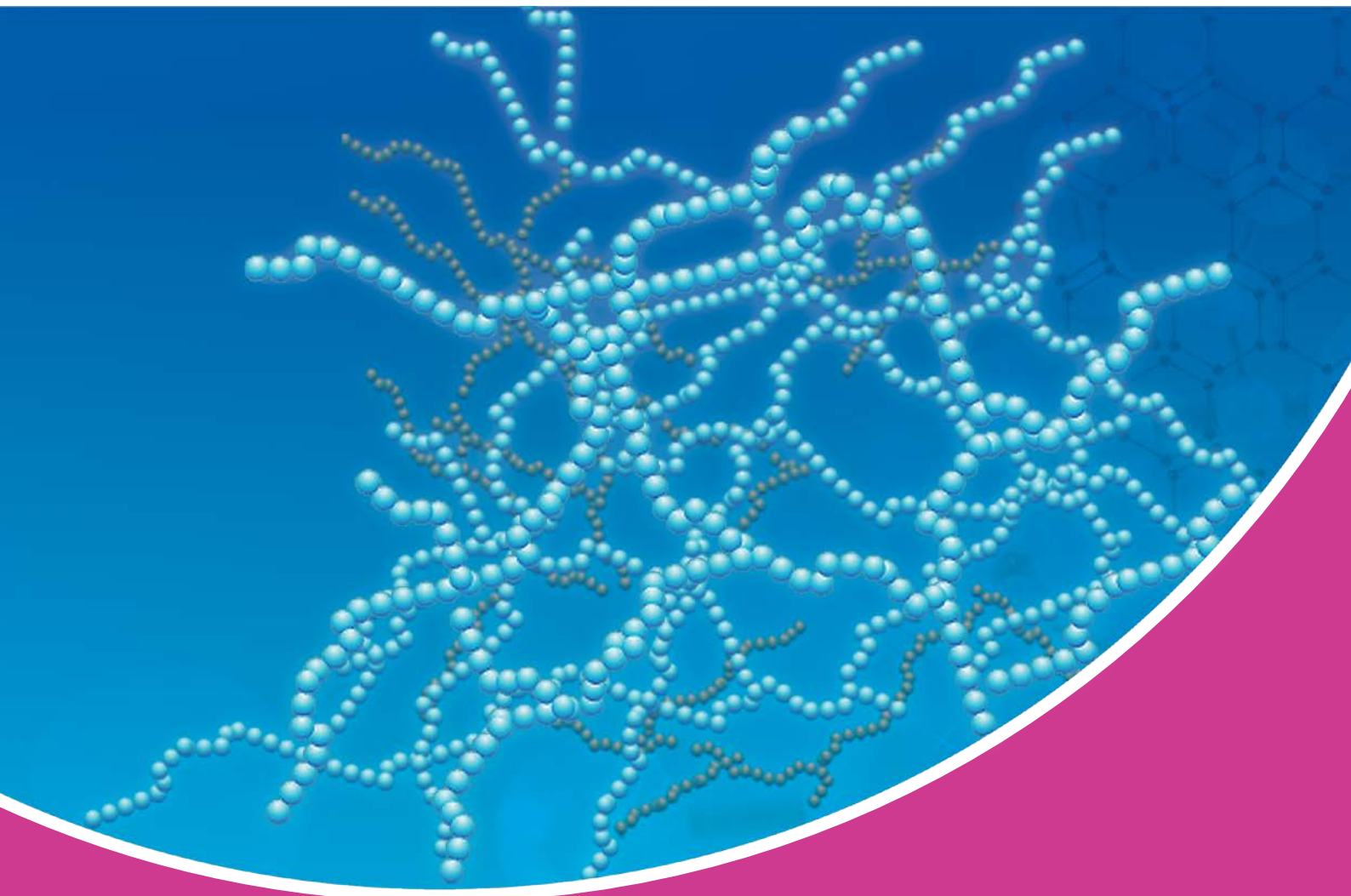
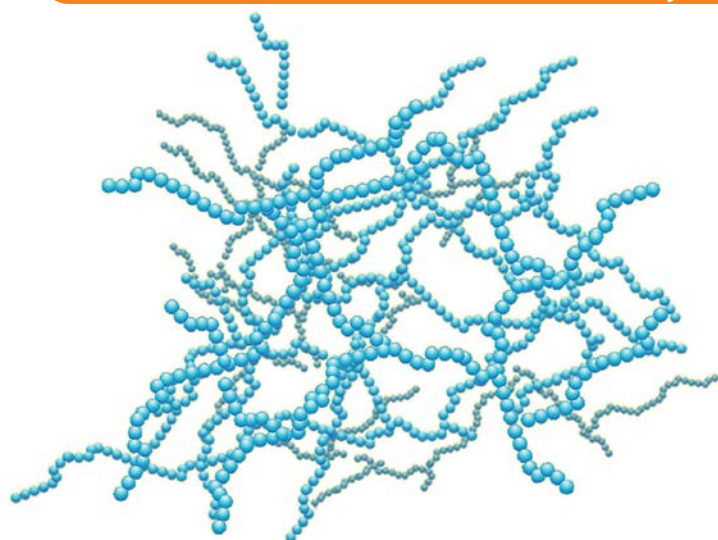


