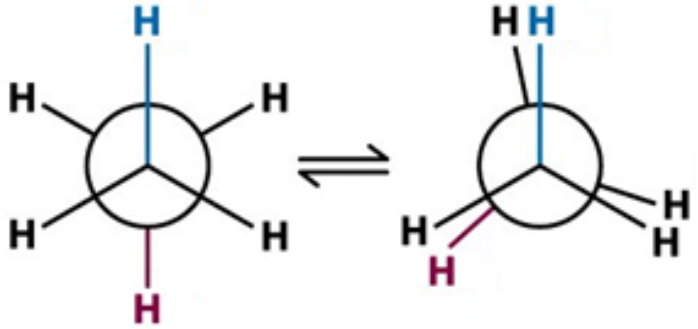


Isómeros de conformación

Etano – proyección de Newman





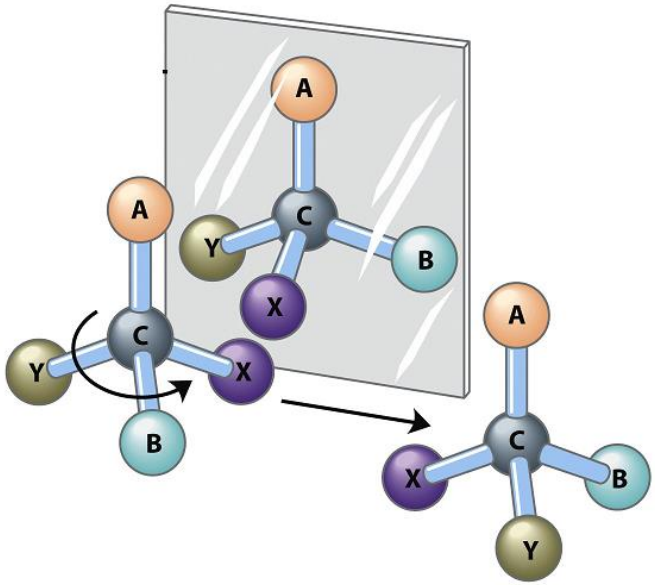


conformaciones ***alternada*** ***eclipsada***

Simetría molecular

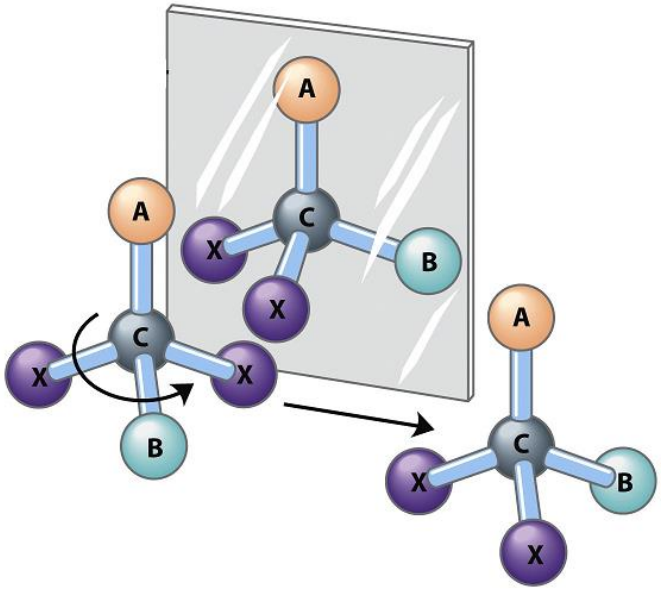
ENANTIOMEROS

Quiral
(asimétrico)

