

Marine Biopolymer *Excellence*

Precision-grade chitin derivatives sourced from sustainable shrimp shell biorefinery operations in Odisha, India — backed by verified process standards.

Chitin-N

Chitosan

Chito-oligosaccharide (COS)

COS · NAG · Protein Hydrolysate Blend



The Functional Biopolymer Revolution

Chitin is the second most abundant natural polymer on Earth. Our biorefinery converts what was once discarded shrimp shell waste into a portfolio of high-value functional ingredients — each with documented industrial, agricultural, nutritional, and pharmaceutical utility.

Our products are traceable, sustainably sourced, and competitively positioned against synthetic and imported alternatives — offering Indian and global B2B buyers cost certainty, quality consistency, and supply chain confidence.



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Chitin — *Native Grade*

Poly- $[\beta-(1\rightarrow4)\text{-N-acetyl-D-glucosamine}]$ · CAS 1398-61-4

The primary structural polysaccharide extracted from crustacean exoskeleton, Chitin-N is a high-purity, minimally-processed polymer that serves as the foundational raw material for downstream applications in agriculture, biomedical engineering, water treatment, and industrial manufacturing.

DEGREE OF
ACETYLATION

> 85%

FORM

Powder / Flake

MOISTURE

≤ 10%

ASH CONTENT

≤ 2%

COLOUR

Off-white / Cream



AGRICULTURE

Soil Amendment & Plant Immunity Activator

Chitin incorporated into soil activates plant systemic resistance via the jasmonic acid signalling pathway — acting as a natural, non-toxic elicitor. It



INDUSTRIAL / CHEMICAL

Chitosan & COS Precursor Manufacturing

Native chitin is the primary feedstock for the deacetylation process that yields chitosan, and for enzymatic or acid hydrolysis to produce chito-



WATER TREATMENT

Heavy Metal & Dye Biosorption

Chitin's abundant hydroxyl and acetamido groups provide natural chelation sites for heavy metals (Pb^{2+} , Cu^{2+} , Hg^{2+} , Cd^{2+}) and anionic dyes in



also promotes growth of beneficial soil microbiota including mycorrhizal fungi and nitrogen-fixing bacteria.

- ✦ Triggers systemic acquired resistance (SAR) in plants
- ✦ Suppresses soil-borne fungal pathogens (Fusarium, Pythium)
- ✦ Enhances phosphorus solubilisation activity
- ✦ 100% biodegradable — improves soil organic carbon

oligosaccharides — all higher-value downstream products.

- ✦ Consistent acetylation degree ensures predictable deacetylation yields
- ✦ Low ash content reduces chemical consumption in downstream processing
- ✦ Scalable, verified process — suitable for industrial lots

industrial wastewater — functioning as a natural bioadsorbent.

- ✦ Effective across pH 4–8 range
- ✦ Non-toxic, sludge-free, regenerable
- ✦ Meets ETP compliance for textile, electroplating, pharma effluent



BIOMEDICAL / R&D

Scaffold Matrix & Wound Healing

Chitin's structural similarity to mammalian glycosaminoglycans makes it a preferred scaffold material for tissue engineering and wound care applications — promoting cell adhesion and collagen synthesis.

- ✦ Biocompatible and biodegradable
- ✦ Supports fibroblast and keratinocyte proliferation



PACKAGING & FILMS

Biodegradable Packaging Composite

Chitin-reinforced bioplastic films show improved tensile strength, oxygen barrier properties, and natural antimicrobial activity — making them ideal functional fillers for bio-packaging manufacturers.

- ✦ Reduces reliance on synthetic polymer additives
- ✦ Inherent antimicrobial properties extend product shelf life
- ✦ Compostable — aligns with Extended Producer Responsibility norms



COSMETICS

Film-Former & Skin Conditioner

Chitin nano-particles and fibres are used in premium cosmetic formulations as natural film-formers, humectants, and skin protectants — replacing synthetic polymers like nylon or silicone derivatives.