Natural Polysaccharides / Chemically Modified Polysaccharides Series



Neutral Polysaccharides



Neutral polysaccharides are composed of neutral monosaccharides such as glucose and xylose linked by glycosidic bonds and are polymerized as macromolecules in the range of thousands to millions. They are known to exhibit various properties depending on the type of composed monosaccharides, the bonding position, the presence / absence of side chains / branches, and so on. Since these polysaccharides have many hydroxyl groups (OH), they show affinity for water molecules. They act as hydrophilic colloids holding a large number of water molecules due to their properties. For industrial use, they are widely used for various purposes such as dispersion stabilization, suspension stabilization, viscosity imparting, gel-forming ability, film-forming feature, and adhesive effect.

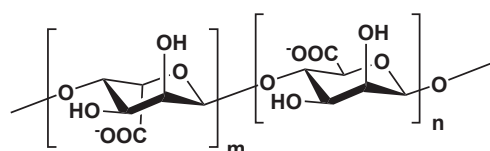
Product No.	Product Name	Main Chain Linkages ‡	Constituent Monosaccharides ‡
A0456	Amylopectin	α 1-4, [Branches α 1-6]	Glc
D1449	Dextran	α 1-6	Glc
L0088	Laminaran	β 1-3, [Branches β 1-6]	Glc
P0978	Pullulan	α 1-4 and α 1-6	Glc α 1-6 bonds of (Glc α 1-4 Glc α 1-4 Glc) unit
X0078	Xylan	β 1-4, [Side chains α 1-2, α 1-3]	Main chains: Xyl Side chains: Ara, 4-O-Me-GlcA
C0072	Chitin	β 1-4	GlcNAc

‡ Since polysaccharides are heterogeneous compounds, representative main chain linkages and constituent monosaccharides are shown.

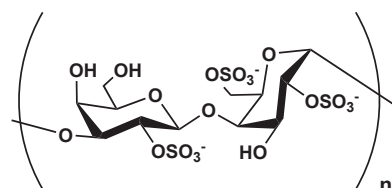
Amylopectin (Amylose free), from Waxy Corn	25g / 500g	[A0456]
(+)-Arabinogalactan from Larch Wood	25g / 100g	[A1328]
Curdlan	5g / 25g	[C3859]
Chitin	25g / 250g	[C0072]
Dextran 40 (Mw.=ca. 40,000)	25g / 100g / 500g	[D1448]
Dextran 70 (Mw.=ca. 70,000)	25g / 100g / 500g	[D1449]
Dextrin	100g / 500g	[D4657]
Dextrin (Soluble fiber)	100g / 500g	[D5658]
Glucan from Black Yeast	1g / 5g	[G0331]
Guar Gum	25g / 500g	[G0478]
Inulin (by Enzymatic synthesis)	25g / 500g	[I1067]
Konjac Glucomannan	25g / 100g	[K0075]
Laminaran from <i>Eisenia Bicyclis</i>	1g / 25g	[L0088]
Pullulan	5g / 100g / 500g	[P0978]
Tamarind Gum from Tamarind seed, Polysaccharide	25g / 500g	[T0909]
Xylan from Corn Core	25g / 100g	[X0078]