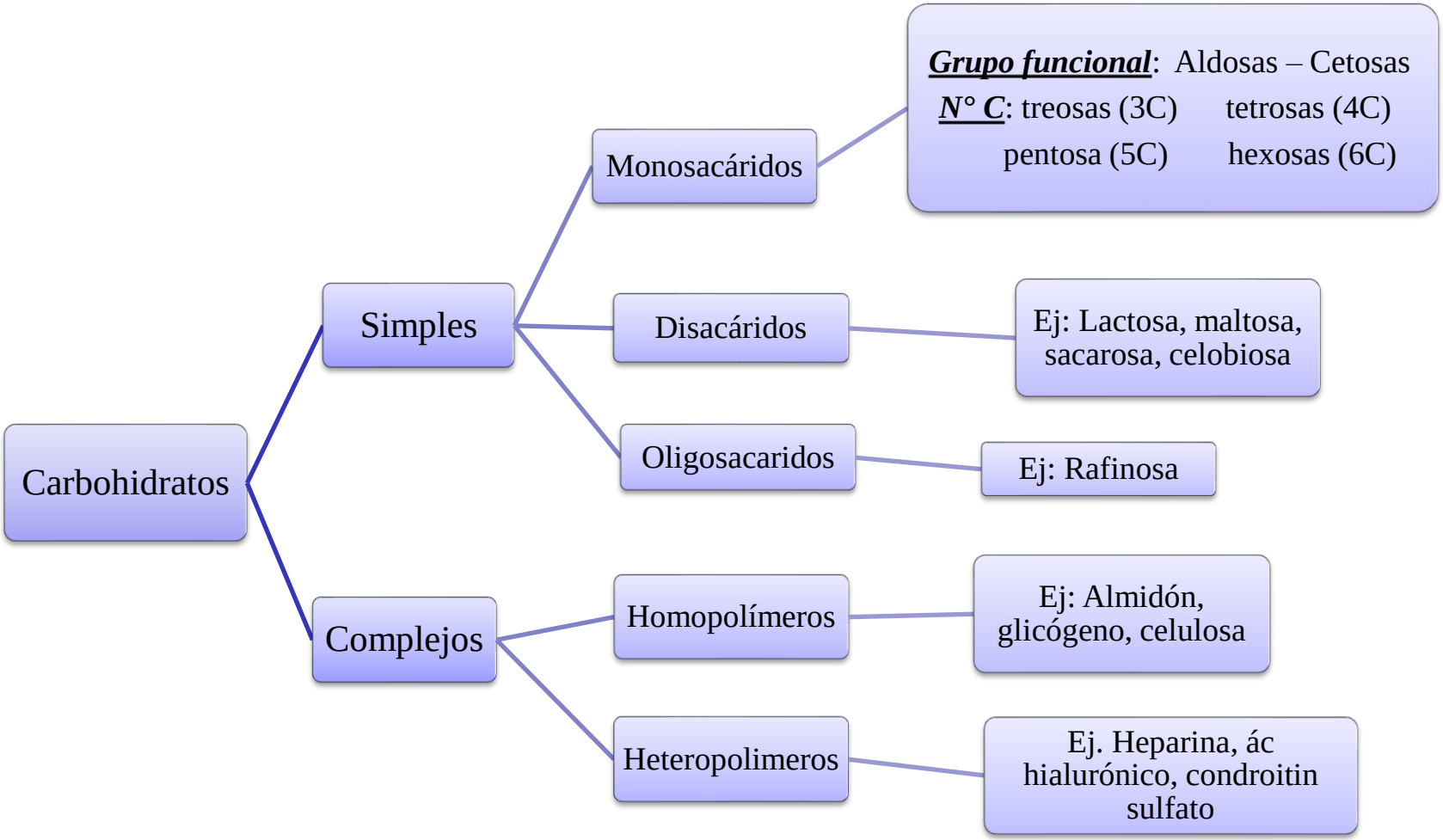


Poseen idénticas propiedades fisicoquímicas

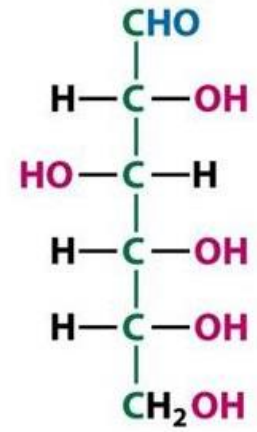
Aquiral
(simétrico)



Carbohidratos: aldehídos y cetonas polihidroxiladas

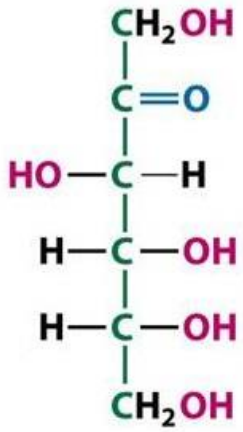


Los monosacáridos contienen uno o más *carbonos asimétricos*.