- ✦ Provides long-lasting moisture-retention film on skin
- ✦ Suitable for "natural" and "clean beauty" formulations



✦ Haemostatic — promotes rapid clot formation

✦ Safe, non-irritant, non-comedogenic



Chitosan

Poly- $[\beta\text{-(1}\rightarrow\text{4)}\text{-D-glucosamine}]$ · CAS 9012-76-4 · Degree of Deacetylation $\geq 75\%$

Chitosan is the N-deacetylated derivative of chitin and one of the most versatile natural cationic polymers known to science. Its free amino groups grant it exceptional solubility, charge-based interactions, and biological activity — spanning food safety, agriculture, nutraceuticals, pharma drug delivery, and advanced materials science.

DEACETYLATION DEGREE

$\geq 75\text{--}95\%$

VISCOSITY GRADE

Low / Medium / High

SOLUBILITY

1% Acetic Acid

MOISTURE

$\leq 10\%$

HEAVY METALS

Compliant



AGRICULTURE

Seed Treatment & Biopesticide

Chitosan as a seed priming agent enhances germination rates, builds systemic resistance, and creates a protective biofilm against fungal and



FOOD INDUSTRY

Natural Preservative & Antimicrobial Coating

Chitosan-based edible coatings extend fresh produce shelf life by 30–50% by forming a semi-permeable barrier that reduces respiration rate, controls



PHARMACEUTICALS

Controlled Drug Delivery Matrix

Chitosan's mucoadhesive properties and pH-responsive solubility make it the leading natural excipient for controlled-release tablets, nasal drug delivery, and



bacterial pathogens — all without chemical residue concerns.

- ✦ Improves germination by 15–30% across multiple crops
- ✦ Reduces seed-borne fungal infection (*Alternaria*, *Botrytis*)
- ✦ Approved for organic agriculture globally
- ✦ Enhances nutrient uptake efficiency (N, P, K)

microbial growth, and retains sensory quality — eliminating the need for synthetic preservatives.

- ✦ GRAS status in the United States; EFSA reviewed
- ✦ Active against *E. coli*, *Salmonella*, *Listeria*
- ✦ Extends fresh fruit & vegetable shelf life
- ✦ Compatible with post-harvest cold chain operations

oral biologics protection — reducing dosing frequency and improving bioavailability.

- ✦ Mucoadhesive — enhances absorption at mucosal surfaces
- ✦ pH-triggered release for colon-targeted delivery
- ✦ Complexes with DNA/RNA — gene therapy applications
- ✦ USP/BP grade available on request



AQUACULTURE

Feed Additive & Immune Stimulant

Dietary supplementation of chitosan in aquaculture feed significantly improves feed conversion ratio, enhances non-specific immune response, and reduces mortality from common bacterial diseases — replacing antibiotic growth promoters.

- ✦ Improves FCR and specific growth rate in shrimp & fish
- ✦ Stimulates lysozyme and phagocytic activity



COSMETICS & PERSONAL CARE

Hair Care Polymer & Skin Actives Delivery

Cationic chitosan strongly adsorbs to negatively charged hair and skin surfaces, delivering deep conditioning, anti-frizz effects, and enhanced active ingredient penetration — used in shampoos, conditioners, serums, and wound dressings.

- ✦ Proven hair fibre strengthening and smoothing
- ✦ Encapsulates actives for controlled skin delivery



WATER TREATMENT & INDUSTRIAL

Flocculant & Ion-Exchange Media

Chitosan's cationic charge density allows it to electrostatically neutralise negatively charged suspended particles, dyes, and dissolved metals in wastewater — performing as a biodegradable flocculant superior to synthetic polyacrylamides.

- ✦ Removes turbidity, dyes, and heavy metals in one step
- ✦ Biodegradable — no toxic sludge byproduct
- ✦ Effective at very low dose (5–50 mg/L)



- ✦ Antibiotic-free growth promotion strategy
- ✦ Reduces ammonia production in water column

- ✦ Mild, hypoallergenic — suitable for sensitive skin

- ✦ Compatible with municipal and industrial ETP systems

Additional Chitosan Advantages for B2B Partners

Nutraceutical / Weight Management

Chitosan in the gut forms a gel that binds dietary fat, reducing absorption. Clinical studies support its use as a functional ingredient in weight management supplements.

Textile Antimicrobial Finish

Chitosan-treated fabrics exhibit durable antimicrobial activity against bacteria and fungi — used in sportswear, healthcare textiles, and wound dressings without silver or chemical biocides.

