DEZ AZMA Bio Med lab

دانشگاه علوم پزشکی و خدمات بهداشتی درمانی استان مرکزی

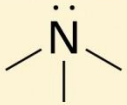
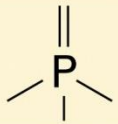
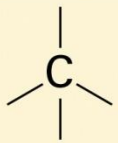
قندها

Carbohydrates

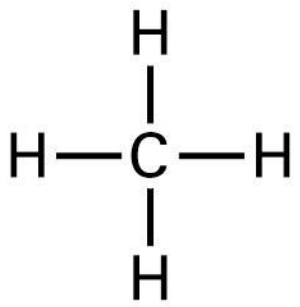
دکتر هادی انصاری هادی پور

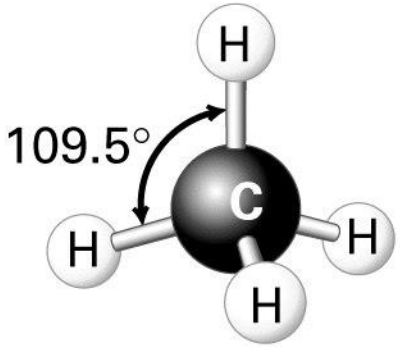
گروه بیوشیمی و ژنتیک

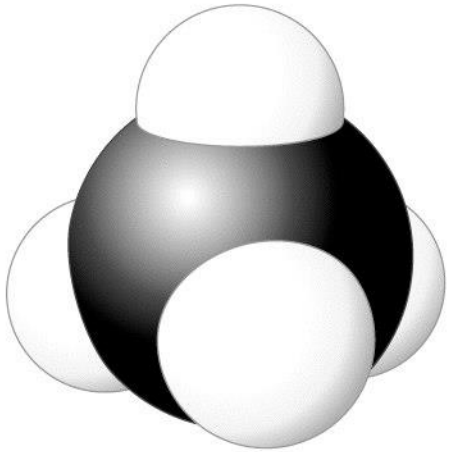
TABLE 2-1 Bonding Properties of Atoms Most Abundant in Biomolecules

Atom and Outer Electrons	Usual Number of Covalent Bonds	Bond Geometry
H	1	
O	2	
S	2, 4, or 6	
N	3 or 4	
P	5	
C	4	