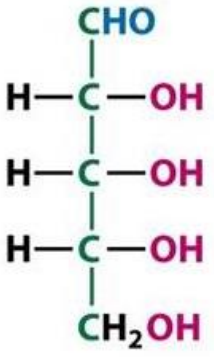
Glucosa

una aldohexosa



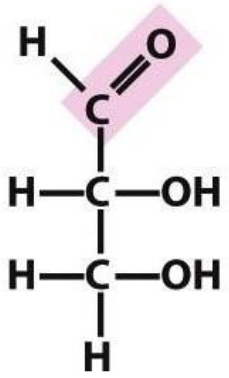
Fructosa

una cetohexosa

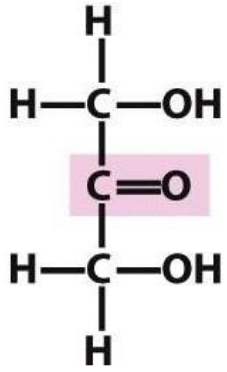


Ribosa

una aldopentosa

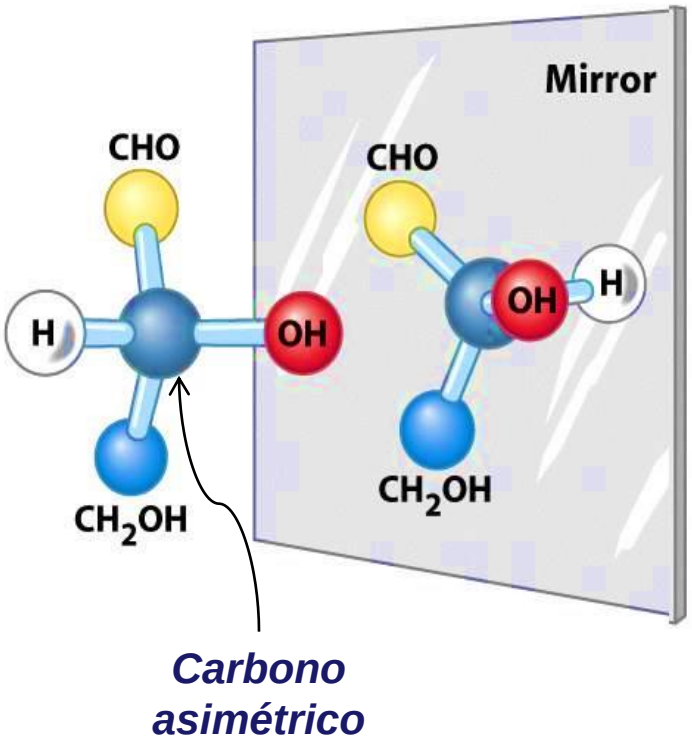


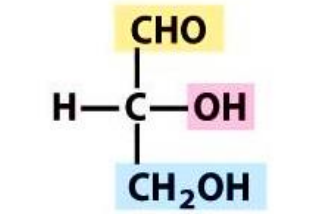
Gliceraldehido



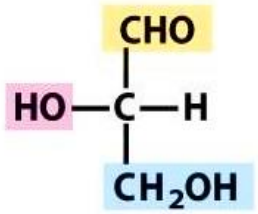