Paper & Pulp Industry

Chitosan enhances wet and dry strength of paper, improves ink retention, and serves as a biodegradable sizing agent — replacing synthetic polyacrylamide-based retention aids.

Cholesterol Binding — Functional Food

Clinical evidence supports chitosan's capacity to bind bile acids and reduce LDL cholesterol — qualifying it for functional food and nutraceutical label claims in multiple markets.



Chito-oligosaccharide (*COS*)

Low-MW Glucosamine Oligomers · DP 2-10 · CAS 148411-57-8

Chito-oligosaccharides are short-chain, water-soluble fragments of chitosan produced by controlled enzymatic or chemical depolymerisation. Unlike chitin and high-MW chitosan, COS is fully water-soluble at physiological pH — unlocking superior bioavailability and a dramatically expanded application scope in human health, animal nutrition, and precision agriculture.

MOLECULAR WEIGHT

1,000–5,000 Da

DP RANGE

2–10

SOLUBILITY

Fully water-soluble

DEACETYLATION

≥ 80%

FORM

Fine powder /
Solution



NUTRACEUTICALS / HUMAN HEALTH

Prebiotic & Gut Microbiome Modulator

COS selectively promotes the growth of beneficial gut bacteria (*Bifidobacterium*, *Lactobacillus*) while inhibiting pathogenic



ANIMAL FEED

Antibiotic-Free Growth Promoter

COS in poultry, swine, and aquaculture feed demonstrates consistent improvement in growth rate, feed



PRECISION AGRICULTURE

Biostimulant & Plant Defence Elicitor

COS is a potent plant defence elicitor even at ppm concentrations — triggering the expression of pathogenesis-related



species — classifying it as a next-generation prebiotic with immune and metabolic health benefits. Its small molecular size ensures rapid absorption and efficacy at low doses.

- ✦ Bifidogenic effect — clinically validated prebiotic action
- ✦ Reduces gut inflammation via NF-κB inhibition
- ✦ Supports intestinal barrier integrity (tight junction proteins)
- ✦ Anti-obesity effect via gut axis modulation

conversion efficiency, and immunity — serving as a science-backed, regulatory-compliant replacement for antibiotic growth promoters (AGPs) that are being phased out globally.

- ✦ Improves average daily gain (ADG) in broilers and swine
- ✦ Enhances villus height:crypt depth ratio for better nutrient absorption
- ✦ Reduces diarrhoea incidence and mortality
- ✦ Reduces residual antibiotic contamination in food supply

(PR) proteins and stimulating secondary metabolite synthesis. As a foliar spray or drip irrigation additive, it dramatically enhances crop resilience, yield, and quality.

- ✦ Effective at concentrations as low as 100–500 ppm
- ✦ Increases chlorophyll content and photosynthetic efficiency
- ✦ Reduces fungicide and pesticide dependency
- ✦ Registered biostimulant in EU and India (FCO compatible)



COSMETICS / DERMATOLOGY

Anti-Ageing & Skin Brightening Active

COS inhibits melanin synthesis by downregulating tyrosinase activity, while simultaneously stimulating collagen and hyaluronic acid production in dermal fibroblasts — making it a powerful, natural dual-action cosmetic ingredient for anti-ageing and brightening formulations.



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- ✦ Tyrosinase inhibition — natural skin brightening



PHARMACEUTICALS

Anti-inflammatory & Neuroprotective Agent

Emerging clinical and pre-clinical data position COS as a multi-target bioactive: it inhibits pro-inflammatory cytokines (TNF-α, IL-6), offers neuroprotection in Alzheimer's models, and demonstrates significant antitumour activity via apoptosis induction in multiple cancer cell lines.



FUNCTIONAL FOODS & BEVERAGES

Functional Ingredient & Natural Preservative

COS's water solubility and mild flavour profile make it eminently compatible with beverages, dairy products, and health foods — offering antioxidant and antimicrobial benefits without altering organoleptic properties of the food matrix.