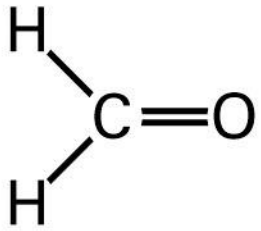
(a) Methane

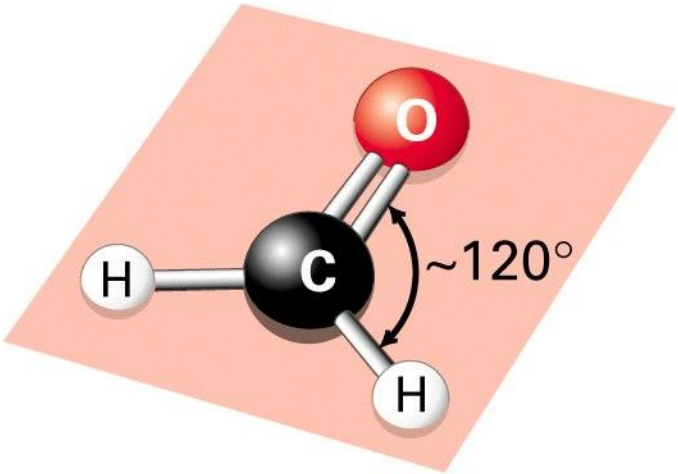


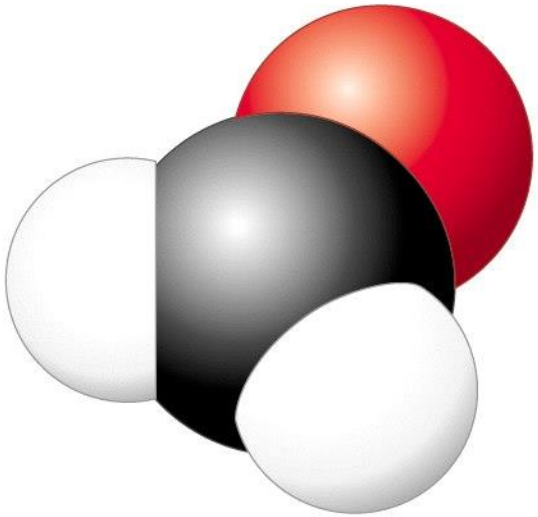




(b) Formaldehyde



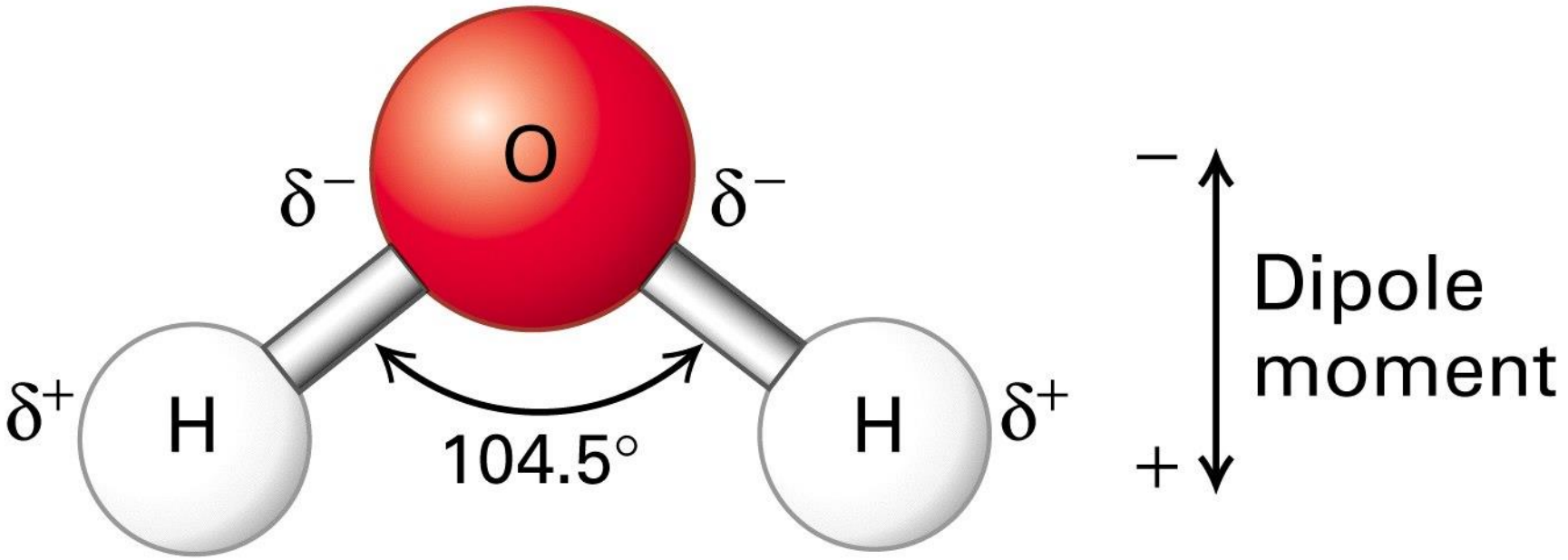


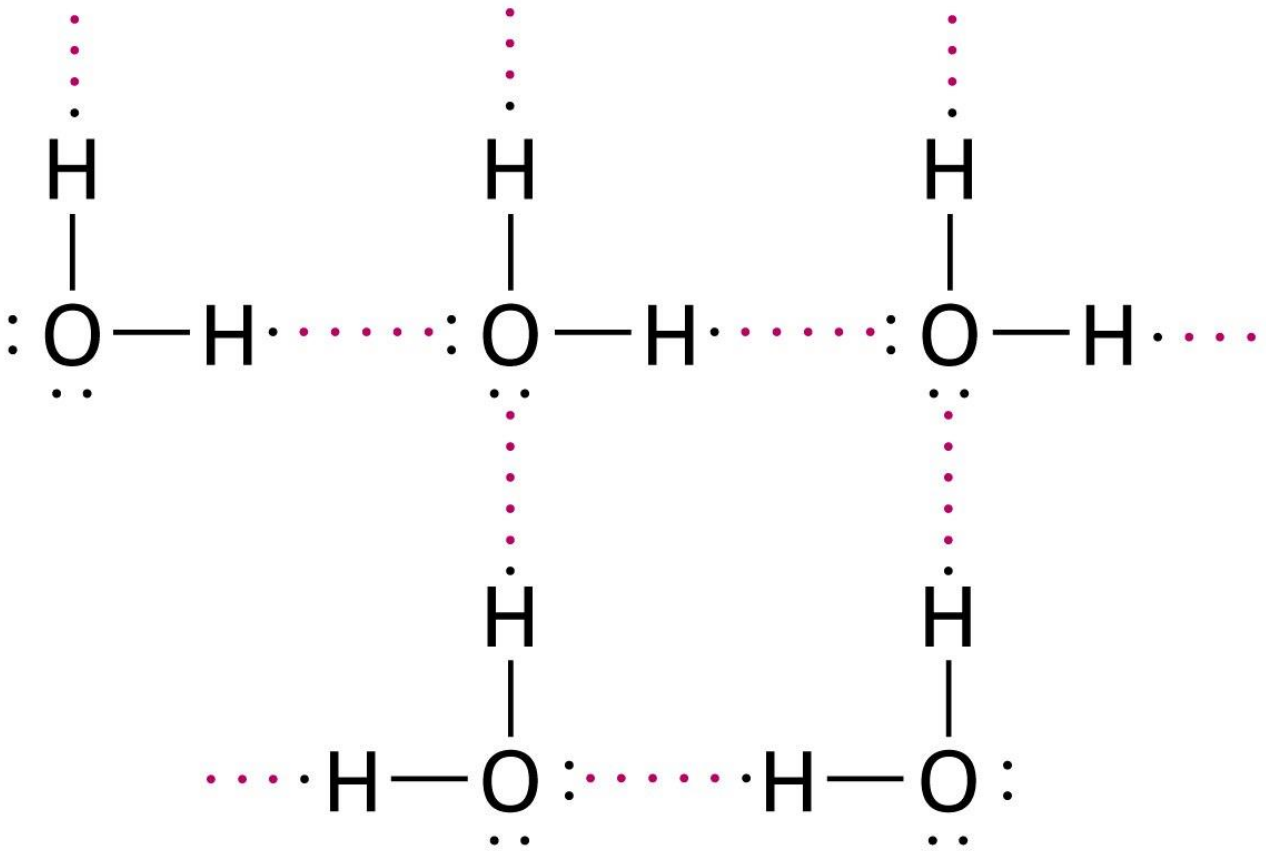


Chemical structure

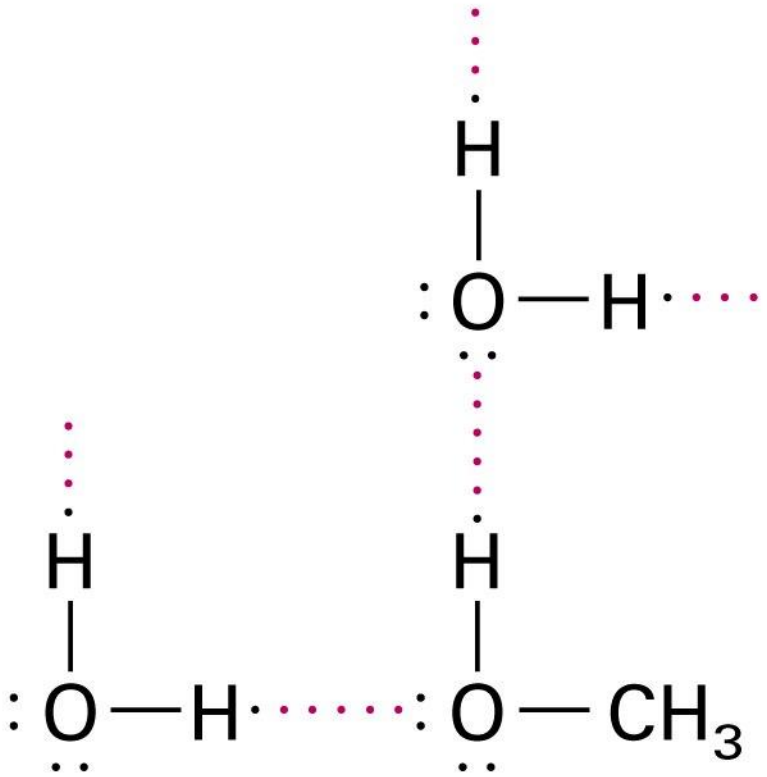
Ball-and-stick model

Space-filling model

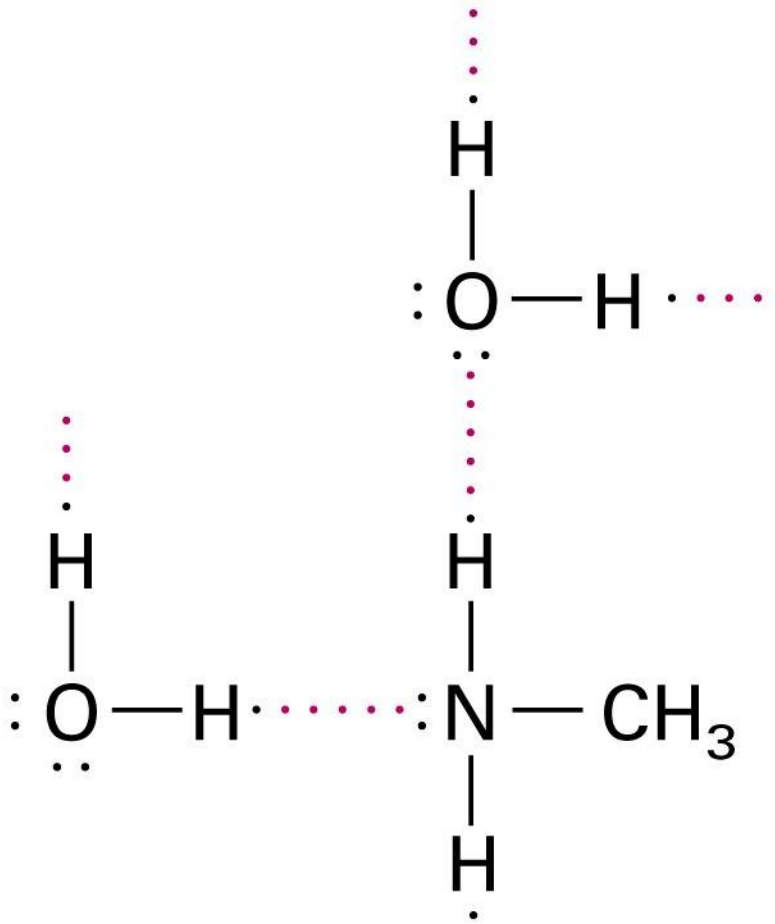

O
δ−
δ−
H
H
δ+
δ+
104.5°
−
+
Dipole
moment



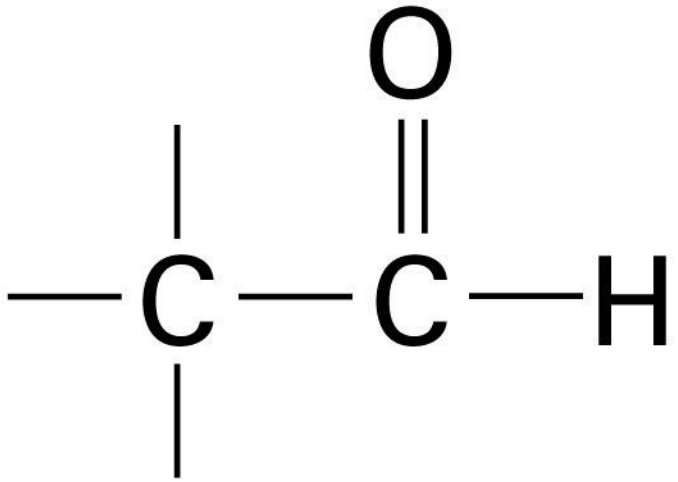
Water-water



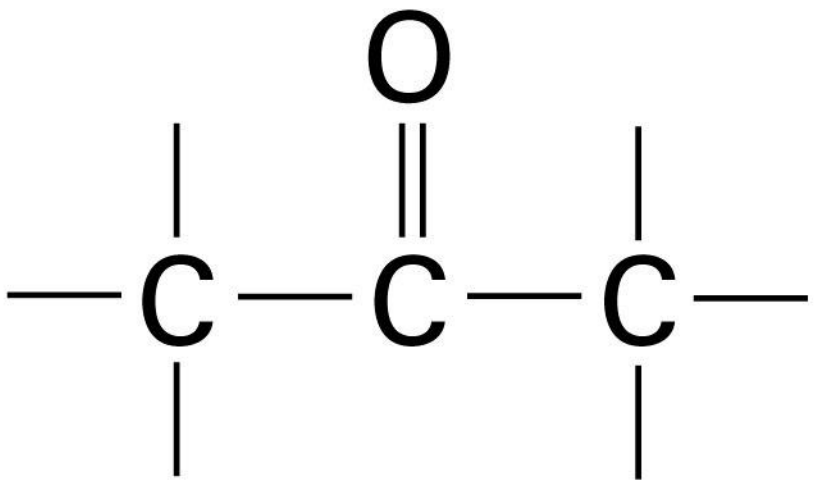
Methanol-water



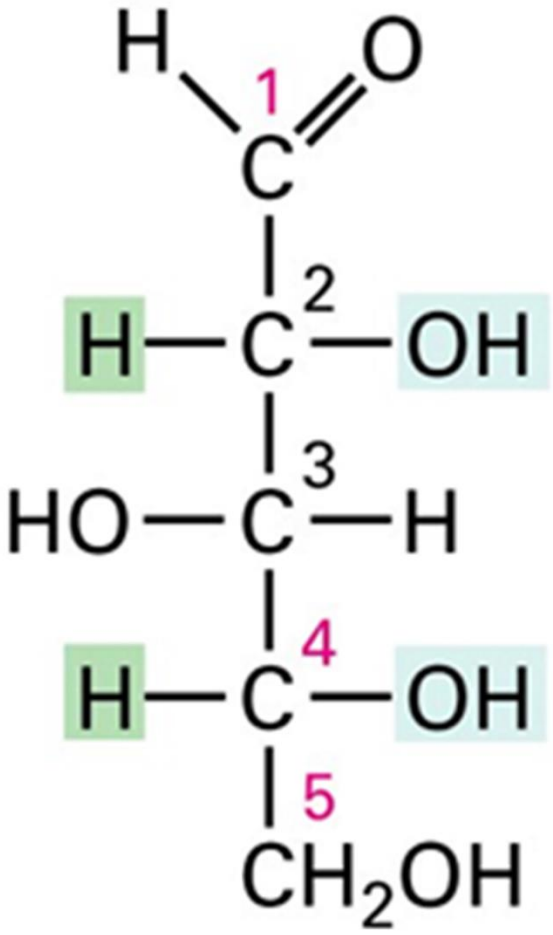
Methylamine-water

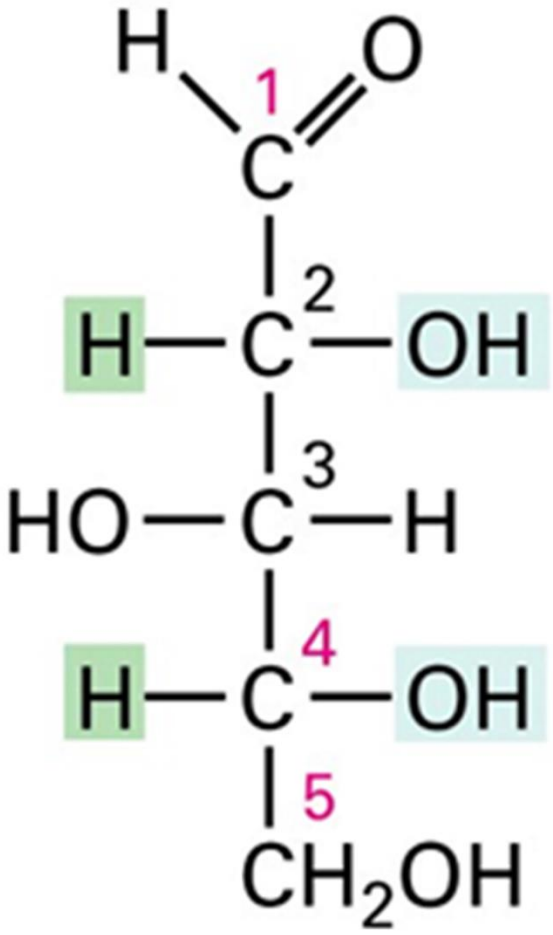


Aldehyde

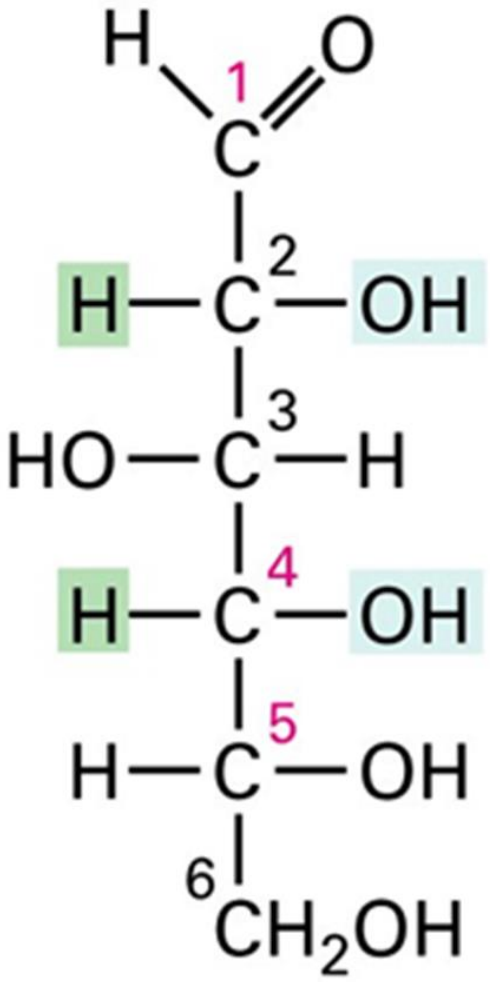


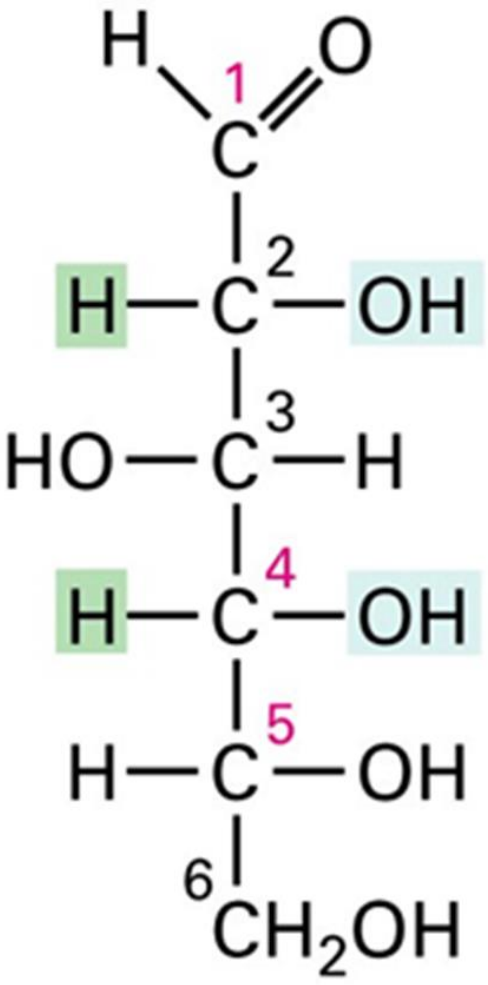