Dihidroxiacetona

Carbohidratos: actividad óptica

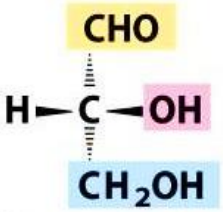




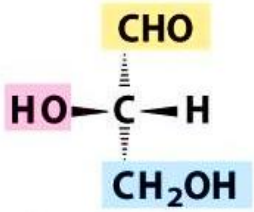
D-Glyceraldehyde



L-Glyceraldehyde

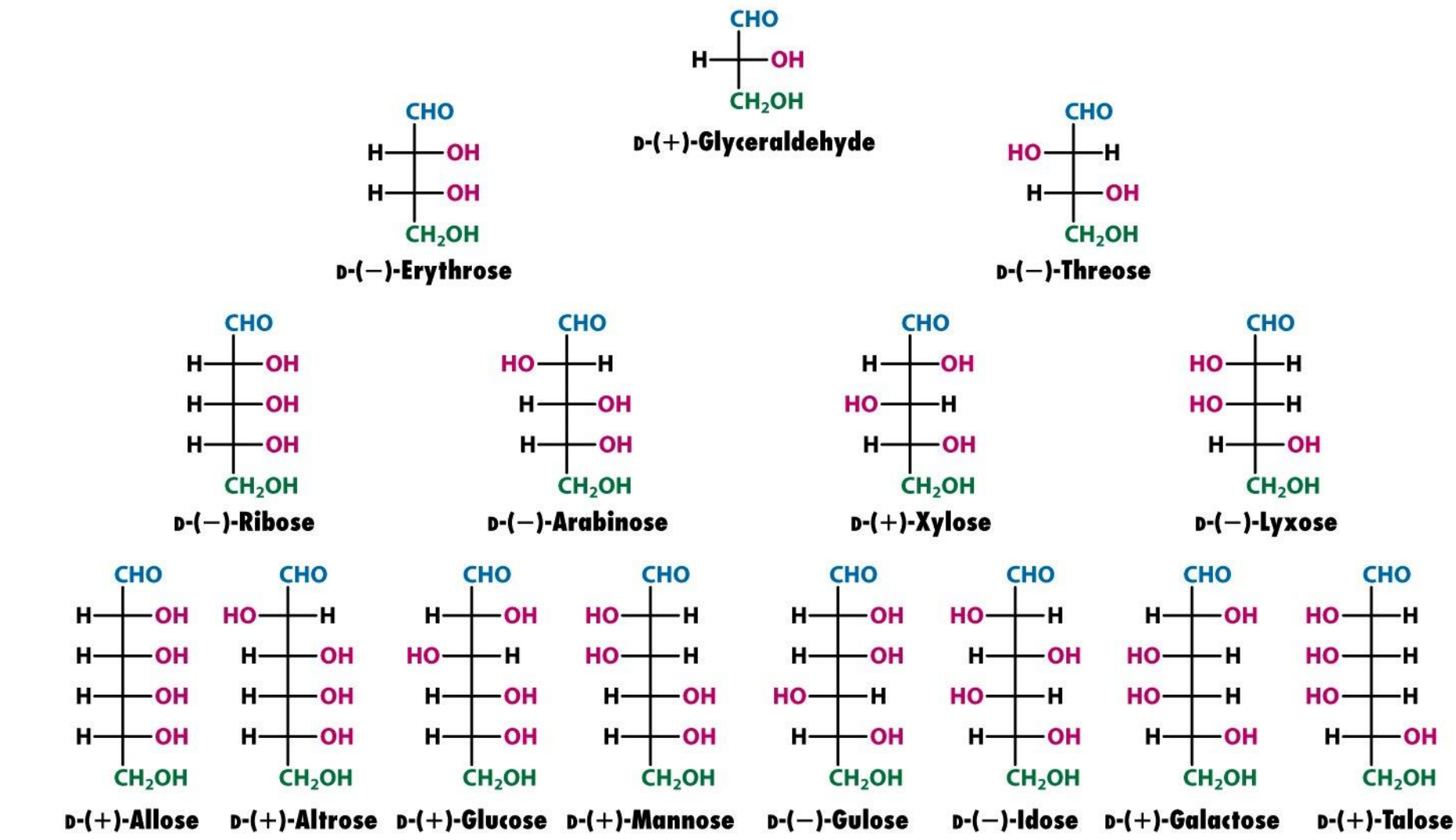


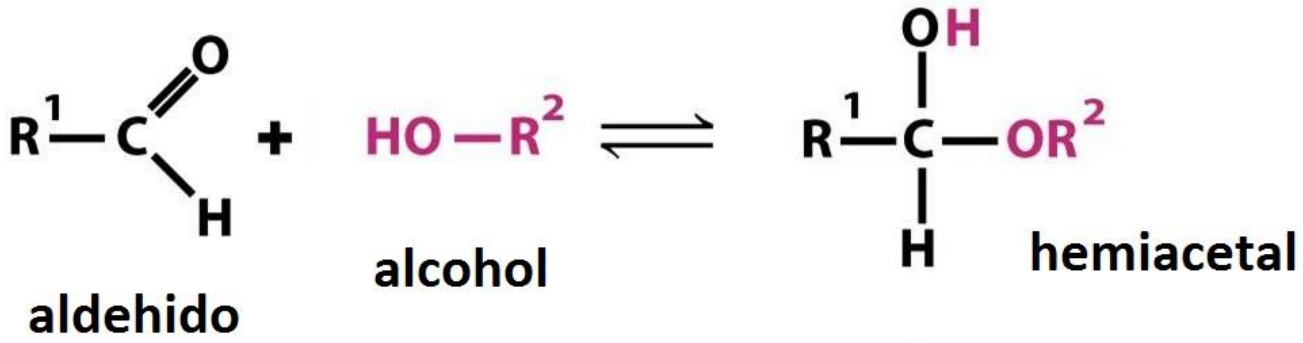
D-Glyceraldehyde

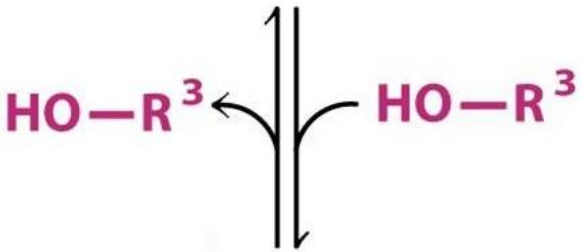


L-Glyceraldehyde

Aldosas: isómeros D