Acidic Polysaccharides (Polysaccharides containing carboxy groups and sulfate groups)

Acidic polysaccharides contain a lot of uronic acids (a compound in which the terminal hydroxy group [-CH₂OH] of aldohexose is oxidized to a carboxy group [-COOH]) and several sulfate groups (a compound in which the hydroxy group [-OH] of aldohexose is dehydrated condensation with sulfuric acid). These polysaccharides are thought to function with mechanisms that maintain the structure of plant tissues and protect them from exogenous substances. Polyuronic acid-containing pectin and gum arabic are found in land plants while polyuronic acid-containing alginic acid, sulfate group-containing carrageenan and fucoidan are obtained from seaweeds. For practical use, they are widely used for purposes such as imparting viscosity, adhesive effect, dispersion stabilization, aggregation suppression, protein stabilization, and gel-forming ability.



Alginic Acid
[A0733]



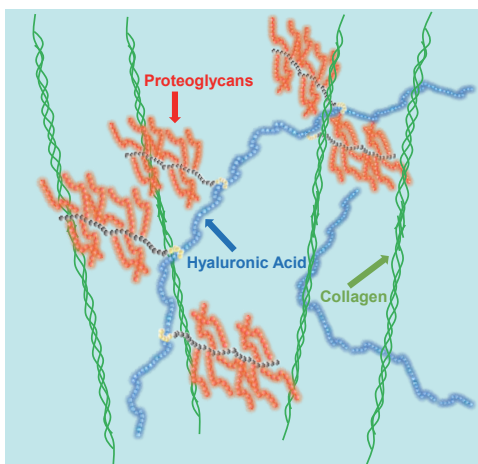
λ-Carrageenan
[C3313]

Product No.	Product Name	Main Chain Linkages ‡	Constituent Monosaccharides ‡
A0733	Alginic Acid	β1-4	ManA, GulA
P0024	Pectin	α1-4	GalA, GalA[COOMe]
X0048	Xanthan Gum	β1-4, [Side chains α1-3]	Main chains: Glc Side chains: Man, GlcA
C1804	κ-Carrageenan	α1-3Gal(4S)β1-4Anhydro-Gal	Gal(4S), 3,6-Anhydro-Gal
C1805	ι-Carrageenan	α1-3Gal(4S)β1-4Anhydro-Gal(2S)	Gal(4S), 3,6-Anhydro-Gal(2S)
C3313	λ-Carrageenan	α1-3Gal(2S)β1-4Gal(2S, 6S)	Gal(2S, 6S), Gal(2S)

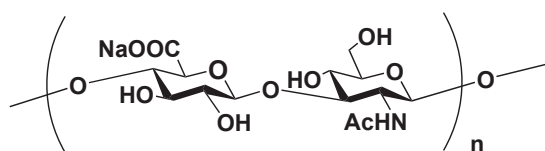
‡ Since polysaccharides are heterogeneous compounds, representative main chain linkages and Constituent monosaccharides are shown. The sulfate group in parenthesis is the OH position that can be introduced.

Alginic Acid	25g / 500g [A0733]
Alginic Acid Sodium Salt 100-200	25g / 500g [A0205]
Alginic Acid Sodium Salt 300-400	25g / 500g [O0583]
Alginic Acid Sodium Salt 500-600	25g / 500g [O0584]
Alginic Acid Sodium Salt 800-900	25g / 500g [O0585]
Alginic Acid Calcium Salt	25g / 500g [A0738]
Arabic Gum	100g [A3553]
κ-Carrageenan	25g / 500g [C1804]
ι-Carrageenan	25g / 500g [C1805]
λ-Carrageenan (Low-viscosity)	1g / 5g [C2871]
λ-Carrageenan (High-viscosity)	25g / 500g [C3313]
Pectin from Citrus	25g / 500g [P0024]
Xanthan Gum	25g / 100g / 500g [X0048]

