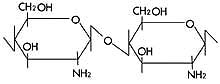
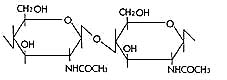
**4- Chitin and Chitosan:**

Chitin is one of the most abundant polysaccharides found in nature. It is found naturally in the shells of crustaceans, insect exoskeletons, fungal cell walls, micro fauna and plankton. It is found in association with proteins and minerals such as Calcium Carbonate. Chitin is a homopolymer of 2-acetamido-2-deoxy- D -glucose (N-acetylglucosamine) 1 →4 linked in a β configuration forming a long chain linear polymer. It is thus an amino sugar analog of cellulose. Chitin is insoluble in most solvents.



Chitosan is a useful derivative of chitin by removing most of the acetyl groups of chitin using strong alkalis. To obtain a soluble product the degree of deacetylation of chitosan must be 80% to 8 5% or higher; i. e. the acetyl content of the chitosan product must be less than 4% - 4.5 %. Chitosan is a semicrystalline polymer and the degree of crystallinity is a function of the degree of deacetylation.

**Chitin Chitosan**



Chitosans are characterised by two principal factors: viscosity and degree of deacetylation, the control over these two parameters allows the production of a wide range of chitosans, which can be used in [medical and industrial fields](http://www.france-chitine.com/util.e.html)

Crystallinity is maximum for both chitin (i. e. 0% deacetylated) and fully deacetylated chitosan. Minimum crystallinity is achieved at intermediate degrees of deacetylation. Because of the stable, crystalline structure, chitosan is normally insoluble in both organic solvents and aqueous solutions at a pH above 7. However, it dissolves readily in most dilute organic acids solutions, such as formic, acetic, tartaric, and citric acids because the free amino groups are protonated and the molecule become fully soluble below pH 5. Chitosan is soluble to a limited extent in dilute inorganic acids except phosphoric and sulfuric acids. The pH-dependent solubility of chitosan is a very useful property, which provides a convenient mechanism for processing chitosan products under mild conditions. For example, viscous solutions of chitosan can be prepared at lower pH and then extruded and gelled in high pH solutions or baths of nonsolvents such as methanol. The obtained gel fibers can be subsequently drawn and dried to form high-strength fibers.

**Chitosan Properties:**

-**Biocompatibility:**

Chitin and chitosan are natural biopolymers. They have no antigenic properties, and thus are perfectly compatible with living tissue. Their anti-thrombogenic and hemostatic properties make them very suitable for use in all fields of biology.

- **Cicatrizant:**

Chitosan forms films that are permeable to air. It facilitates cellular regeneration while protecting tissue from microbe attack. In addition, chitosan has been found to have a biostimulant effect on the regeneration of tissue. This property has allowed it to be used in making an artificial skin for skin grafts on high degree burns and in surgical applications such as chitin suture thread.

- **Anti-cholesterolemic agent:**

Chitosan can trap lipids at their insolubilization pH in the digestive tract. Administered to rats, chitosan considerably reduces the level of cholesterol in the blood.

- **Chelation agent:**

Chitin and its derivatives are remarkable chelation agents. Chitosan is used for a wide range of applications: as a chromatography medium, trapping heavy metals and water treatment.

- **Biodegradable:**

Chitin and chitosan are biodegradable biopolymers. Enzymes break down the chitin and chitosan into oligopolymers then dealt by metabolism.

**Uses of Chitosan:**

**-**[**Cosmetics**](http://www.france-chitine.com/ecosm.html)**:**

Chitin, is an excellent cosmetic product that is remarkably well tolerated by the skin. Its biological tolerance has been demonstrated for a long time. In addition, it is an efficient trapper of heavy metals that are responsible for very many contact allergies.

Chitin is a particularly effective hydrating agent. It has two advantages: it supplies water and it avoids dehydration.

Lastly, chitosan forms a protective tensor film on the skin's surface that can fix other active principles for the skin. Thus other hydrating agents, solar filters, organic acids or other active principles can be combined with the derivatives of chitin.

**-**[**Environment**](http://www.france-chitine.com/eenvironment.html)**:**

There are more than one technology to remediate to soil pollution by organochloride solvents and petroleum products. Some are ex situ involving excavation and transportation of polluted soil to specialised plant some are in situ involving much lower costs. Among those technologies in situ some are based on utilisation of biological activity and are named soil bioremediation. Bioremediation is founded on soil micro-organisms capacity of braking and consuming organic pollutants and oil residues.

**-Agriculture:**

Chitin and Chitosan have been proven to control numerous pre and post harvest diseases on various horticultural commodities. It has been scientifically demonstrated that both soil and foliar plant pathogens of fungal, bacterial and viral origin may be controlled using chitin and/or  chitosan based products.

- [**Water Treatment**](http://www.france-chitine.com/etrait.html)**:**

The properties of chitosan enable it to attach itself to a variety of organic contaminants (bacteria, algae, urea, sweat) minerals, metals and oil.  Chitosan therefore dramatically increases the effectiveness of filtration systems, being sand, DE or cartridges, which normally cannot capture fine particles and solved pollutant.

**Applications of chitosan:**

|  |  |
| --- | --- |
| Wastewater Treatment | - Removal of Metal Ions.  - Coagulant: Protein, Dye, Amino Acids. |
| Food Industry | - Removal of Dye, Suspended solids etc.  - preservative  - Colour Stabilization  - Animal Food Additive |
| Medical | - Bandages  - Blood Cholestrol Control  - Controlled Release of Drugs  - Skin Burn  - Contact Lens |
| Biotechnology | - Enzyme Immobilization  - Protein Separation  - Cell Recovery  - Chromatography  - Cell Immobilization |
| Agriculture | - Seed Coating - Fertilizer  - Controlled Agrochemical Release |
| Cosmetics | - Moisturizer  - Face, Hand and Body Creams  - Bath Lotion |
| Pulp and Paper | - Surface Treatment  - Photographic Paper |
| Membrane | - Permeability Control  -Reverse Osmosis |