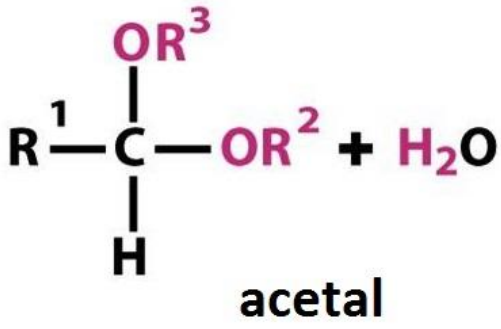




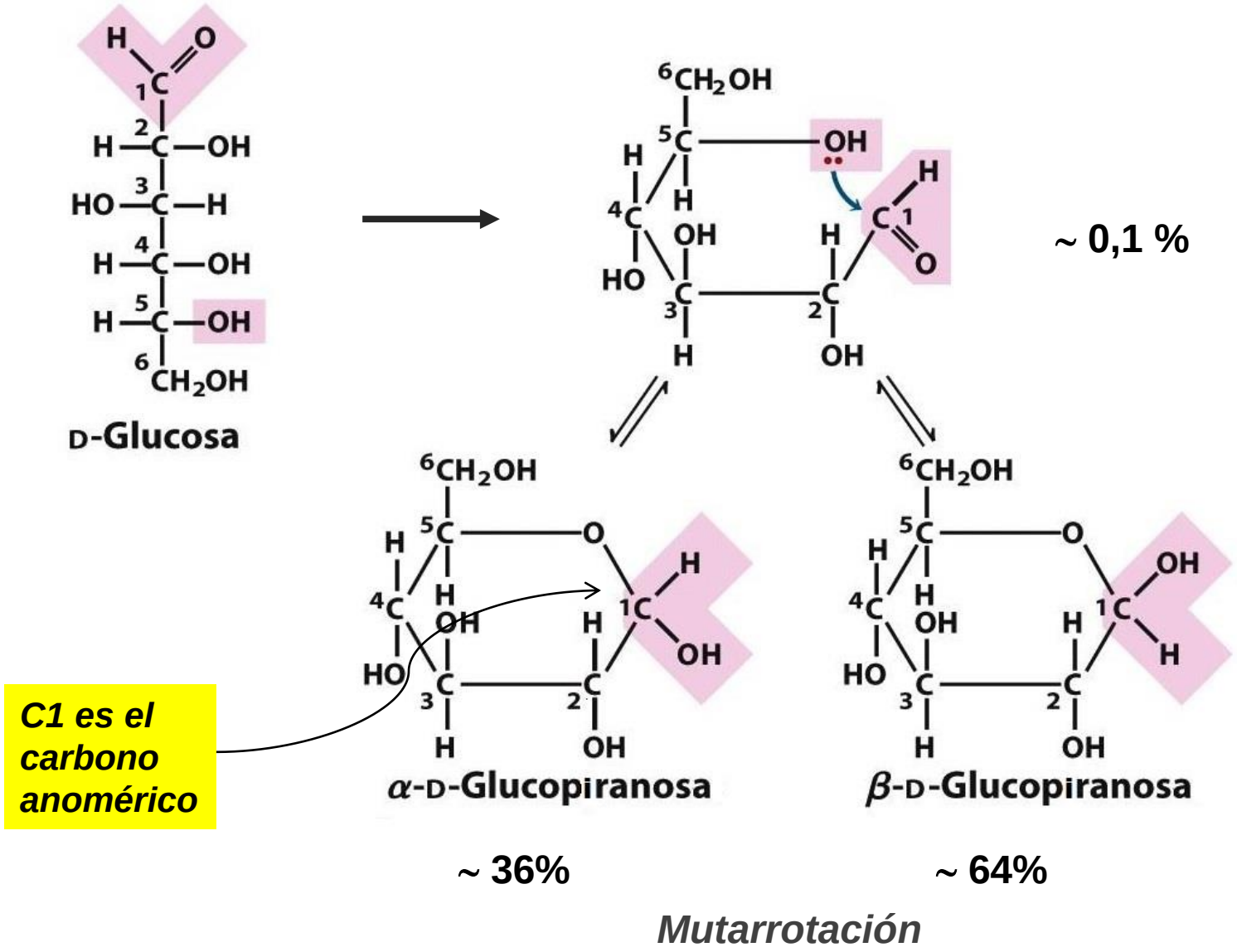


- ***Paso 1***: Se produce una adición nucleofílica en medio ácido. El alcohol OH-R^2 actúa como nucleófilo.

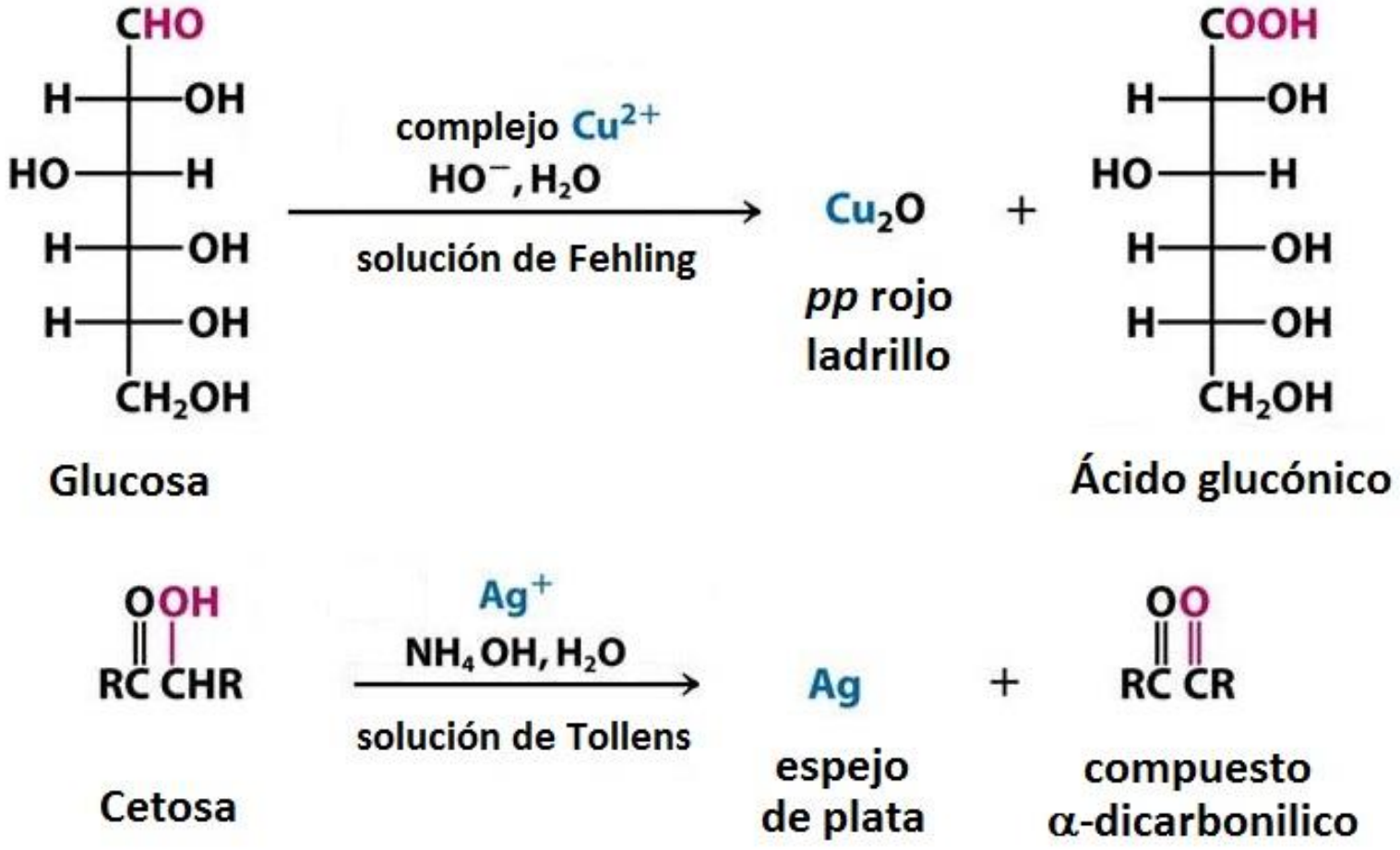
- ***Paso 2***: Se produce un segundo ataque nucleofílico por otra molécula de alcohol (OH-R^3).