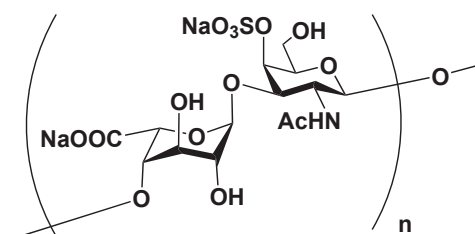
Acidic Polysaccharides (Glycosaminoglycans)



Glycosaminoglycans (GAGs) are long linear polysaccharides that form repeating disaccharide structures and have long been studied as systematic names for mucopolysaccharides. It is well known that it functions as a molecule of the extracellular matrix to support tissues present throughout the body. Due to their negative charge and binding to bioactive molecules, GAGs are intimately involved in the regulation of many cellular functions. In vivo, hyaluronic acid (HA) generally exists as a free sugar chain, but chondroitin sulfate (CS), dermatan sulfate (DS), keratan sulfate (KS), and heparan sulfate (HS) have sulfate group modifications in their internal structures, bind to coreproteins as side chains varying lengths. GAG-modified protein molecules are called proteoglycans (PG).



Hyaluronic Acid Sodium Salt from Bacteria
[H1791]



Dermatan Sulfate Sodium Salt
[D3672]

Product No.	Product Name	Main Chain Linkages ‡	Constituent Monosaccharides ‡
H1791	Hyaluronic Acid Sodium Salt	β 1-4GlcA β 1-3GlcNAc	GlcNAc, GlcA
D3672	Dermatan Sulfate Sodium Salt	β 1-4IdoA β 1-3GalNAc(4S)	GalNAc(4S), IdoA
C0335	Chondroitin Sulfate Sodium Salt	β 1-4GlcA β 1-3GalNAc(4S or 6S)	GalNAc(4S or 6S), GlcA
H0393	Heparin Sodium Salt	α 1-4GlcA or IdoA(2S) β 1-3GlcNAc(NS, 3S, 6S)	GlcNAc(NS, 3S, 6S), GlcA, IdoA(2S)

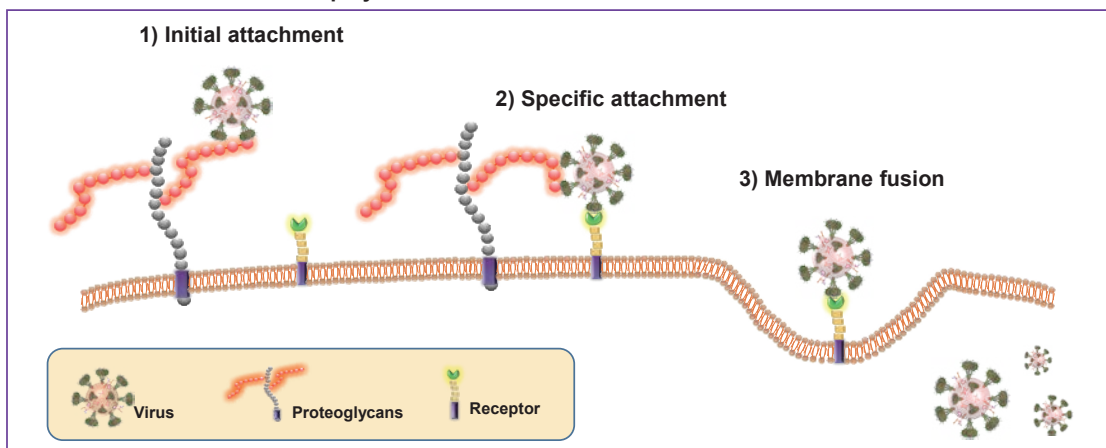
‡ Since polysaccharides are heterogeneous compounds, representative main chain linkages and constituent monosaccharides are shown. The sulfate group in parenthesis is the OH position that can be introduced.