- ✦ Natural antimicrobial — extends beverage shelf life

- ✦ Stimulates collagen Type I and III synthesis
- ✦ Antioxidant (ROS scavenging) — prevents photoageing
- ✦ Excellent skin penetration due to low molecular weight

- ✦ Inhibits NF- κ B and MAPK inflammatory pathways
- ✦ Anti-tumour — induces apoptosis in multiple cancer lines
- ✦ Neuroprotective — reduces amyloid beta aggregation
- ✦ Anti-diabetic — improves insulin sensitivity

- ✦ Antioxidant — compatible with clean-label beverages
- ✦ Thermostable — withstands food processing temperatures
- ✦ No off-taste or odour at functional doses



PROPRIETARY SYNERGISTIC BLEND

BioActiv Complex™ COS · NAG · Protein Hydrolysate

[Chito-oligosaccharide + N-Acetylglucosamine + Clarified Protein Hydrolysate]

Our flagship multi-component bioactive — co-produced from the same shrimp shell biorefinery stream — delivers a synergistic trio of complementary functional molecules in a single, standardised product. The clarification process ensures a clean, odour-minimised input compatible with premium B2B applications.

COMPONENT 01

COS

Prebiotic + Immune Activator +
Elicitor

COMPONENT 02

**N-Acetylglucosamine
(NAG)**

Joint Health + Skin Matrix + Anti-
inflammatory

COMPONENT 03

**Protein Hydrolysate
(Clarified)**

Amino Acid Source + Nitrogen +
Bioactive Peptides

PROCESS FEATURE

Clarified Grade

Colour, odour & turbidity
optimised for premium use

APPLICATION SEGMENTS



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Where the Blend Delivers Unmatched Value



Animal Nutrition & Aquaculture

Poultry · Swine · Shrimp · Fish Feed Additive

- COS acts as prebiotic, improving gut microbiome balance and villus architecture for superior nutrient absorption
- NAG provides direct N-acetylglucosamine for intestinal mucin synthesis, reinforcing the gut mucosal barrier
- Protein hydrolysate contributes free amino acids and bioactive peptides that stimulate growth hormone secretion and anabolic pathways
- Combined effect: improved FCR, reduced mortality, antibiotic-free production — command premium pricing in export markets



Biostimulant & Liquid Fertiliser

Foliar Spray · Drip Irrigation · Soil Drench

- COS elicits plant defence enzymes and stimulates root development at ultra-low concentrations
- NAG contributes to plant cell wall biosynthesis and supports rhizobium activity in legume systems
- Protein hydrolysate delivers organic nitrogen, amino acids (glutamine, glycine, proline) that directly feed plant metabolism
- Single product replaces 3 inputs — cost advantage and application simplicity for farmer adoption



Nutraceuticals & Joint Health

Supplements · Functional Food · Sports Nutrition

- NAG is the biological precursor to hyaluronic acid and chondroitin sulfate — supporting joint cartilage regeneration
- COS reduces systemic inflammation via NF- κ B inhibition, addressing the inflammatory component of arthritis
- Bioactive peptides from protein hydrolysate (collagen-type fragments) further support connective tissue integrity
- Combined efficacy rivals glucosamine-chondroitin supplements with superior bioavailability due to COS water solubility



Cosmetics — Advanced Skin Bioactive

Serums · Anti-Ageing · Wound Healing Creams

- NAG is a proven skin-brightening and hyaluronic acid synthesis stimulator — widely used in prestige skincare
- COS scavenges free radicals, inhibits tyrosinase, and promotes keratinocyte proliferation for wound healing
- Clarified protein hydrolysate peptides provide amino acid building blocks for collagen and elastin synthesis
- Clarification ensures formulation stability and compatibility with transparent serums and premium cosmetic systems



Why the Blend is Our Most Compelling B2B Proposition

Co-Production Economics

All three components arise from the same process stream — reducing raw material cost and enabling competitive pricing vs. separately sourced individual ingredients.

Formulation Simplicity

Partners receive a single standardised input instead of managing three separate ingredient supply chains — simplifying procurement, QC, and regulatory dossiers.

Clinical Synergy Data

The combination of COS + NAG has emerging clinical and pre-clinical evidence for superior outcomes in gut health, joint health, and skin applications vs. individual components.

Clean Label & Traceability

Natural origin, traceable source, and clarified processing makes this blend compatible with clean-label, organic, and sustainability-positioned product lines in food, feed, and personal care.

Medispace Innovations

Marine Biopolymers · Circular Biorefinery ·

B2B ENQUIRIES

Odisha, India · Shrimp Shell Biorefinery

Technical Backing:

Products available: Bulk / Sample / Custom Grade



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