Glucosa- anómeros alfa y beta

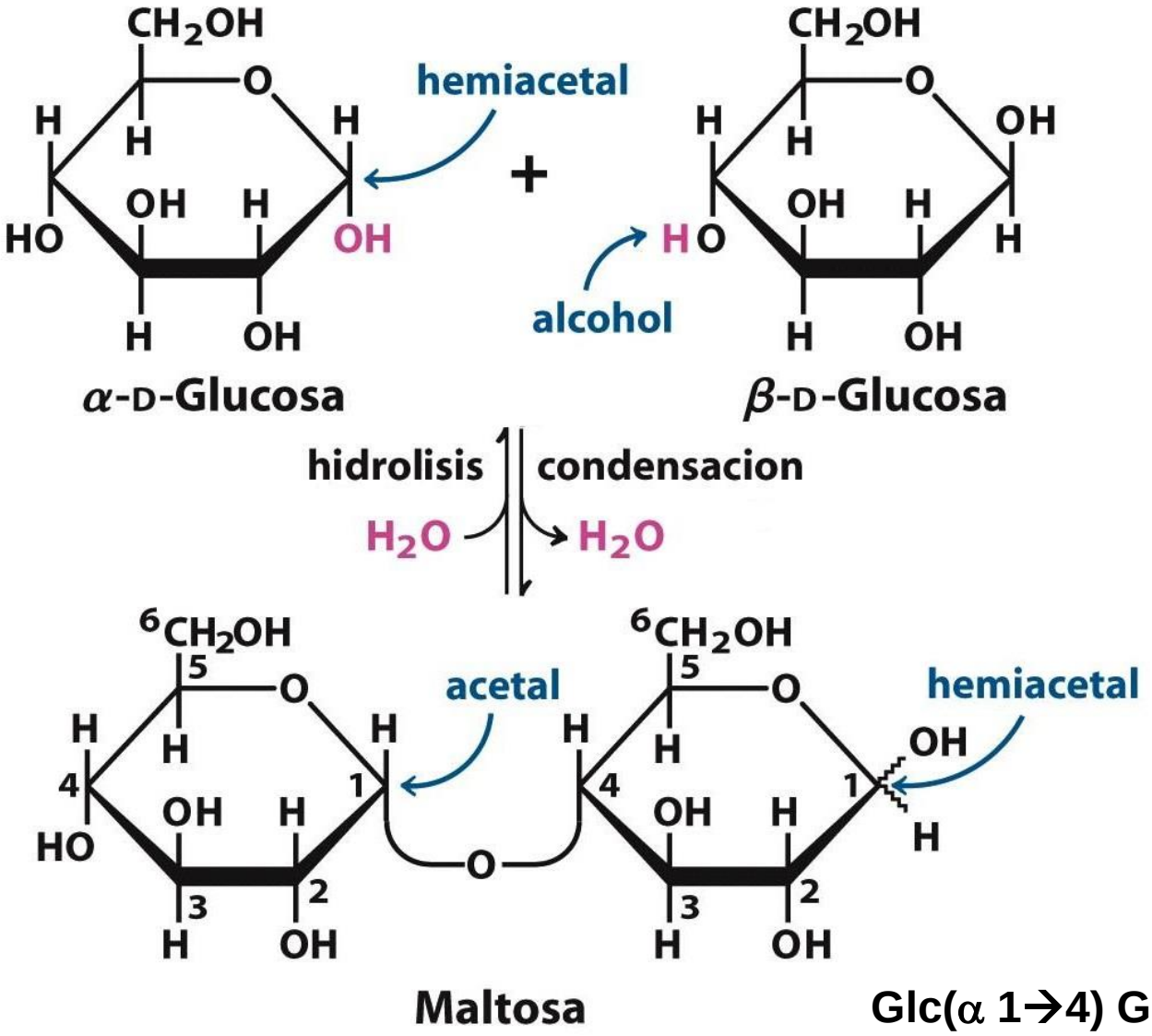


Oxidación de Glucosa – azucares reductores



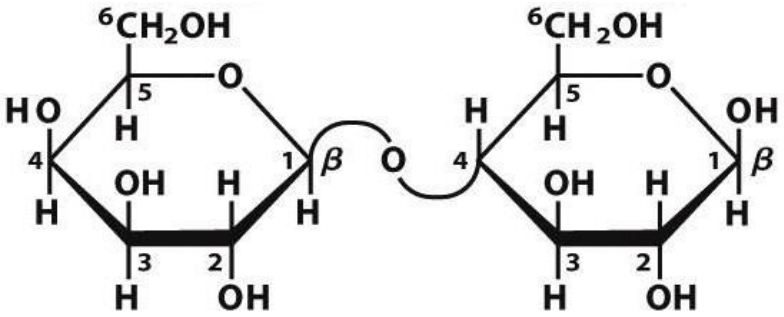
Cuando el carbono anomérico (C1) de la forma cíclica tiene libertad para *abrirse y generar la forma lineal*, puede ser oxidado. En este caso se trata de un azúcar reductor.