Keto


H
O
1
C
2
H
C
OH
3
HO
C
H
4
H
C
OH
5
CH2OH

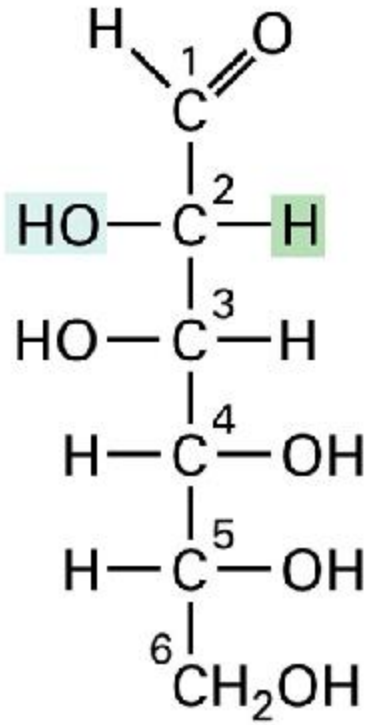


D-Ribose

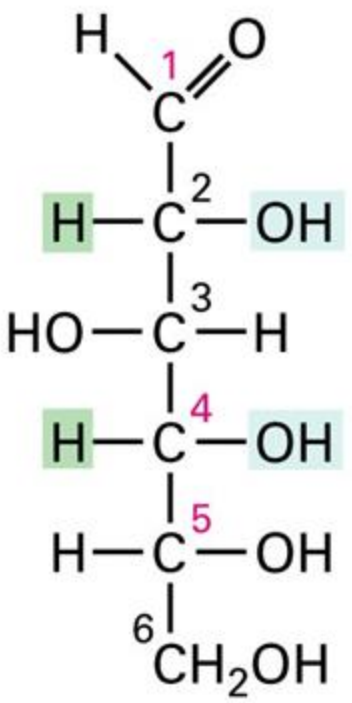

H
O
1
C
2
H
C
OH
HO
C
3
H
4
H
C
OH
5
H
C
OH
6
CH2OH



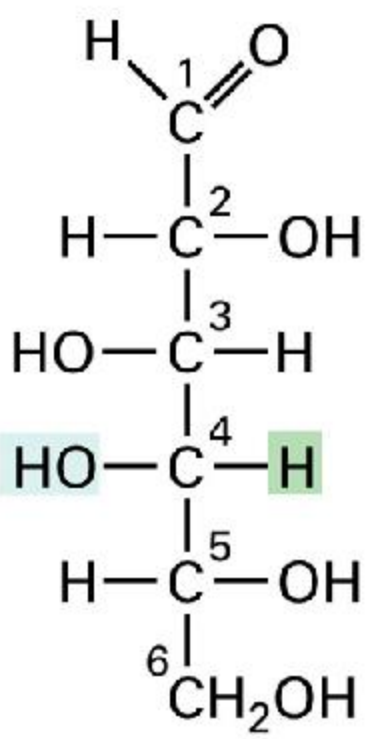
D-Glucose



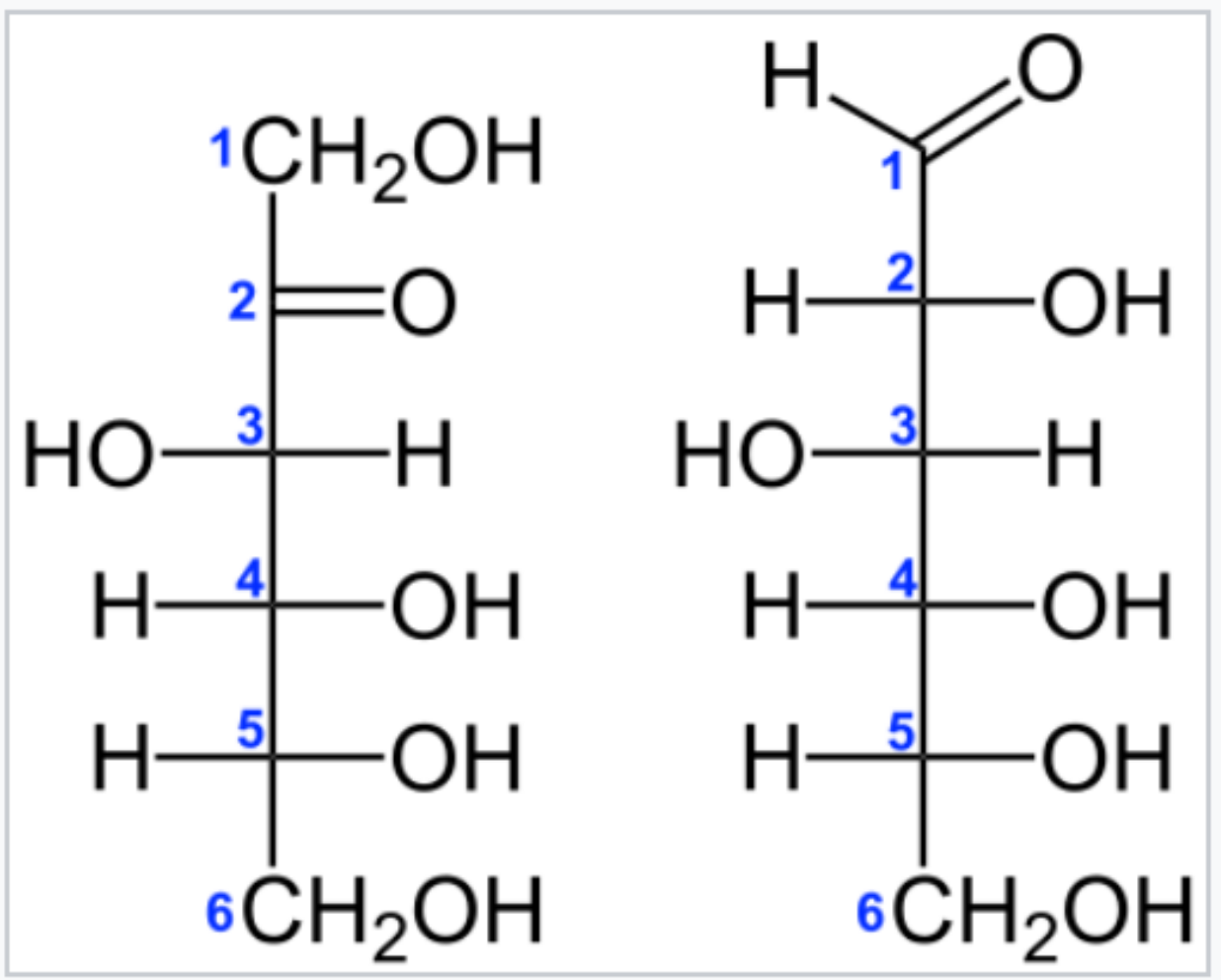
D-Mannose

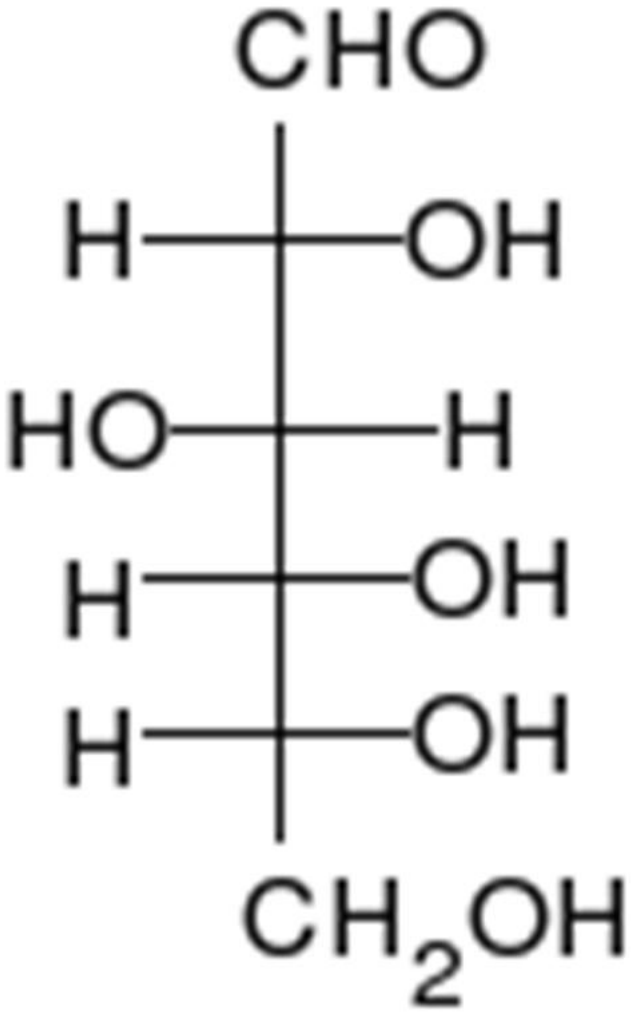


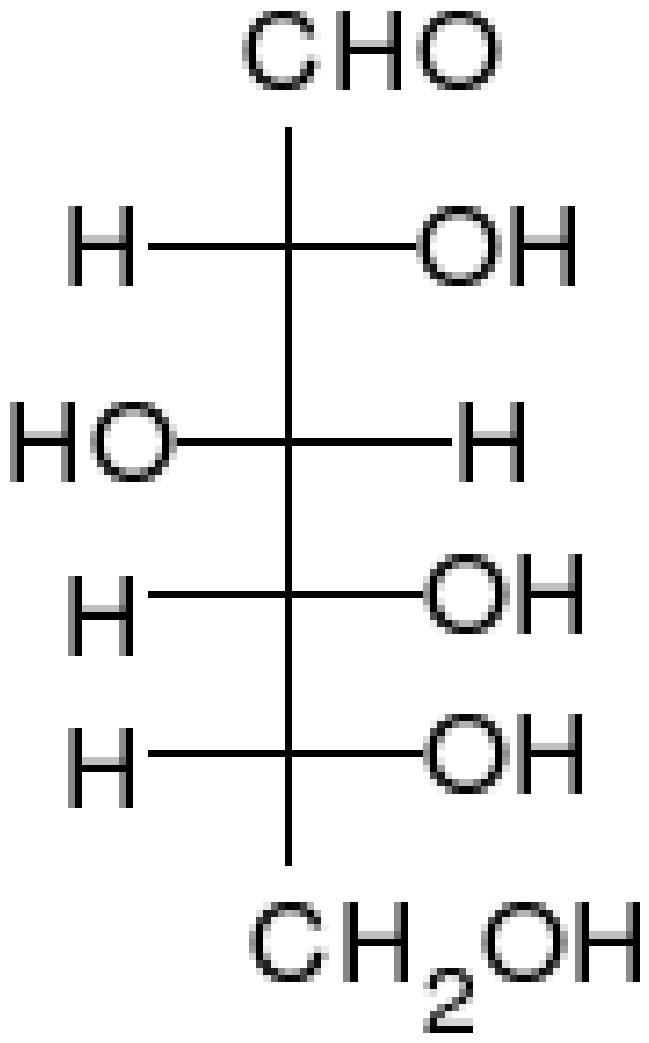
D-Glucose

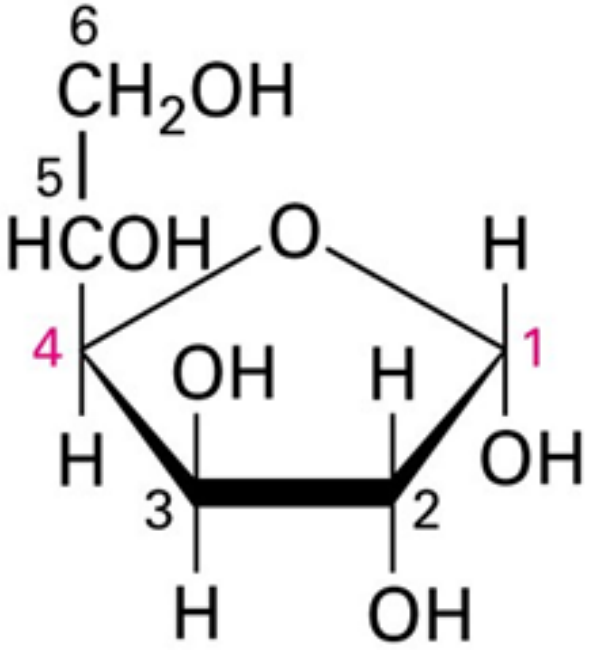


D-Galactose

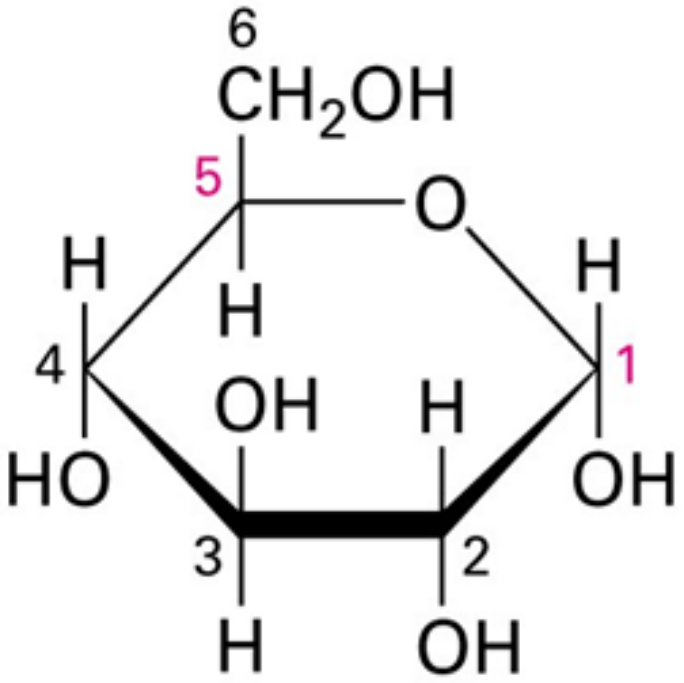

1CH2OH
2
O
HO
3
H
H
4
OH
H
5
OH
6CH2OH
H
O
1
H
2
OH
HO
3
H
H
4
OH
H
5
OH
6CH2OH


CHO
H
OH
HO
H
H
OH
H
OH
CH2OH

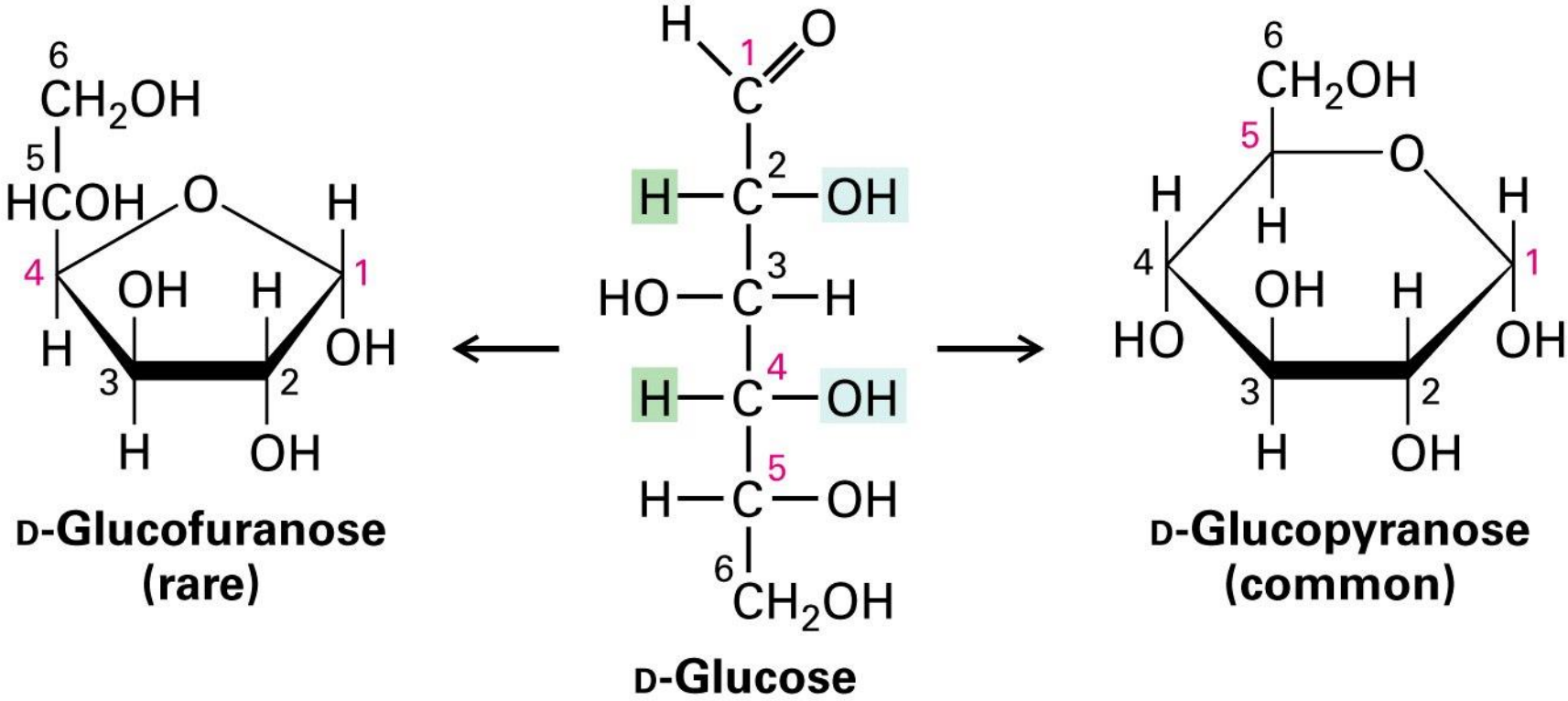

CHO
H
OH
HO
H
H
OH
H
OH
CH2OH

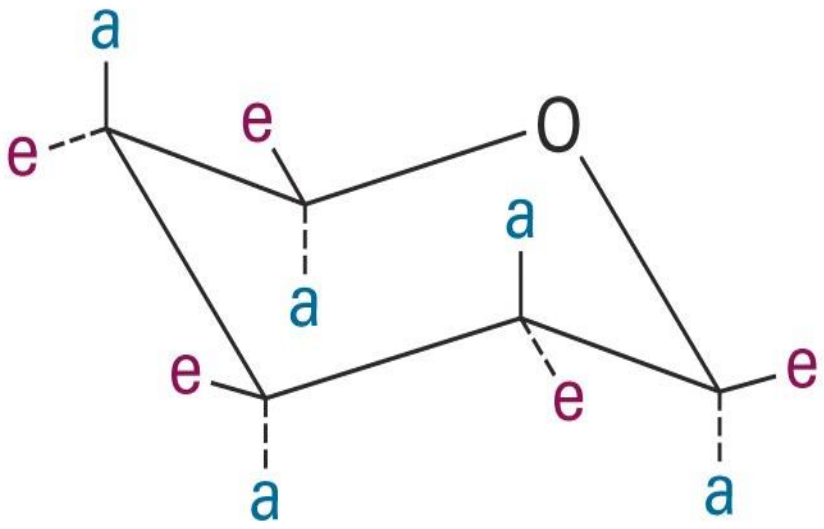


furanose