Chondroitin Sulfate Sodium Salt	25g / 100g [C0335]
Dermatan Sulfate Sodium Salt	20mg / 100mg [D3672]
Heparin Sodium Salt from Hog intestine	100mg / 1g [H0393]
Hyaluronic Acid from Cockscomb	1g [H0595]
Hyaluronic Acid Sodium Salt from Cockscomb	100mg / 1g [H0603]
Hyaluronic Acid Potassium Salt from Cockscomb	1g [H0652]
Hyaluronic Acid from Bacteria	1g [H1807]
Hyaluronic Acid Sodium Salt from Bacteria	100mg / 1g [H1791]
Hyaluronic Acid Potassium Salt from Bacteria	1g [H1808]

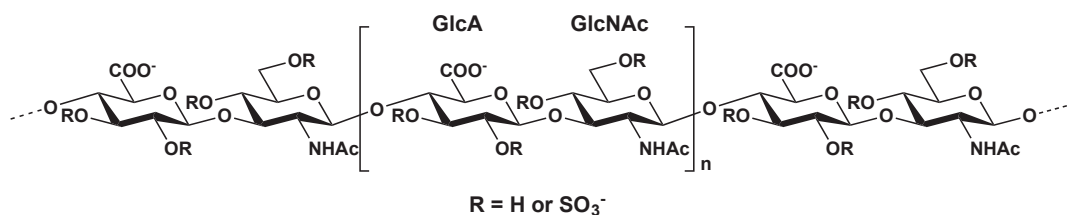
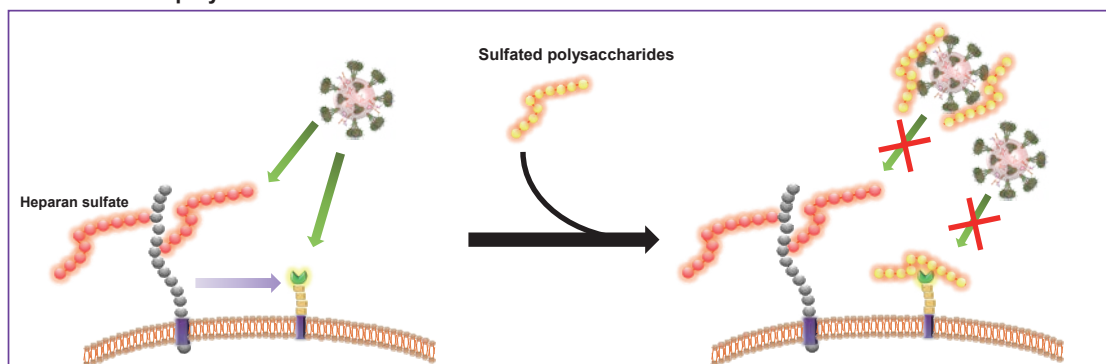
Chemically Modified Polysaccharides (Sulfated Polysaccharides)

Sulfated polysaccharides are known as multifunctional polysaccharides, that are related in physiological functions on the cell surface *in vivo*. These polysaccharides have supportive effects of viral infections. It has been reported that chemical mimics of sulfated polysaccharides inhibit viral adhesion during infection step.

Virus Infection via membrane polysaccharide



Inhibition with polysaccharide



Hyaluronic Acid, High-Sulfated [H1739]

Product No.	Product Name	Main Chain Linkages ‡	Constituent Monosaccharides ‡
H1739	Hyaluronic Acid, High-Sulfated	β1-4GlcA(2S, 3S)β1-3GlcNAc(4S, 6S)	GlcNAc(4S, 6S), GlcA(2S, 3S)
D5144	Dextran Sulfate Sodium	Glc(2S, 3S, 4S)α1-6Glc(2S, 3S, 4S)	Glc(2S, 3S, 4S)

‡ Since polysaccharides are heterogeneous compounds, representative main chain linkages and constituent monosaccharides are shown. The sulfate group in parenthesis is the OH position that can be introduced.