Formación de disacáridos – maltosa



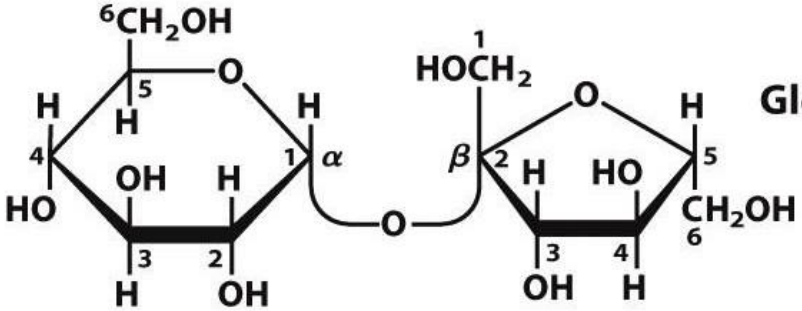
Glc(α 1→4) Glc

Otros disacáridos



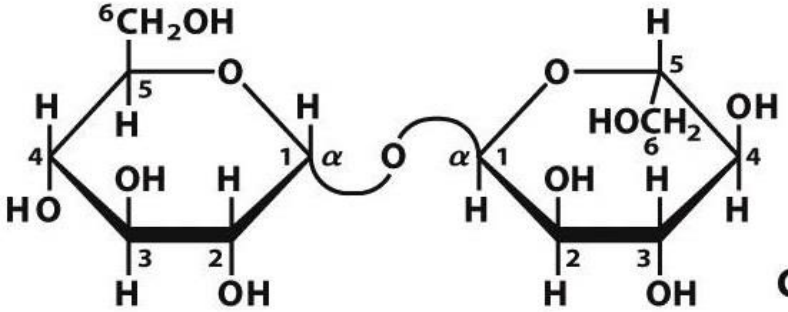
Lactosa

Gal(β1→4)Glc



Sacarosa

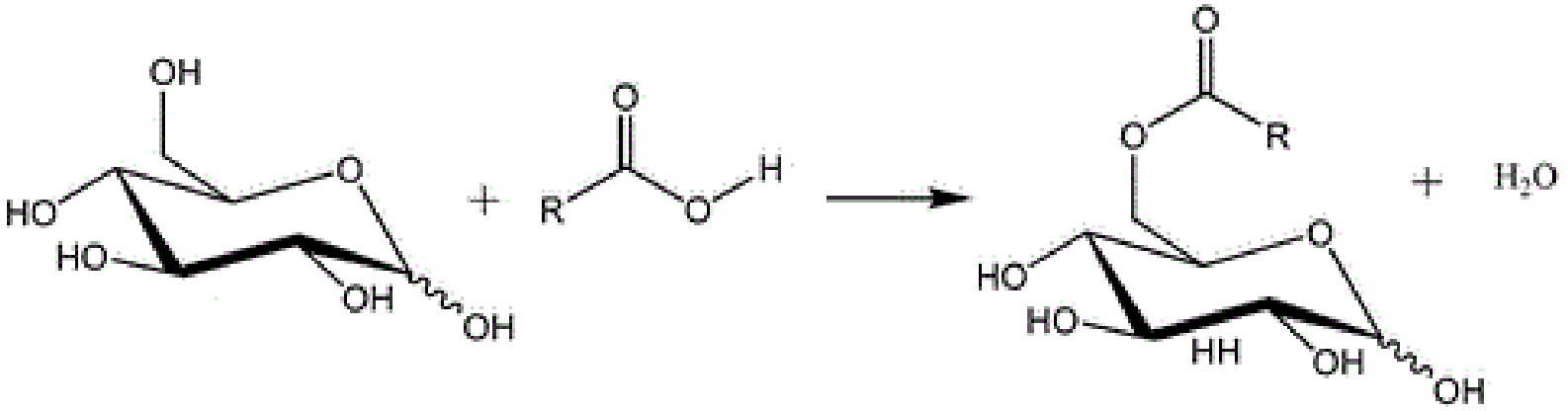
Glc(α1↔2β)Fru

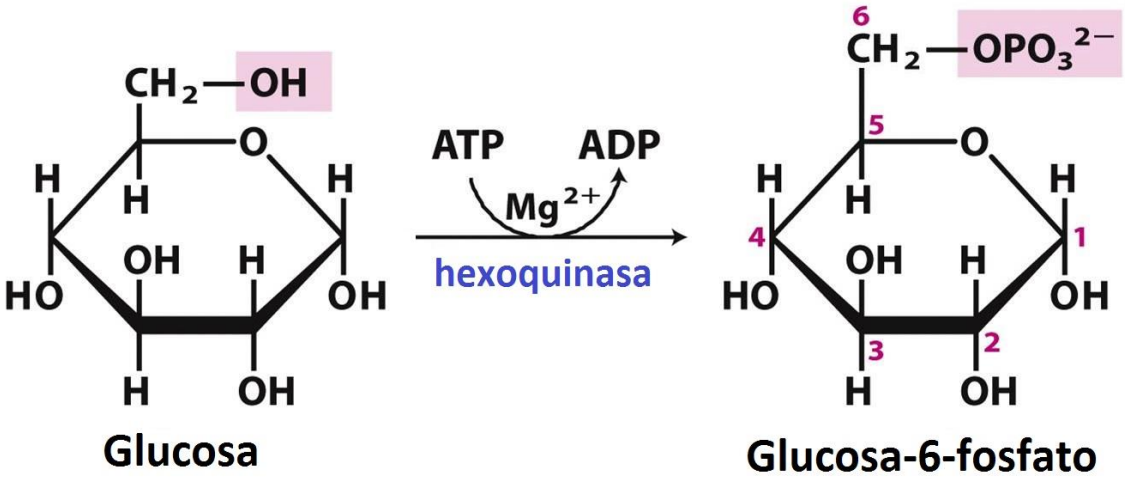


Trehalosa

Glc(α1↔1α)Glc

Esterificación de glucosa – glucosa-6-P