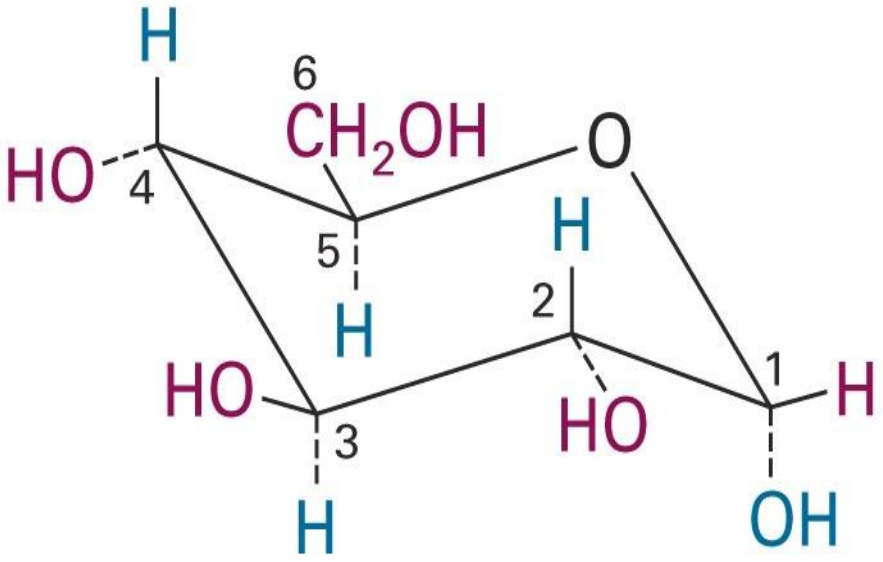


pyranose

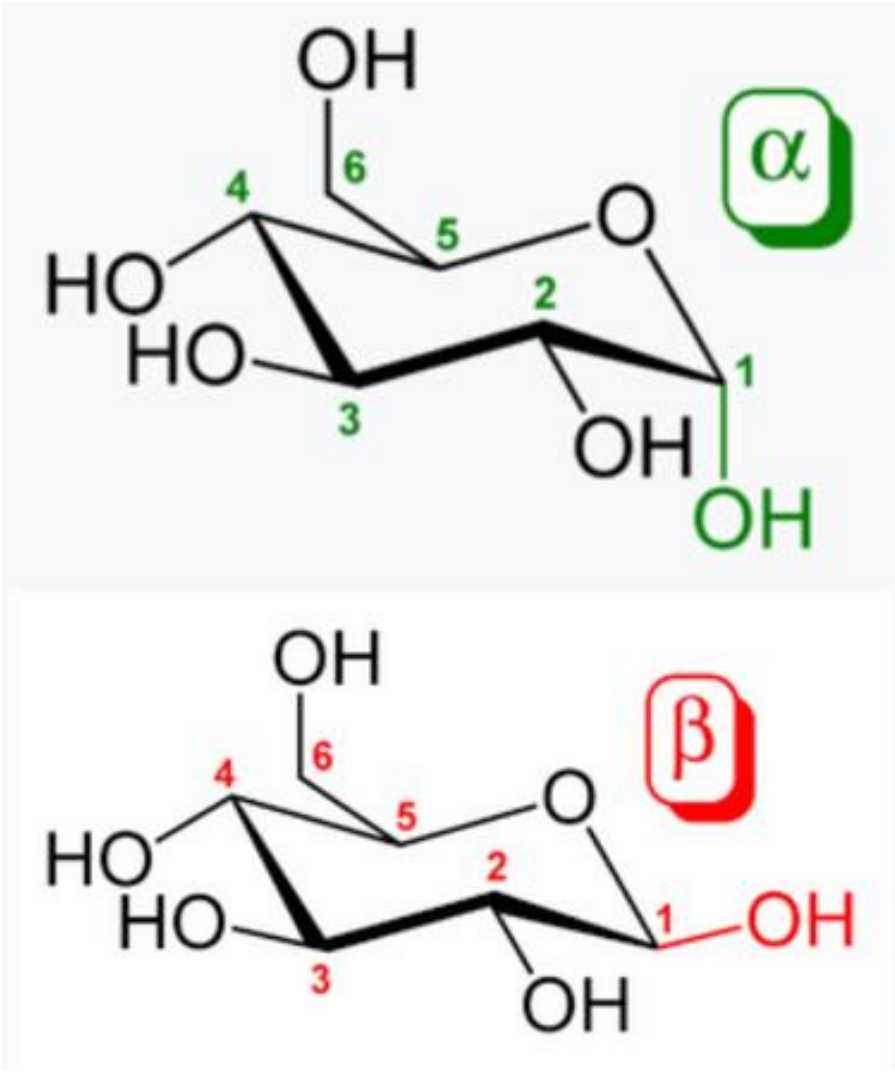

D-Glucofuranose
(rare)
D-Glucose
D-Glucopyranose
(common)



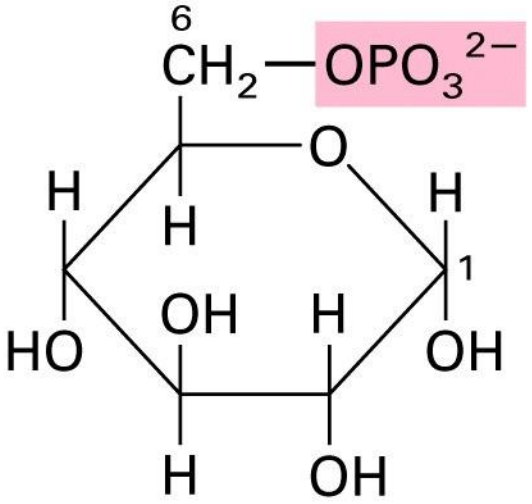
Pyranoses



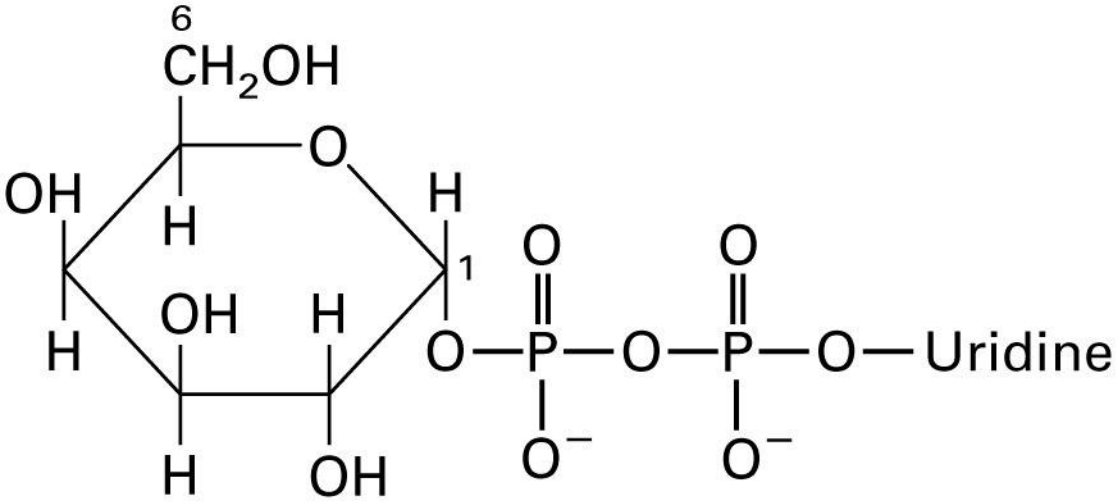
α-D-Glucopyranose



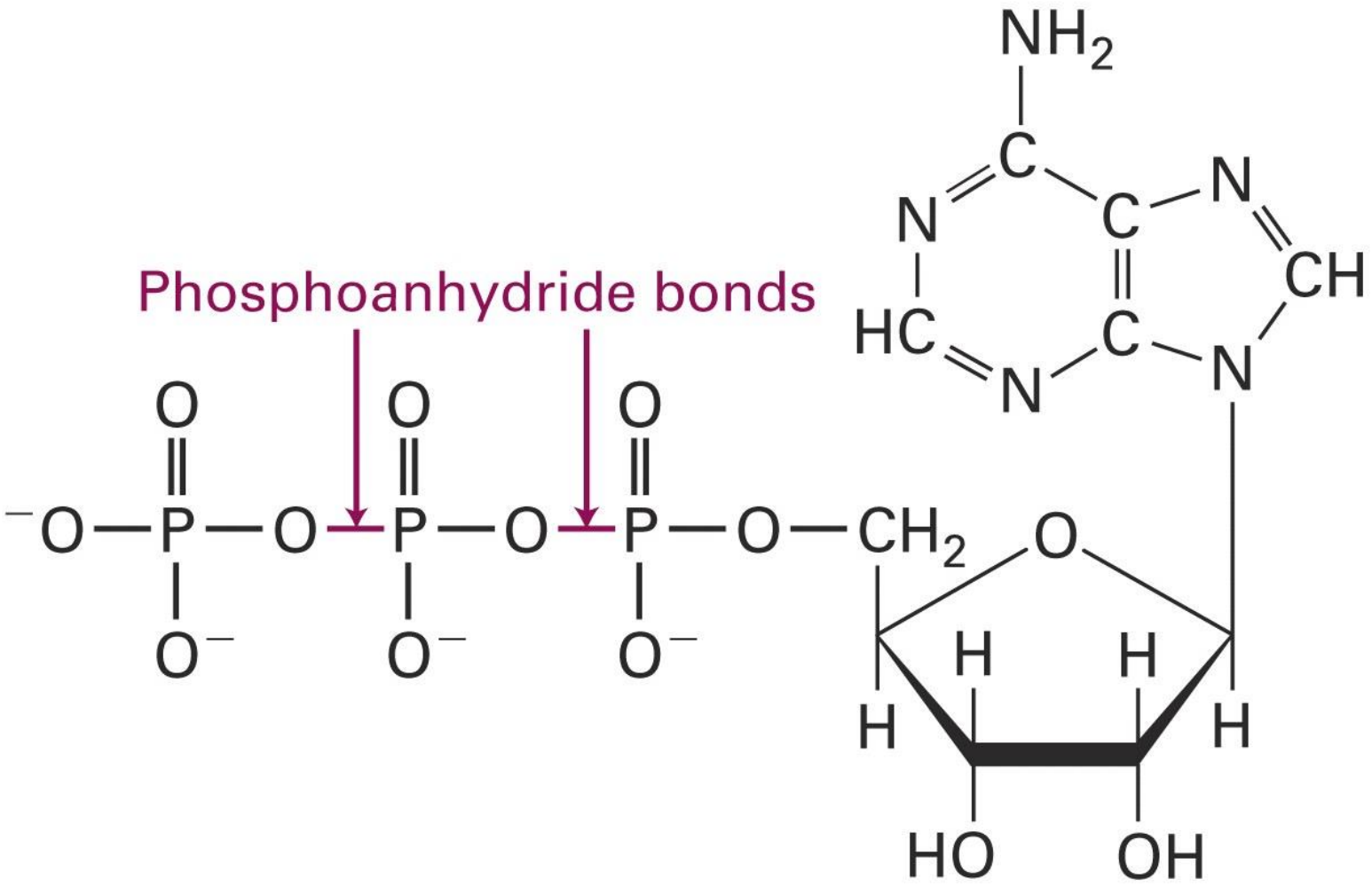
The α and β anomers of glucose. Note the position of the hydroxyl group (red or green) on the anomeric carbon relative to the CH_2OH group bound to carbon 5: they either have identical absolute configurations (R,R or S,S) (α), or opposite absolute configurations (R,S or S,R) (β).



Glucose 6-phosphate

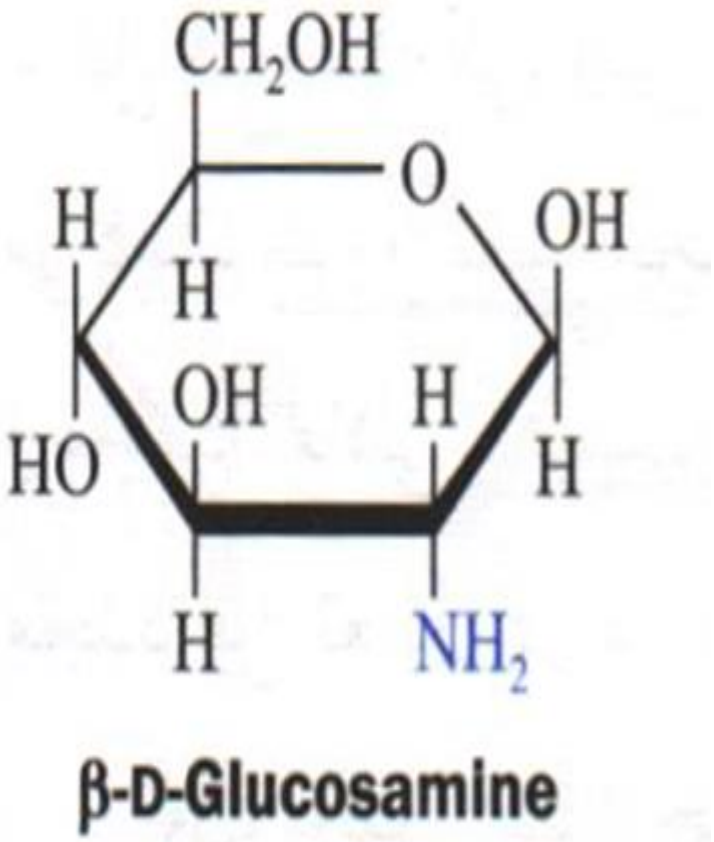


UDP-galactose



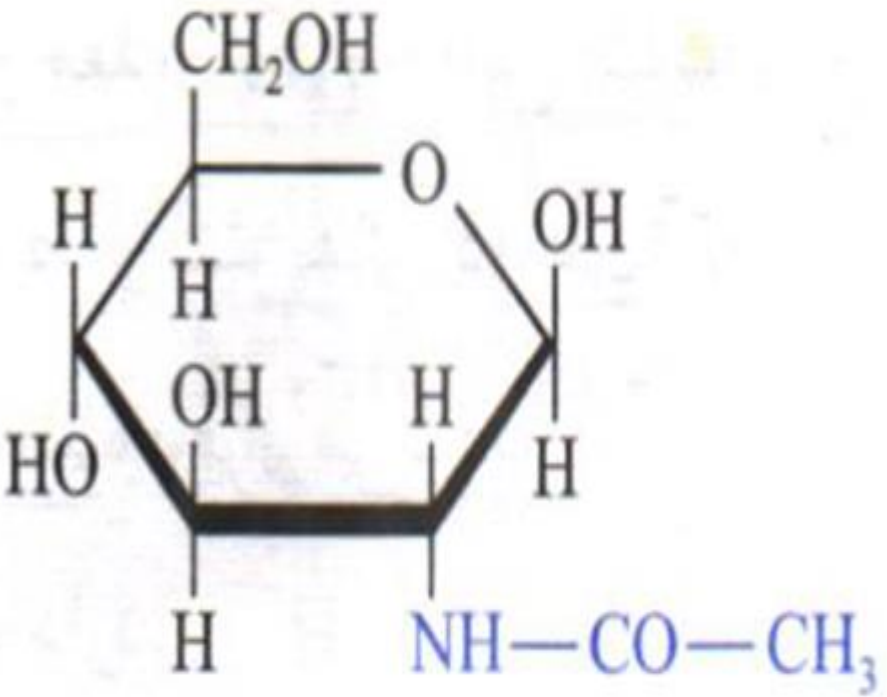
Adenosine triphosphate (ATP)

