

Oligo Chitosan as Super Natural Antimicrobial Agent

● Microbial / Inhibition : 50ppm → 99.99%

Staphylococcus aureus 、 *Esherichia Coli* 、
Listeria monocytogenes 、 *Pseudomonase aeruginosa* 、
Vibrio parahaemolyticus 、 Yeasts etc.

● Applications

Food Industry 、 Vegetable 、 Cosmetics 、
Textile/Diaper/Sanitary Napkin 、 Water Sanitation/Aquiculture
、 Agriculture 、 Detergent 、 Dye/Laundry 、 Packing



Chitosan is a natural biopolymer produced by the deacetylation of chitin, a major component of the shells of crustaceans such as crab, shrimp, and crawfish. Although chitosan is known to have important functional activities, poor solubility makes them difficult to use in food and medicinal applications.

Chitosan oligosaccharides (COS), also called oligo chitosan or chitooligosaccharides, are normally enzymatic products hydrolyzed from chitosan. Because of its water solubility, COS has attracted the interest of many food and nutrition researchers. Recent studies^{1,2} indicate that the advantages of COS include antimicrobial, hypocholesterolemic, immunity-enhancing properties. COS accelerates calcium and iron absorption, and therefore can be useful in the delivery of drugs. COS has antitumor, anti-inflammatory, radio-protective, and antioxidant properties. COS can exclude toxins from the intestines, reduce heavy metal poisoning, as well as prevent tooth decay and tooth-related diseases. In spite of all these benefits, unstable and expensive enzymatic processing and purification steps make COS cost-prohibitive for many applications. Moreover, its astringent taste prevents any wide adoption by the beverage industry.

COS 600 & Super

Simpson Biotech is proud to announce the release of its first industrial scale, water soluble, ultra-low molecular (ULM) weight series of COS products. COS-600 and COS-600 Super are the two products with the chitobiose plus chitotriose content that occupy more than 65% and 95% of the products' total weight. Moreover, neither of the two COS products contain the usual astringent taste. Because chitobiose and chitotriose were reported to be the only 2 COS small enough to be absorbed by the gastrointestinal tract and skin within one hour, COS-600 has great potential in medicinal, cosmetic, and food applications as a source of anti-inflammatory and anti-oxidant activity.

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Oligo-Chitosan Hydrolyzation Platform & Service (OCHPS)

In addition to COS-600, Simpson Biotech is also releasing a "Low Molecular" product line called COS-LM. These products are water soluble, but are made up of several bigger, evenly distributed chitooligomers. According to previous research, bigger molecular weight COS (or degree of polymerization, DP) normally means better anti-microbial activity and immune stimulation.

COS-LM – The Natural Antimicrobial Agent

The COS-LM can effectively suppress the proliferation of most gram positive microbials, most of yeast and many gram negative microbials (see table) even at the concentration of 0.005%, ranking it among the best anti-microbial agents in its category. These characteristics can be leveraged for medicinal devices, plant vaccines as immune stimulation, horticulture and harvesting, and in the food sanitation industry.

Bacteria	Simpson Biotech ¹ COS-LM		LMWCOS ²		LMWC(1h) ³		Incubation (hrs)
	Concentration ppm	Inhibition(%)	Concentration ppm	Inhibition(%)	Concentration ppm	Inhibition(%)	
Bacillus cereus (G+)	50ppm	99.99*	-	-	1000ppm	100.0	20~24h
Bacillus subtilis (G+)	50ppm	99.99	1000 ppm	63.0	-	-	20~24h
Staphylococcus aureus (G+)	50ppm	99.99*	1000 ppm	93.0	-	-	20~24h
Listeria monocytogenes (G+)	50ppm	99.5*	-	-	-	-	20~24h
Esherichia coli (G-)	50ppm	99.99	1000 ppm	51.0	3000ppm	100.0	20~24h
Pseudomonase aeruginosa (G-)	50ppm	86.2*	1000 ppm	22.0	-	-	20~24h
Vibrio parahaemolyticus (G-)	50ppm	75.0*	-	-	-	-	20~24h
Candida utilis (yeast)	50ppm	99.99*	-	-	-	-	20~24h
Saccharomyces cerevisiae(yeast)	50ppm	99.99*	-	-	-	-	20~24h

Source*: Food Industry Research and Development Institute; 2: Carbohydrate Polymers 2001, 44, 71-76.; 3: Biomacromolecules 2007, 8, 566-572

Previous Research – COS (Chitobiose, Chitotriose and Low-molecular)

- N= Low-molecular: Anti-microbial (*Carbohydrate Polymers* 2001, 44, 71-76.)
- N= Low-molecular: Anti-microbial (*Biomacromolecules* 2007, 8, 566-572.)
- N=2 & 3 Reach max plasma conc. after 1 hr, per oral in rat (*Biol. Pharm. Bull.* p545, 2005)
- N=2 & 3 Act as antioxidants (hydroxyl radical scavenger) per oral (*Biol. Pharm. Bull.* p1326, 2003)
- N=2 & 3 Anti-inflammation, reduce CCL₄ induced hepatoinjury (*Biol. Pharm. Bull.* p1971, 2005)

- N=3 Hypertension (*Mar. Drugs* 2010, 8, p1080)
- N=3 Reduce postoperative intraperitoneal adhesion (*J. Vet Clin* 18(3):257, 2001)
- N=2,3-8 Prebiotic, inhibit pathogenic bacteria in intestine (*Anaerobe* 8(2002) 319-32; 食品科學, Vol.29, 4, 2008.)
- N=1-8 Prevent bone lost in rats. (*Oral Radiol* (2005)21:19-22)
- Review^{1,2}: 1. *Food Hydrocolloids* 25 (2011) p170; 2. *Carbohydrate Polymers* 62 (2005) p357