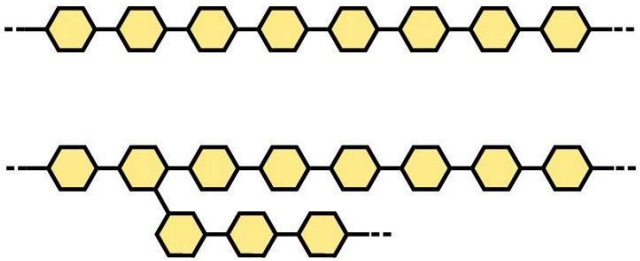


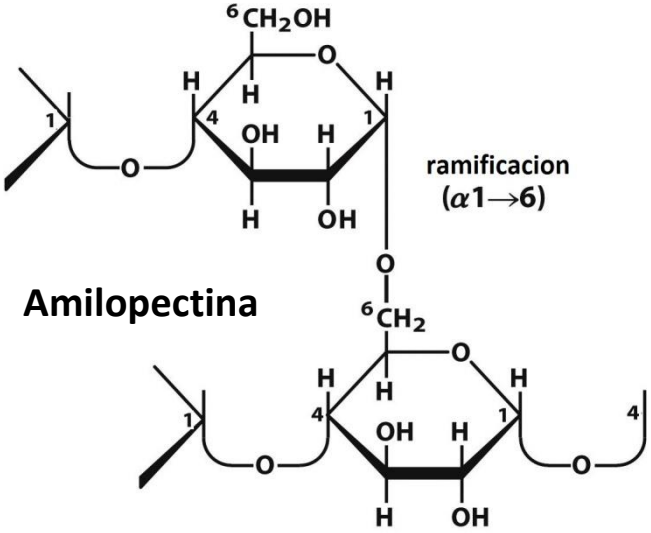


$\Delta G'^{\circ} = -16.7$ kJ/mol

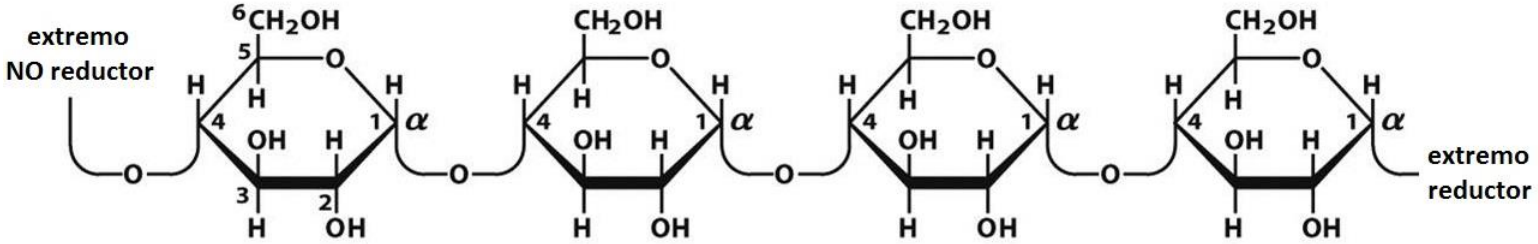
Homopolisacáridos lineales y ramificados:

- Glicógeno α1→4, α1→6
- Almidón α1→4, α1→6
- Celulosa β 1→4





Amilopectina



Amilosa

GRACIAS!!

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