آمیناسیون



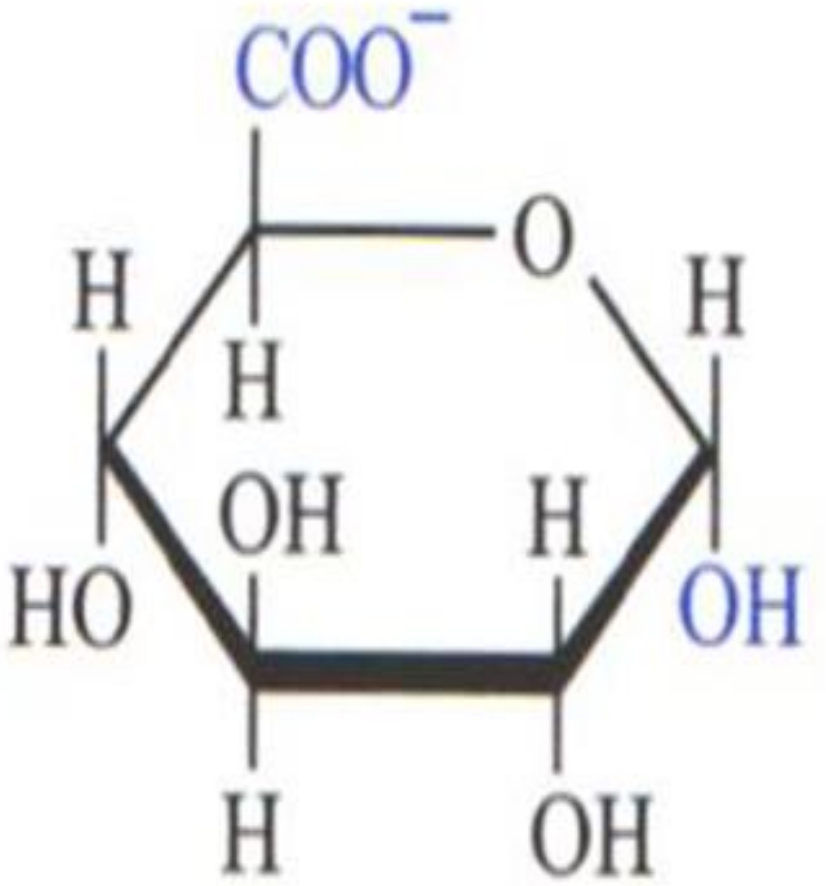
β-D-Glucosamine

آمیناسیون

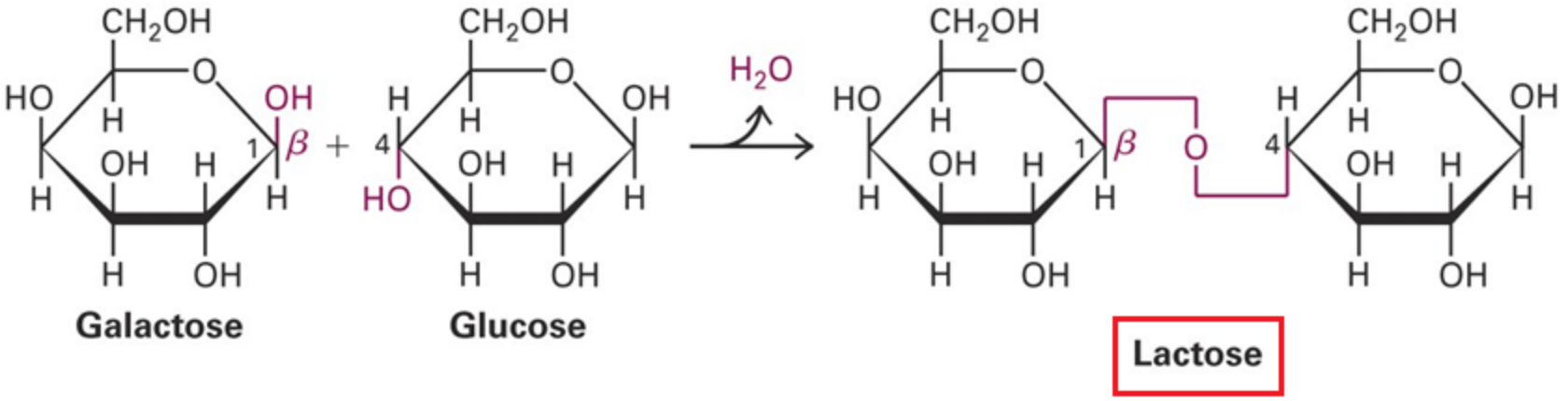


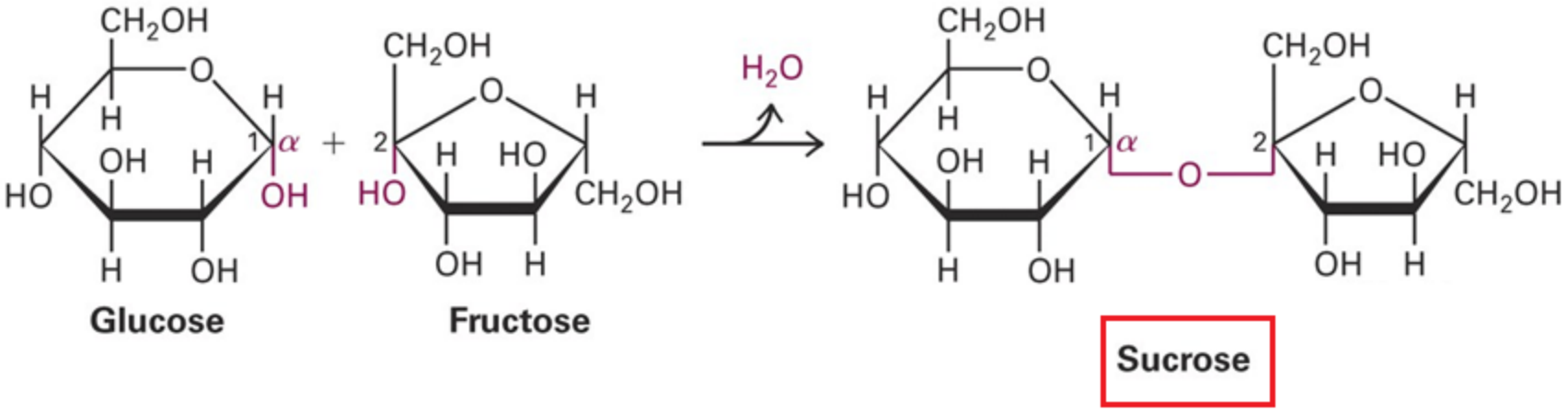
N-Acetyl β-D-glucosamine

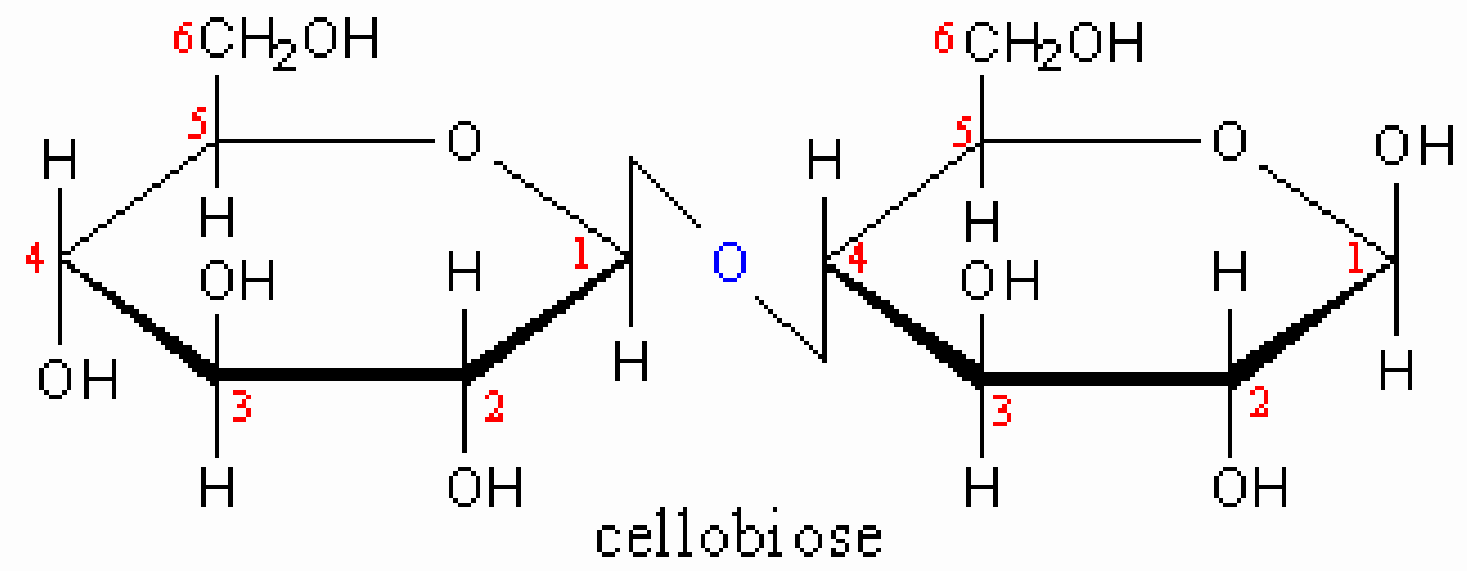
مشتقات اسیدی



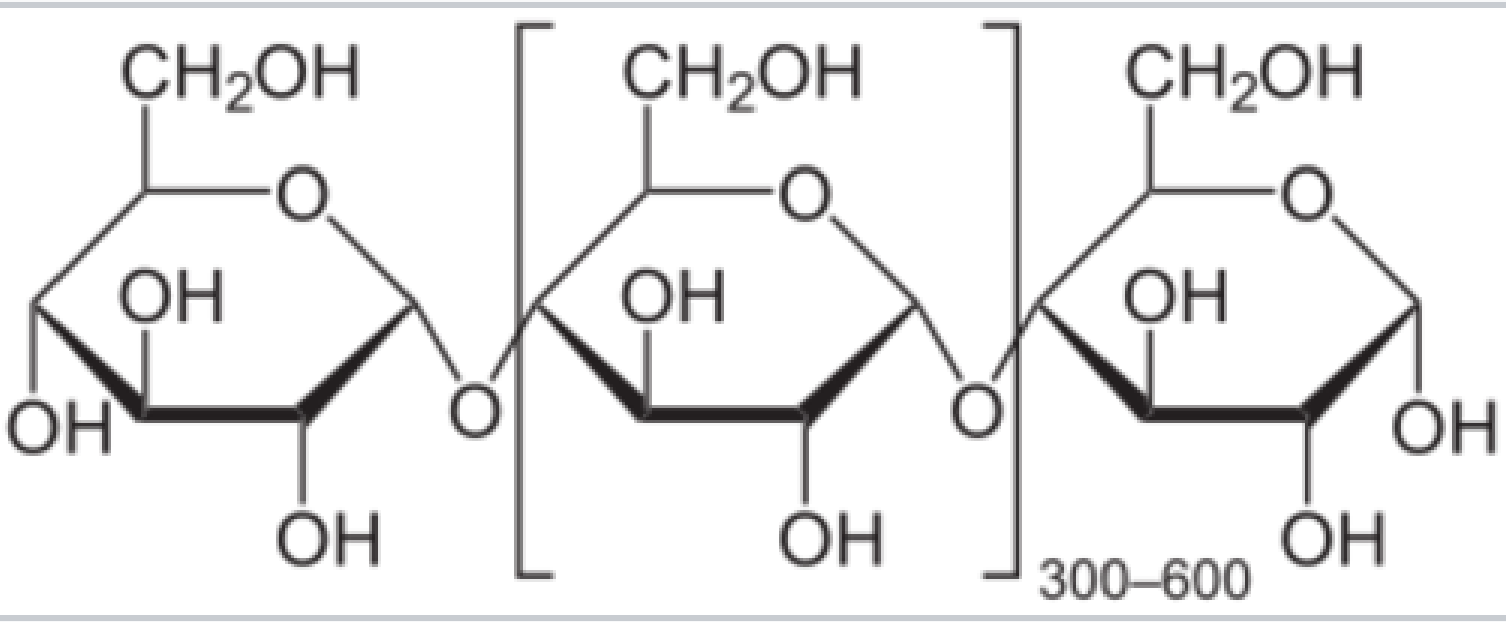
α-D-Glucoronate


Galactose
Glucose
H_2O
Lactose

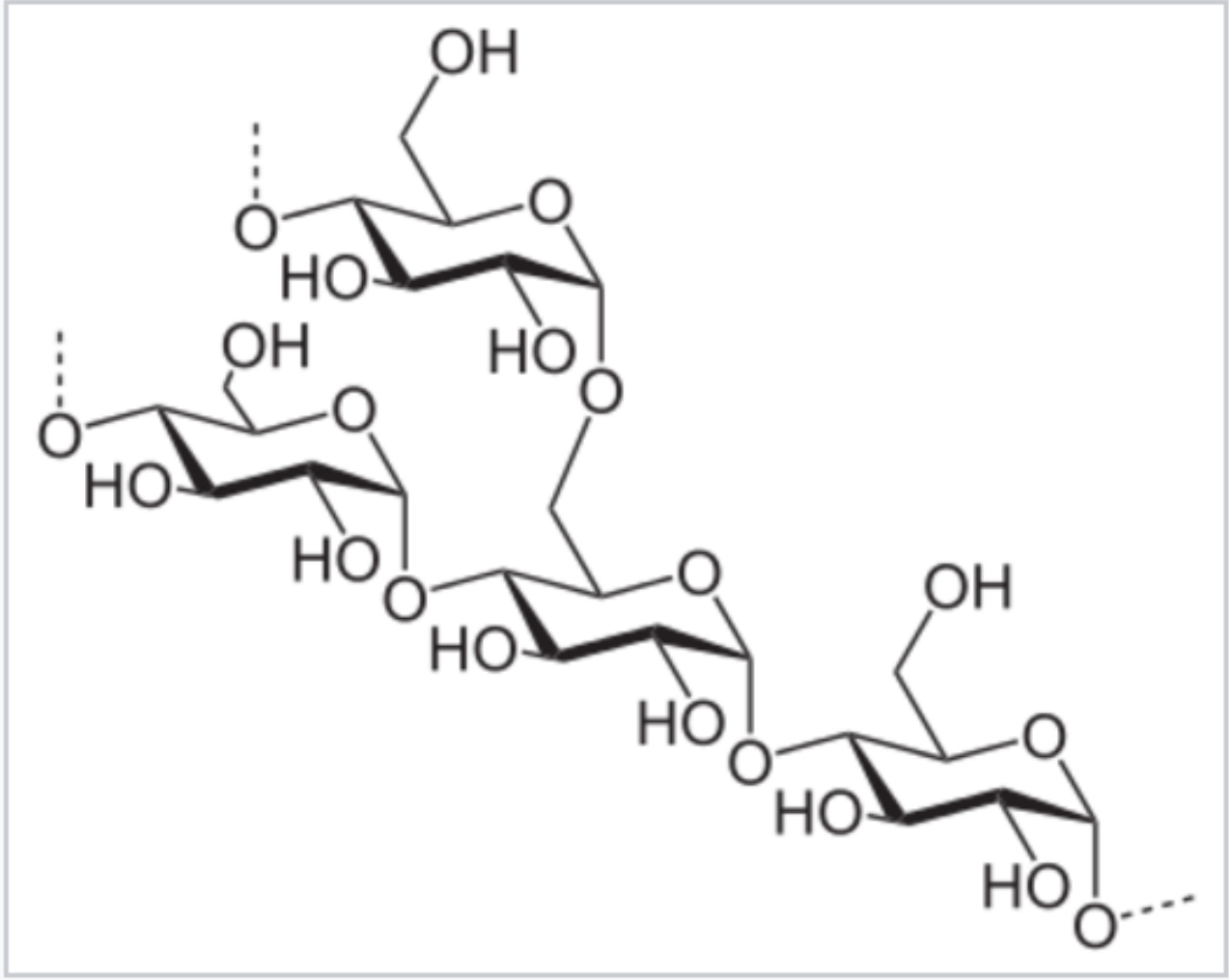