- Dextran Sulfate Sodium from Dextran of Mw. Approx. 8000** 25g [D5143]
- Dextran Sulfate Sodium from Dextran of Mw. Approx. 40000** 5g / 25g [D5144]
- Hyaluronic Acid, High-Sulfated** 10mg [H1739]
- Hyaluronic Acid, Low-Sulfated** 10mg [H1740]

Other Chemically Modified Polysaccharides

Carboxymethyl Celluloses

Carboxymethyl Cellulose Sodium Salt (n=approx. 500)	25g / 500g [C0045]
Carboxymethyl Cellulose Sodium Salt (n=approx. 1,050)	25g / 500g [C0603]

Carboxymethyl Dextrans

Carboxymethyl Dextran Sodium Salt (<i>M_w</i> =ca. 10,000)	1g / 5g [C3250]
Carboxymethyl Dextran Sodium Salt (<i>M_w</i> =ca. 40,000)	1g / 5g [C3251]

Hydroxyethyl Celluloses

Hydroxyethyl Cellulose (200-300mPa·s, 2% in Water at 20°C)	25g / 500g [H0242]
(800-1,500mPa·s, 2% in Water at 20°C)	25g / 500g [H0418]
(4,500-6,500mPa·s, 2% in Water at 25°C)	25g / 500g [H0392]

Hydroxypropyl Celluloses

Hydroxypropyl Cellulose (3-6mPa·s, 2% in Water at 20°C)	25g / 500g [H0473]
(6-10mPa·s, 2% in Water at 20°C)	25g / 500g [H0474]
(150-400mPa·s, 2% in Water at 20°C)	25g / 500g [H0386]
(1,000-4,000mPa·s, 2% in Water at 20°C)	25g / 500g [H0475]

Methyl Celluloses

Methyl Cellulose (13-18mPa·s, 2% in Water at 20°C)	25g / 500g [M0290]
(20-30mPa·s, 2% in Water at 20°C)	25g / 500g [M0291]
(80-120mPa·s, 2% in Water at 20°C)	25g / 500g [M0292]
(350-550mPa·s, 2% in Water at 20°C)	25g / 500g [M0293]
(1,000-1,800mPa·s, 2% in Water at 20°C)	25g / 500g [M0294]
(3,500-5,600mPa·s, 2% in Water at 20°C)	25g / 500g [M0185]
(7,000-10,000mPa·s, 2% in Water at 20°C)	25g / 500g [M0295]

Ethyl Celluloses

Ethyl Cellulose (9-11mPa·s, 5% in Toluene + Ethanol (80:20) at 25°C)	25g / 500g [E0265]
(18-22mPa·s, 5% in Toluene + Ethanol (80:20) at 25°C)	25g / 500g [E0072]
(45-55mPa·s, 5% in Toluene + Ethanol (80:20) at 25°C)	25g / 500g [E0266]
(90-110mPa·s, 5% in Toluene + Ethanol (80:20) at 25°C)	25g / 500g [E0290]

Other Oligosaccharides

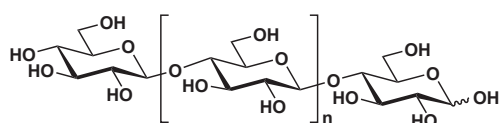
Chitosans

Chitosan (5-20mPa·s, 0.5% in 0.5% Acetic Acid at 20°C)	25g / 100g / 500g [C2395]
(20-100mPa·s, 0.5% in 0.5% Acetic Acid at 20°C)	25g / 100g [C2396]
(200-600mPa·s, 0.5% in 0.5% Acetic Acid at 20°C)	25g / 500g [C0831]

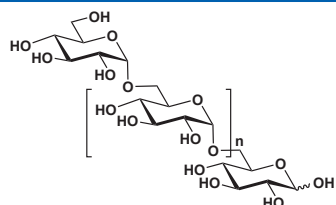
Related Oligosaccharides

 Oligosaccharide Series
from Natural Resources

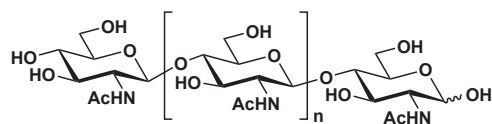
- Highly purified products by column chromatography
- An exclusively unique variety of oligosaccharide series
- Lineup of stepwise glycan length for analytical standards and functional research