Glucose
Fructose
H_2O
Sucrose



cellobiose

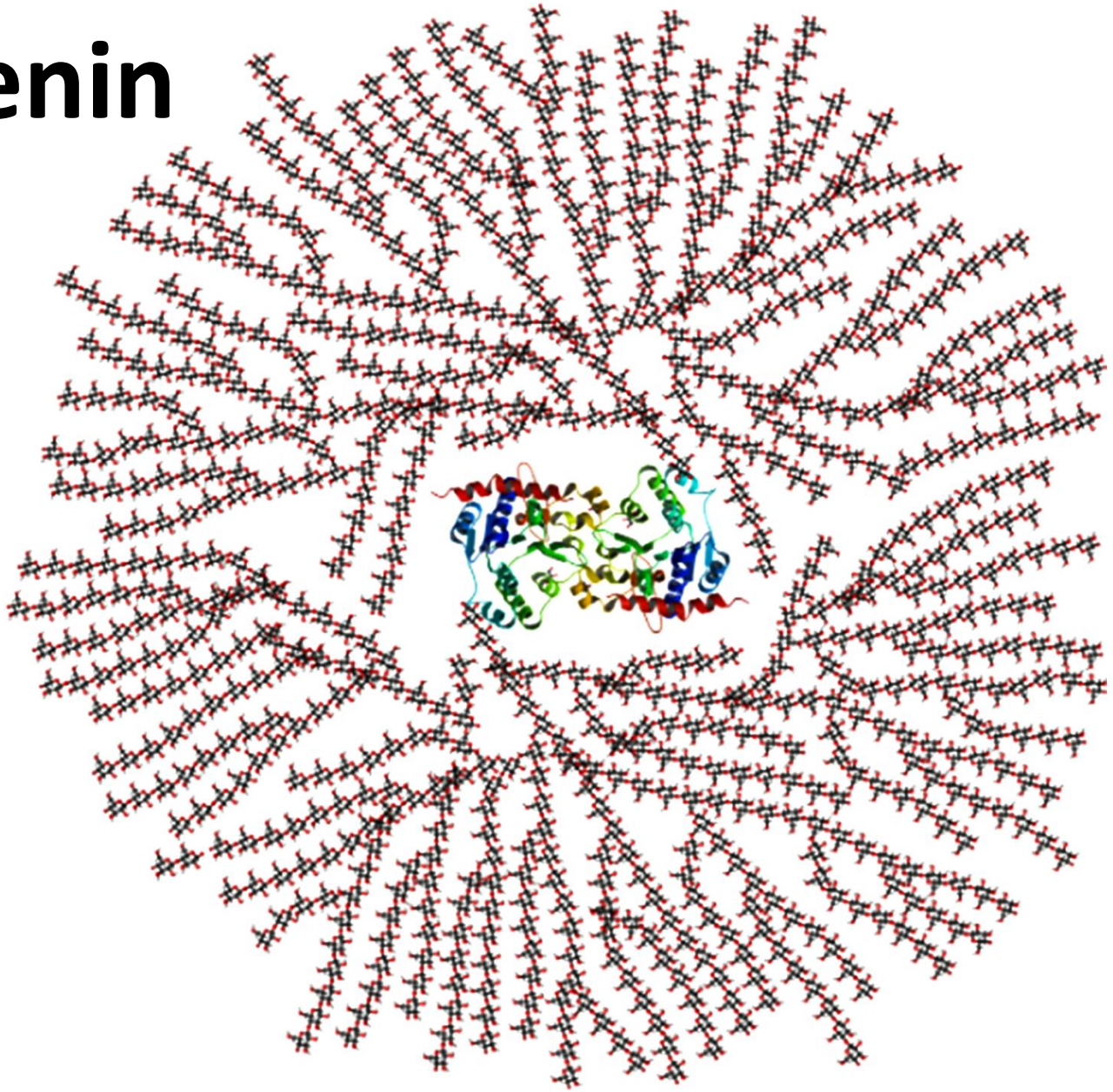


Structure of the amylose molecule



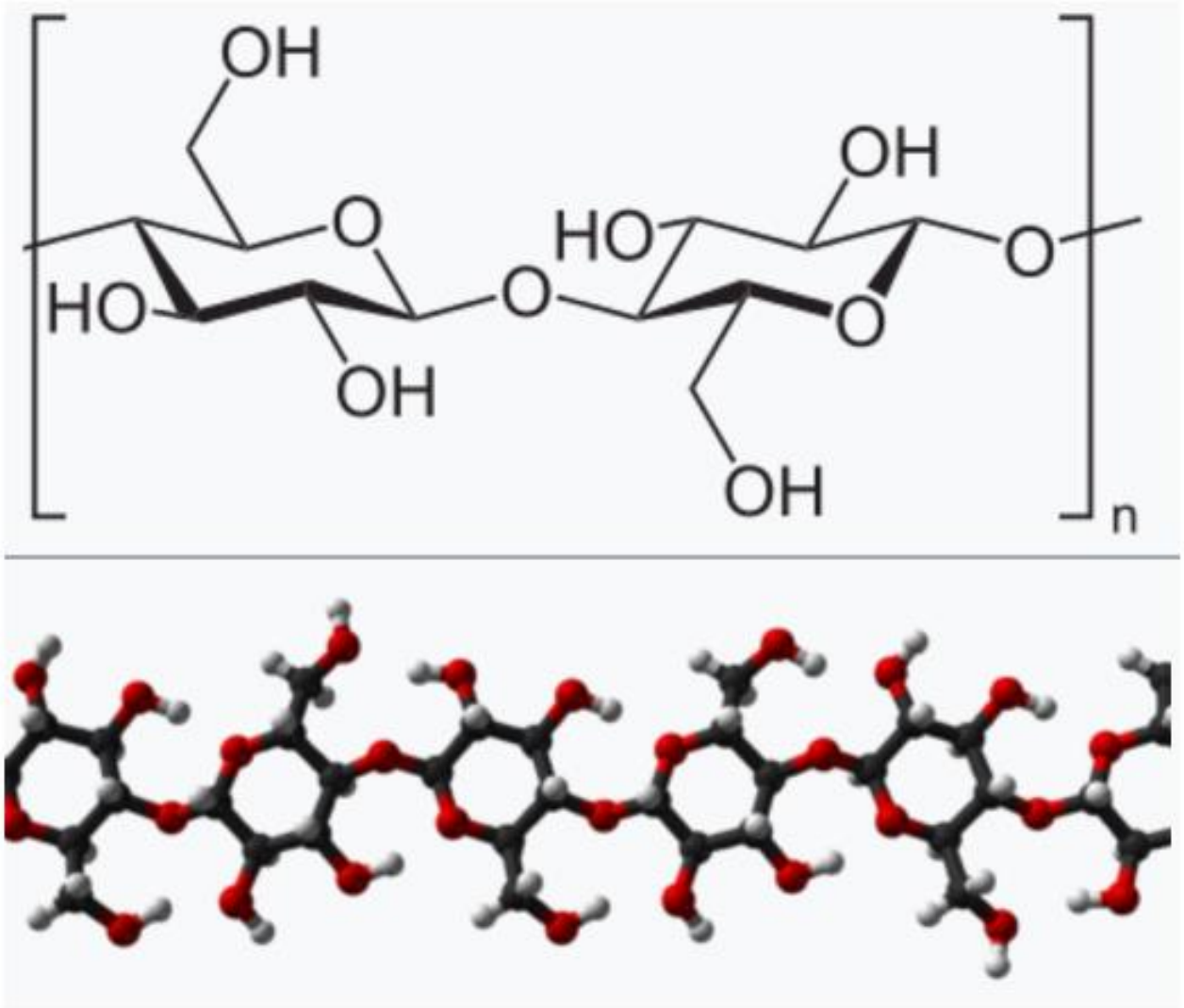
Structure of the amylopectin molecule

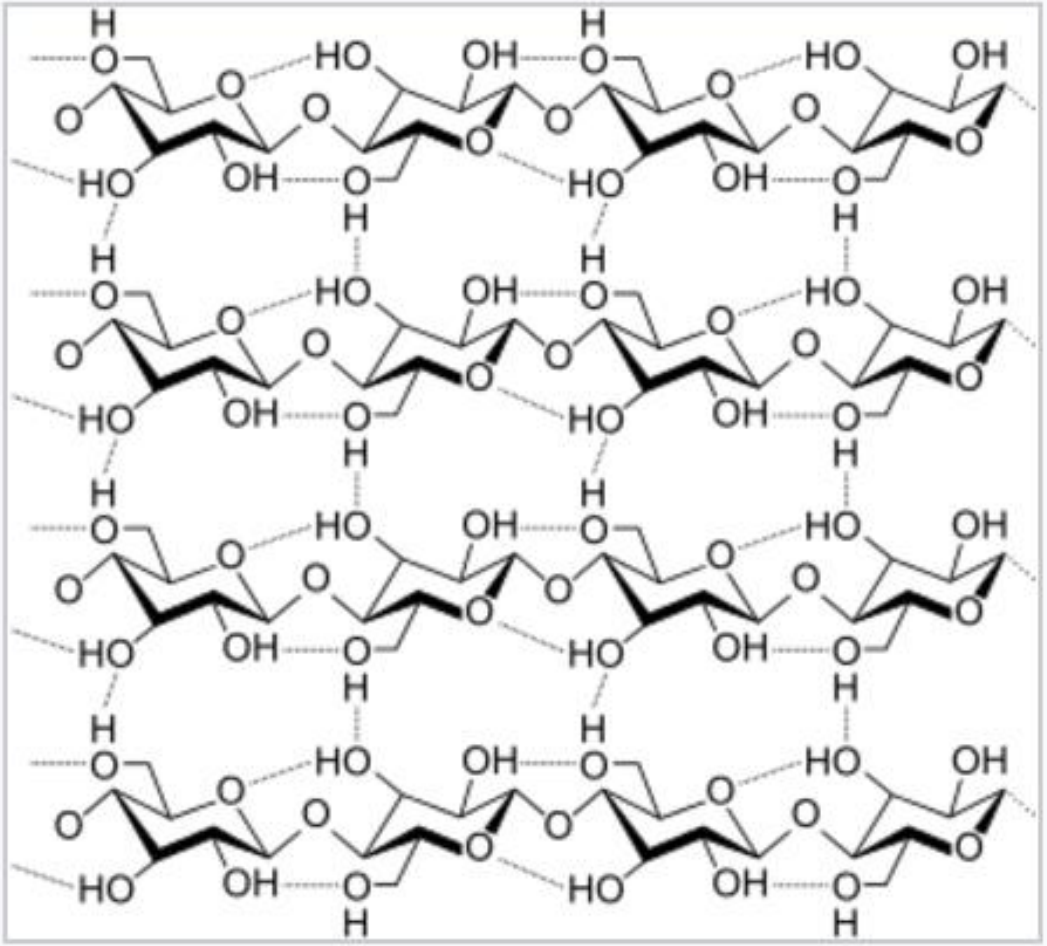
Glycogenin



Cotton fibres represent the purest natural form of cellulose, containing more than 90% of this polysaccharide.

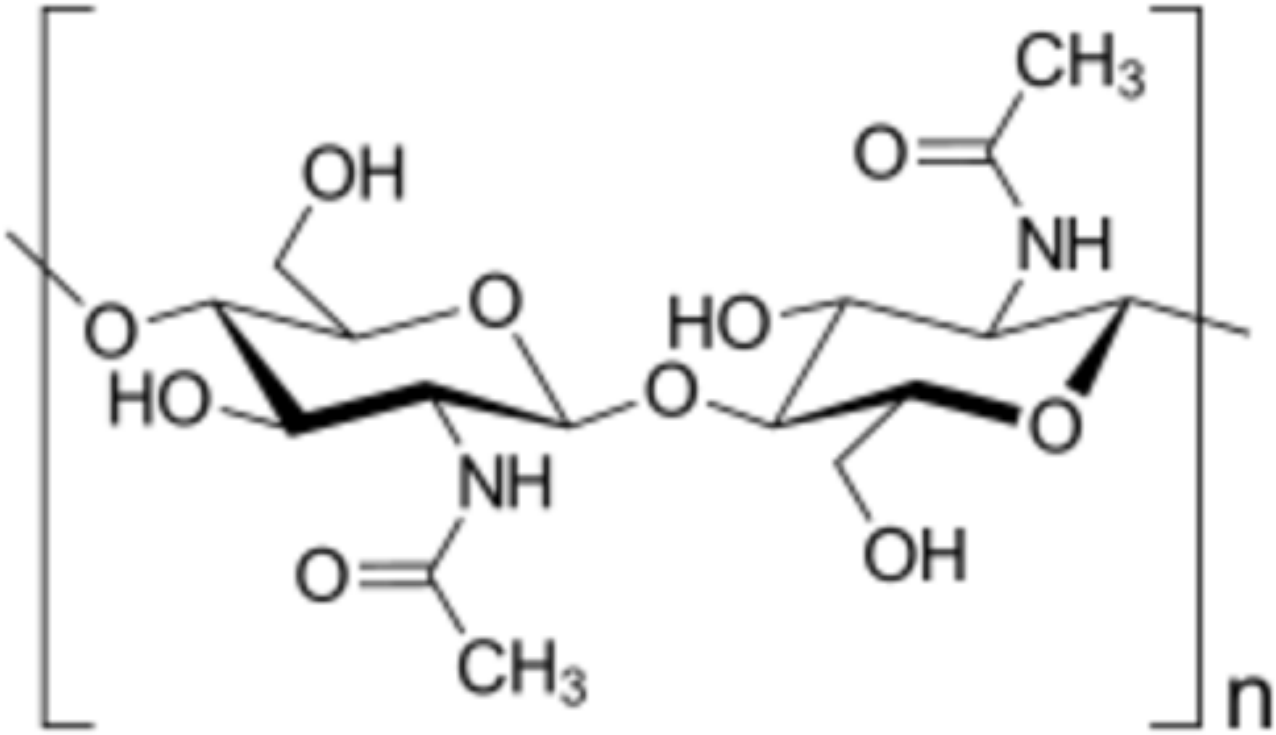
Cellulose



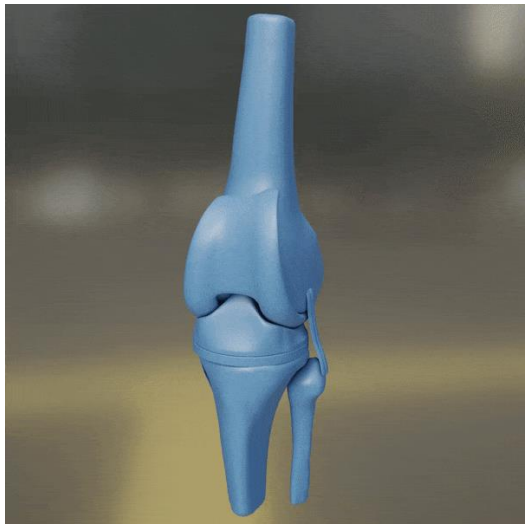


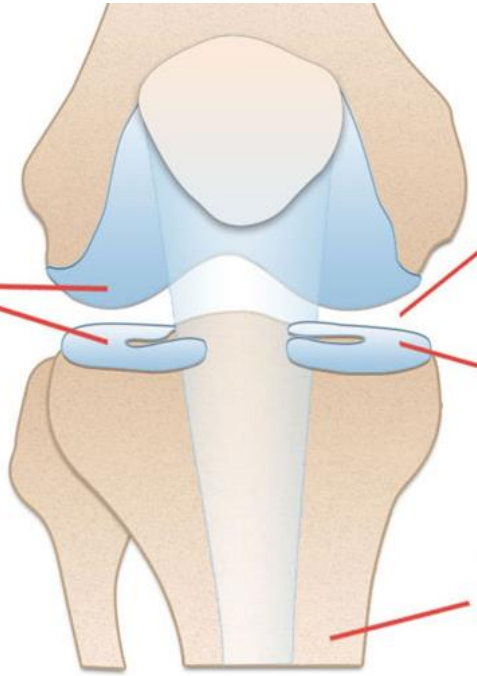
A strand of cellulose (conformation I_α), showing the hydrogen bonds (dashed) within and between cellulose molecules.


Photo: Hadi Ansarihadipour



Structure of the chitin molecule, showing two of the *N*-acetylglucosamine units that repeat to form long chains in β-(1→4)-linkage.





MSM
(Methylsulfonylmethane)

Sulphur donator that increases rebuilding of all damaged connection tissue.

CHONDROITIN

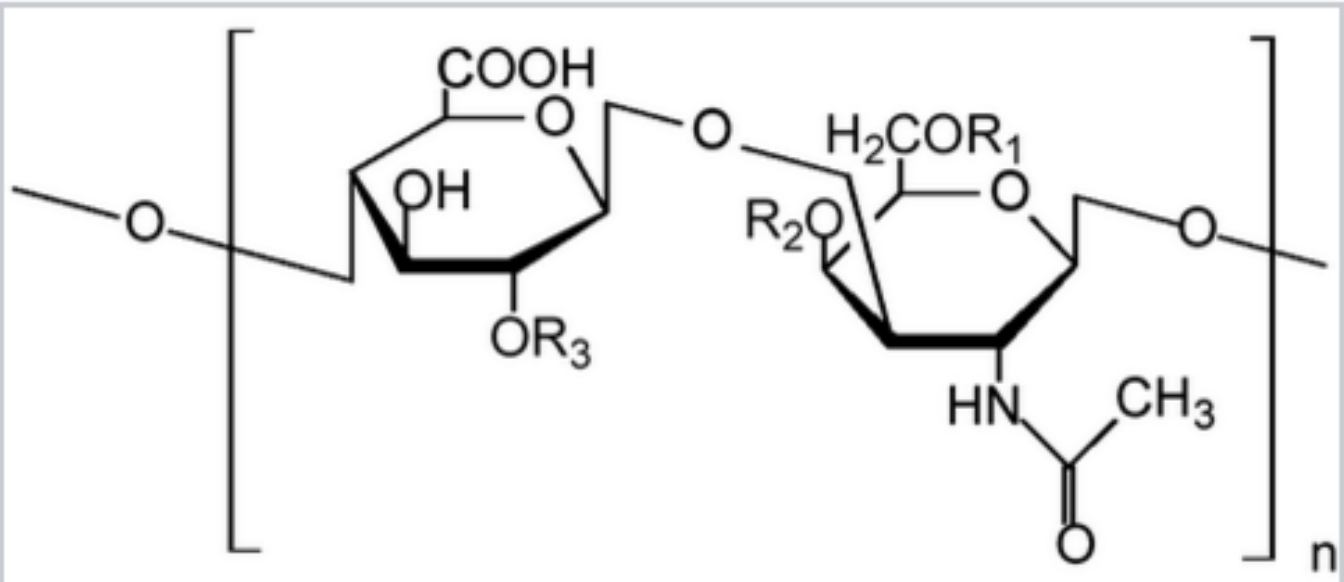
Chondroitin increases synovial fluid for more joint lubrication.

GLUCOSAMINE

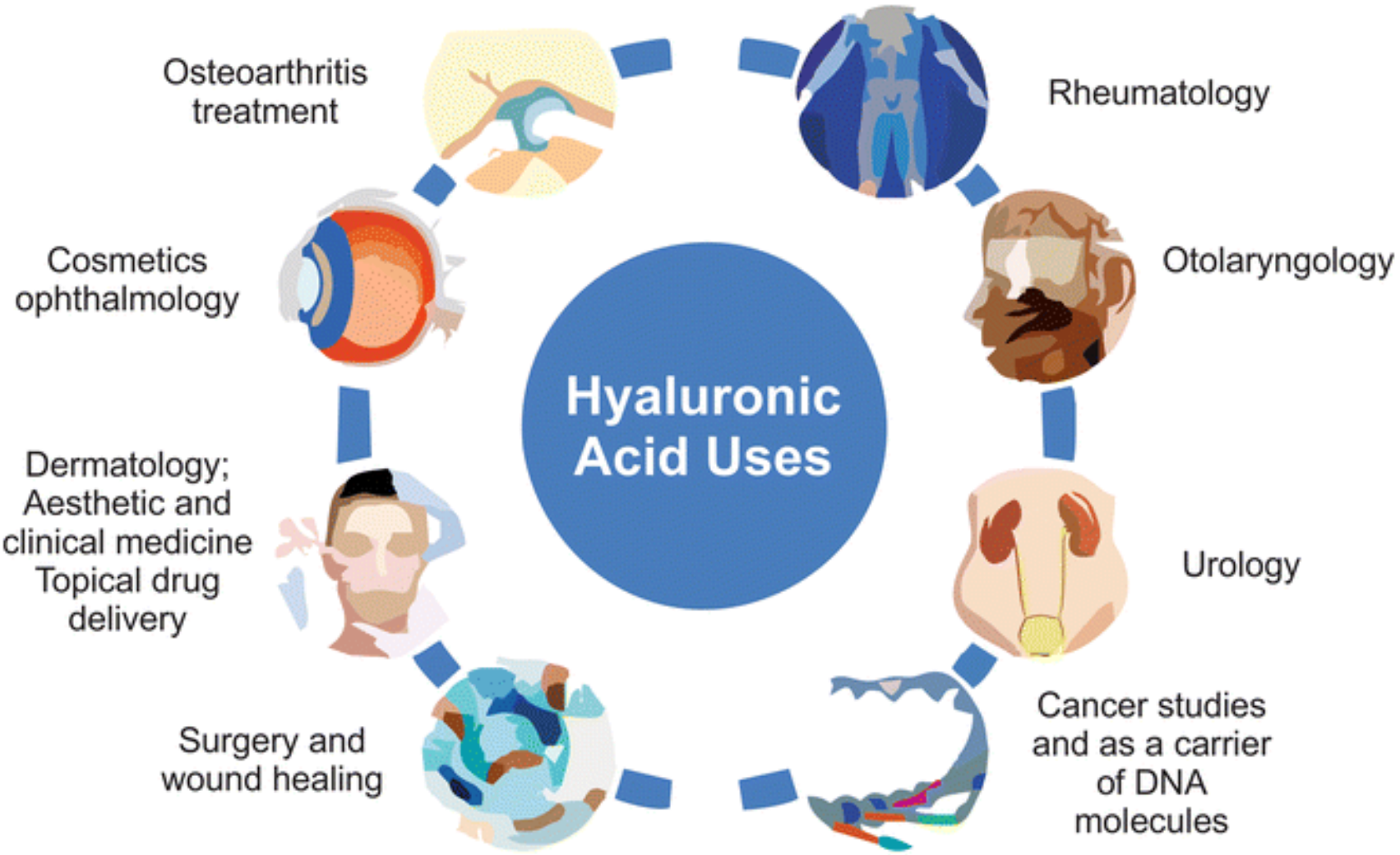
Combined with chondroitin increases regrowth of damaged cartilage.

BORON

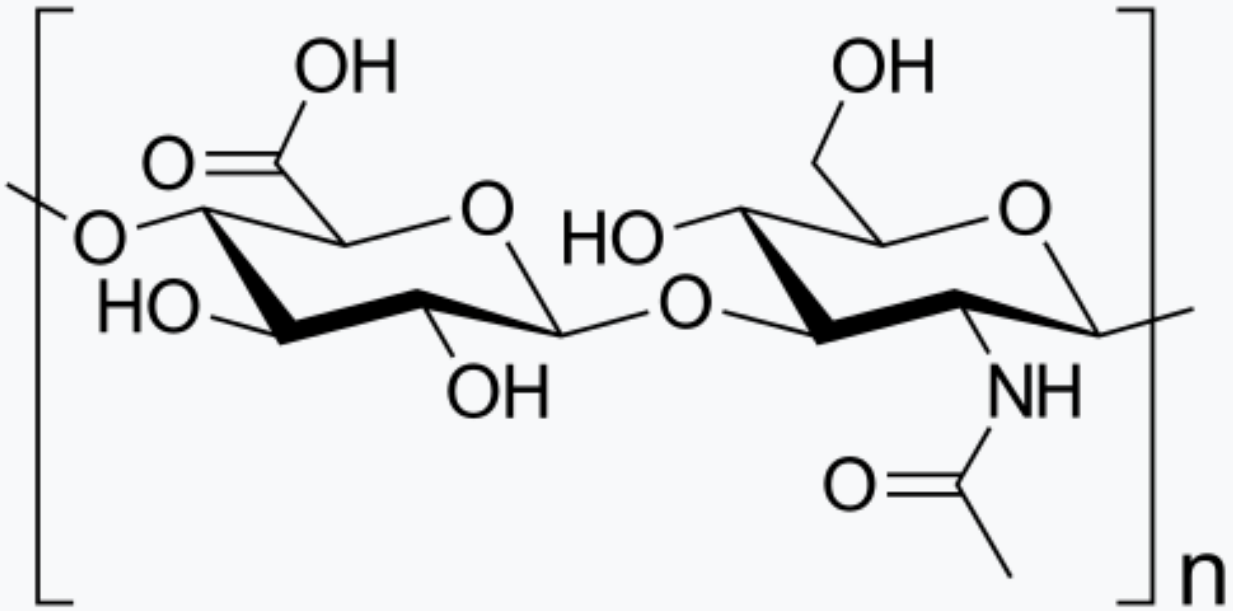
Increases calcium uptake in bone to increase bone strength.



Chemical structure of one unit in a chondroitin sulfate chain. Chondroitin-4-sulfate: R_1 = H; R_2 = SO_3H; R_3 = H. Chondroitin-6-sulfate: R_1 = SO_3H; R_2, R_3 = H.

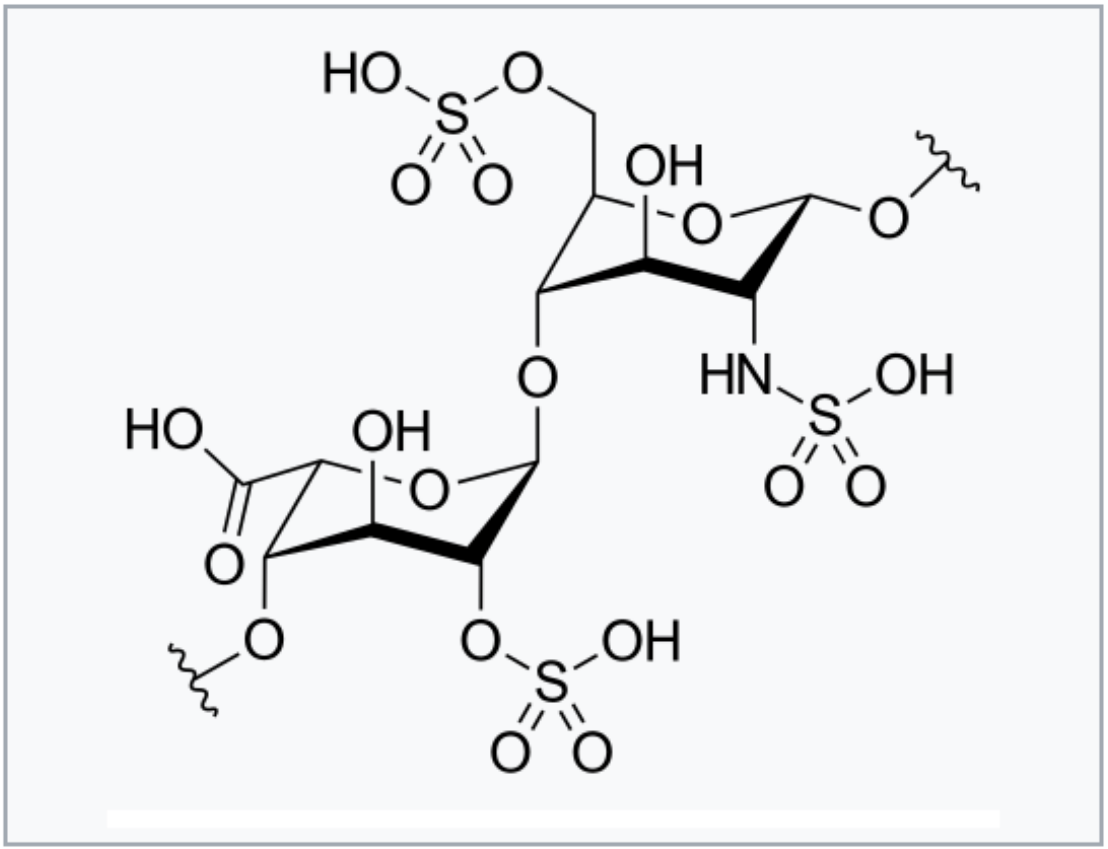

Hyaluronic Acid Uses
Osteoarthritis treatment
Rheumatology
Cosmetics ophthalmology
Otolaryngology
Dermatology; Aesthetic and clinical medicine Topical drug delivery
Urology
Surgery and wound healing
Cancer studies and as a carrier of DNA molecules