 Cello-oligosaccharides [Glcβ(1-4)]_n-Glc


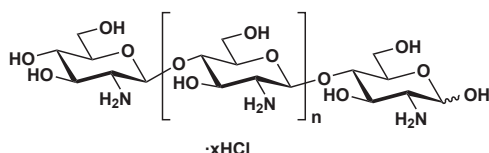
D-(+)-Cellobiose	5g / 25g [C0056]
Cellotriose	20mg [C2795]
Cellotetraose	10mg [C2796]
Cellopentaose	25mg [C2644]

 Isomalto-oligosaccharides [Glcα(1-6)]_n-Glc


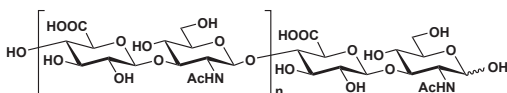
Isomaltose	100mg / 1g [I0231]
Isomaltotriose	100mg / 1g [I0329]
Isomaltotetraose	50mg [I0855]
Isomaltopentaose	50mg [I0854]

 N-Acetyl Chito-oligosaccharides [GlcNAcβ(1-4)]_n-GlcNAc


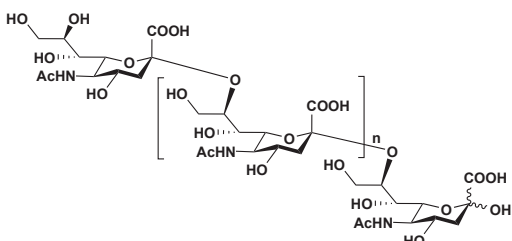
N,N'-Diacetylchitobiose	20mg [D4215]
N,N',N''-Triacetylchitotriose	20mg [T2912]
N,N',N'',N'''-Tetraacetylchitotetraose	10mg [T2910]
N,N',N'',N''',N''''-Pentaacetylchitopentaose	10mg [P2027]

 Chito-oligosaccharides [GlcNH₂β(1-4)]_n-GlcNH₂


Chitobiose Dihydrochloride	25mg [C3679]
Chitotriose Trihydrochloride	25mg [C2642]
Chitopentaose Pentahydrochloride	25mg [C3678]

 Hyaluronan-oligosaccharides [GlcAβ(1-3)GlcNAcβ(1-4)]_n-GlcAβ(1-3)GlcNAc


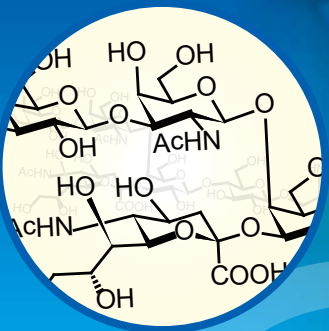
Hyaluronate Tetrasaccharide	1mg / 5mg [H1284]
Hyaluronate Hexasaccharide	1mg / 5mg [H1285]
Hyaluronate Octasaccharide	1mg [H1148]
Hyaluronate Decasaccharide	1mg [H1149]
Hyaluronate Dodecasaccharide	1mg [H1666]

 Colominic acid-oligosaccharides [Neu5Acα(2-8)]_n-Neu5Ac


N-Acetylneuraminic Acid Dimer α(2-8)	10mg [N1163]
N-Acetylneuraminic Acid Trimer α(2-8)	10mg [N1164]
N-Acetylneuraminic Acid Tetramer α(2-8)	5mg [N1165]
N-Acetylneuraminic Acid Pentamer α(2-8)	5mg [N1166]

Glycoscience

Sugar chains



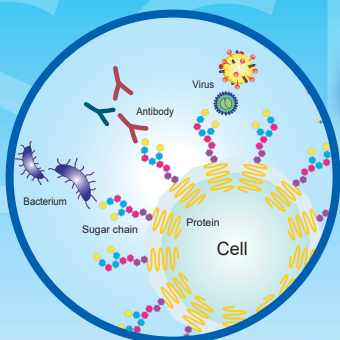
- Functional oligosaccharides
- Various sugar blocks at 10-100kg
- Synthetic technology with high-quality
- Application of sugar-conjugates

Enzymes



- Transfer of the intact oligosaccharide
- Glycohydrolase and the substrates

Antibodies & Lectins



- Antiglyco antibodies for Lewis, glycolipids, glycosaminoglycans
- Fucose specific lectins

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