Hyaluronic acid



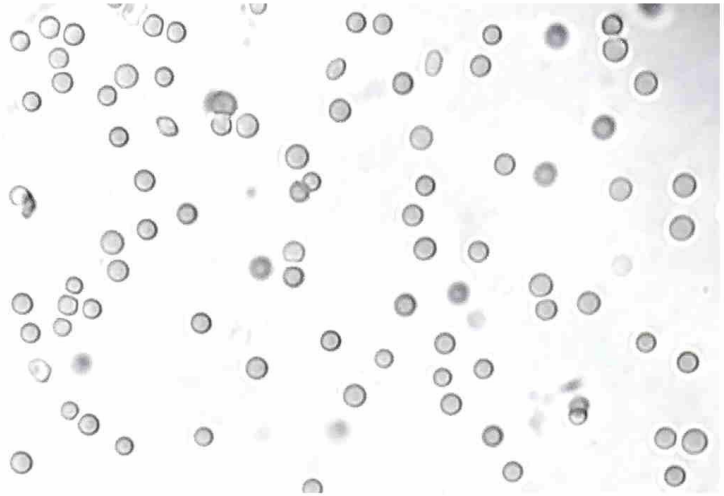

Heparin Sodium
For I.V. or S.C. use
1 ml contains:
Heparin Sodium (mucosa)
Benzyl Alcohol
Sodium Chloride, Water for
Injections
B BRAUN

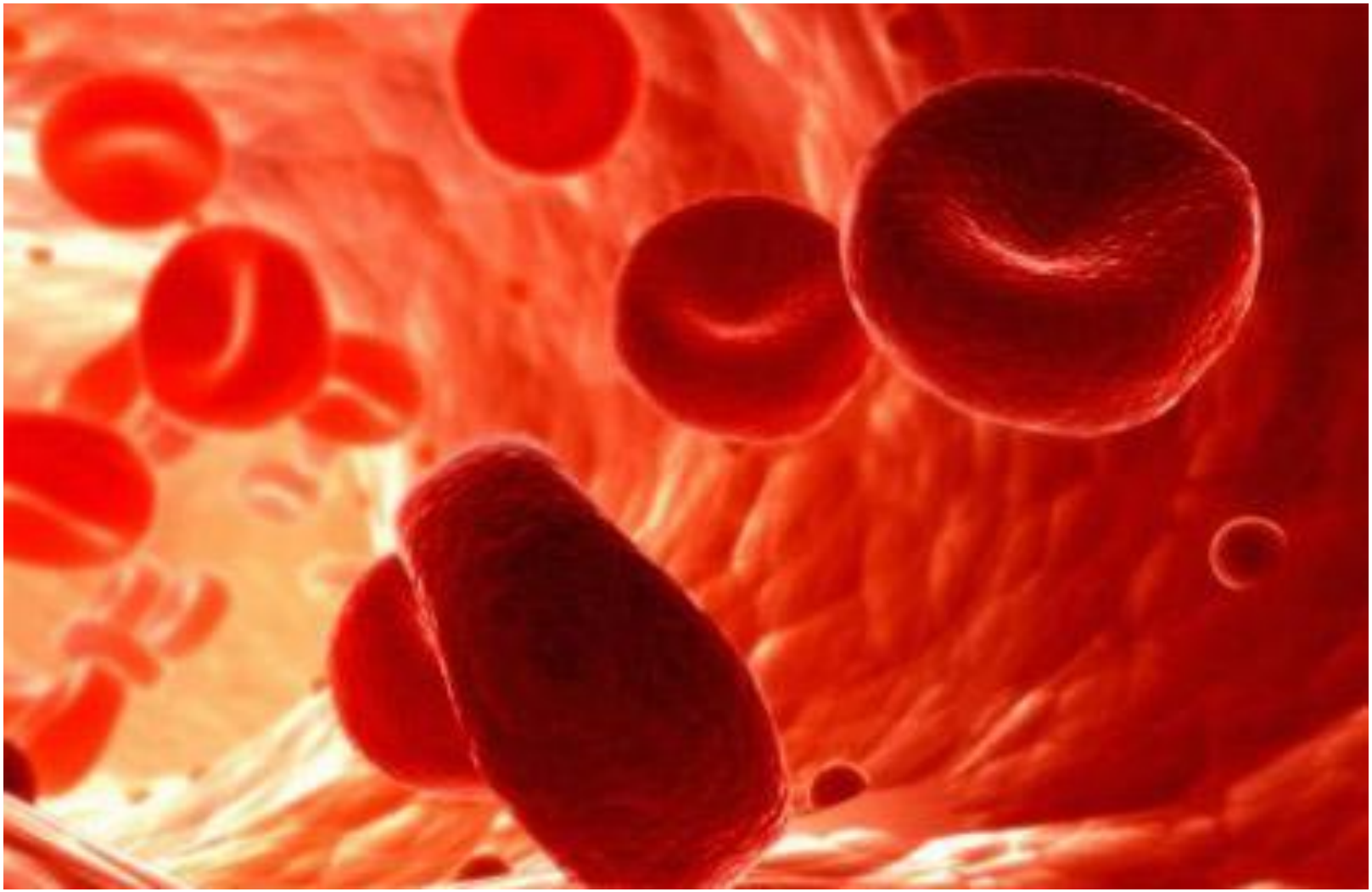
Heparin

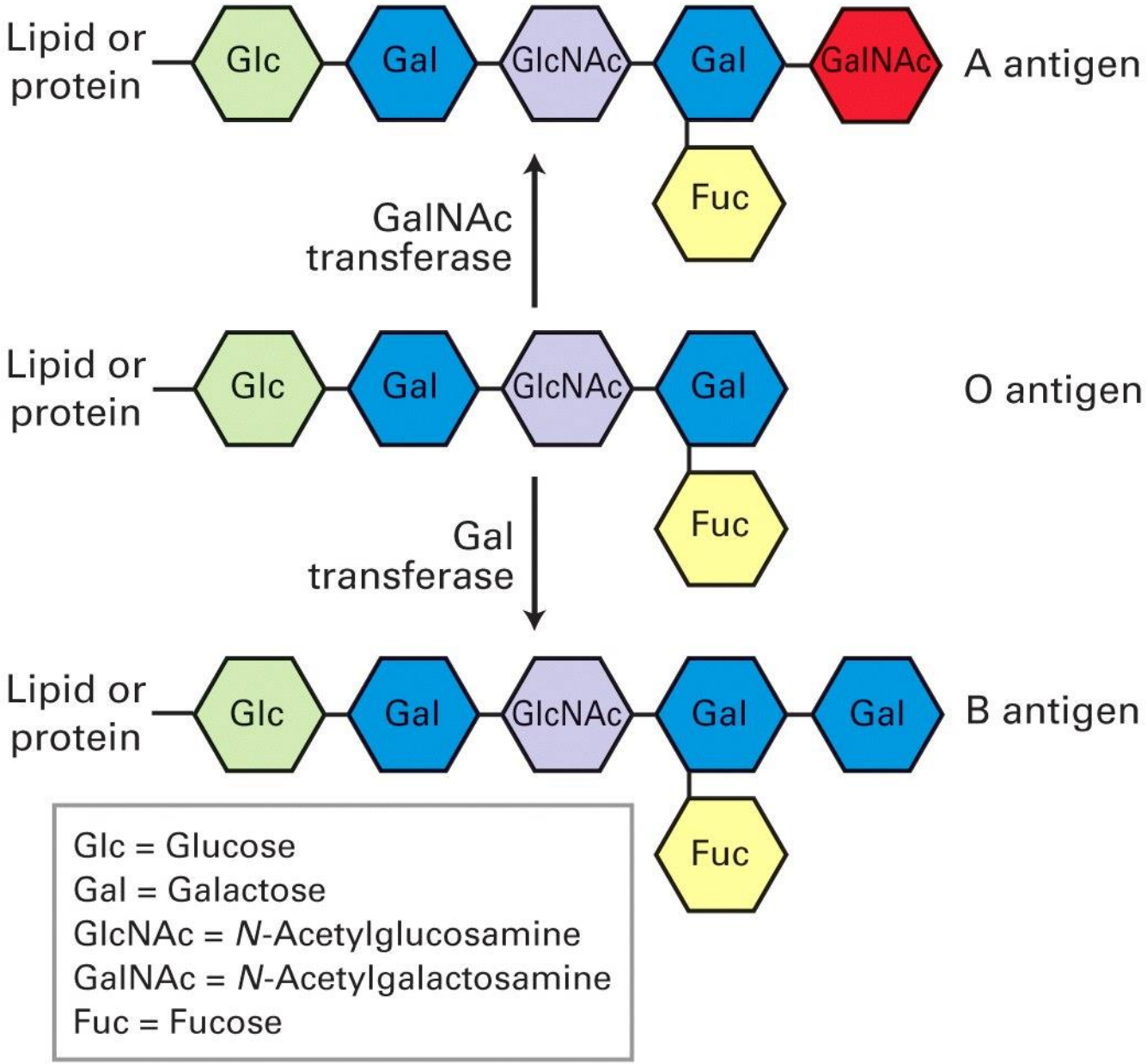

HO
S
O
O
O
OH
O
O
HN
S
OH
O
O
HO
OH
O
O
O
O
S
OH
O
O

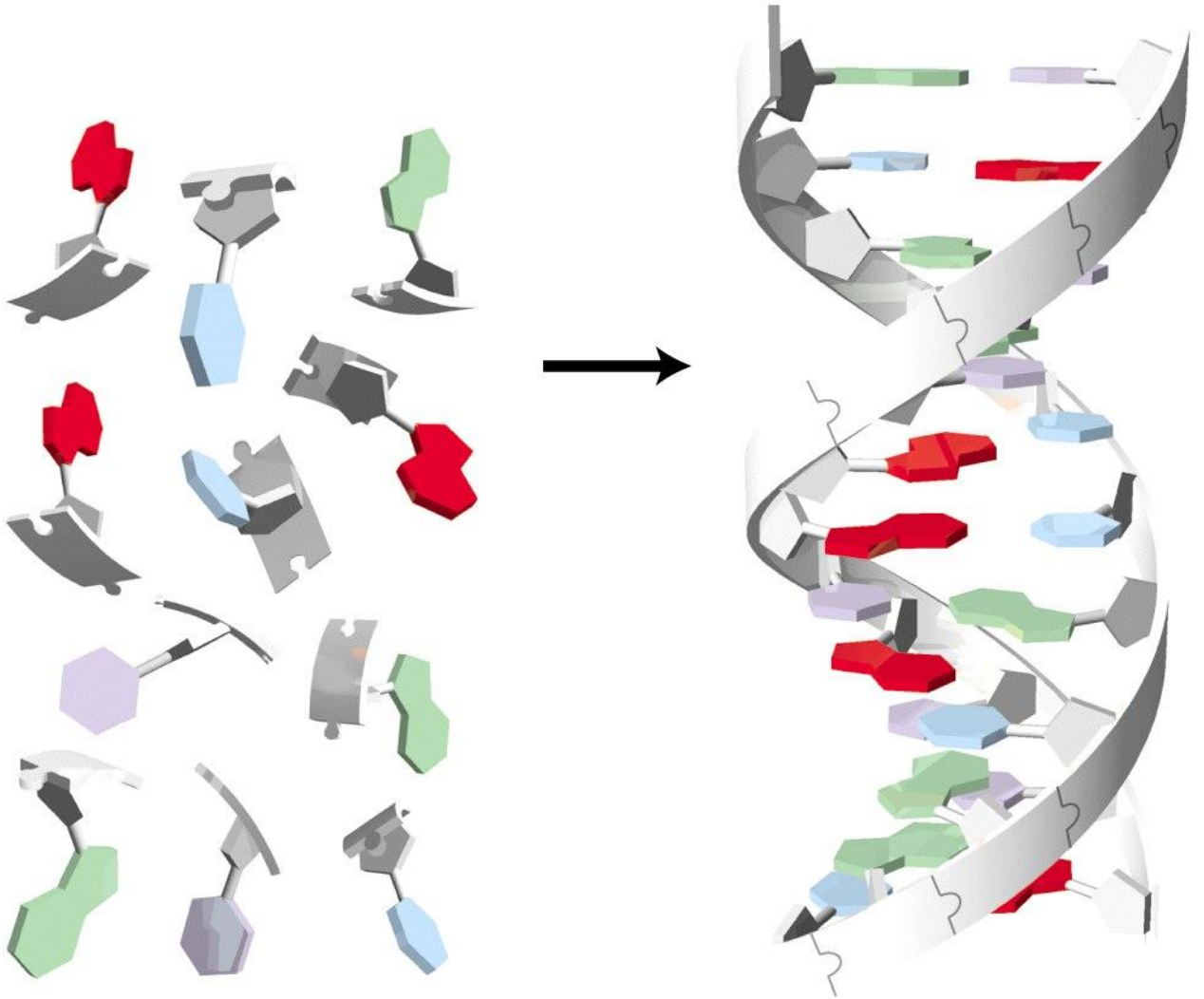

Heparin Sodium
For I.V. or S.C. use
1 ml contains:
Heparin Sodium (mucosa)
Benzyl Alcohol
Sodium Chloride, Water for
Injections
B BRAUN

1000 ul DMSO (50%) + 10 ul whole blood sample
Aug 27, 2023






Lipid or protein
Glc
Gal
GlcNAc
Gal
GalNAc
A antigen
Fuc
GalNAc transferase
Lipid or protein
Glc
Gal
GlcNAc
Gal
O antigen
Fuc
Gal transferase
Lipid or protein
Glc
Gal
GlcNAc
Gal
Gal
B antigen
Fuc
Glc = Glucose
Gal = Galactose
GlcNAc = N-Acetylglucosamine
GalNAc = N-Acetylgalactosamine
Fuc = Fucose



Small molecule subunits

Macromolecule