

## **Seafood Processing By-products**

- Since ancient times, seafood has been considered a healthy food for humans.
- Seafood by-products also play a major role in the daily lives of humans.

### **1. Fish By-products**

- Historically, fish by-products were considered to be of low value and were disposed of.
- In the past, fish deaths, which can occur for a variety of reasons, have been disposed of in various ways, including by burning, discarding in the land, biogas production, production of fish meal, and incorporation into pet food or food for animals.
- Finfish and shellfish waste processing is confined to the manufacture of meal and oil.
- The meal is used mainly for animal feeds, while the oil is used in edible oils and oils for industrial applications.
- Recent studies have identified a number of biologically active compounds from fish muscle proteins, bones, fins, internal organs, collagen, gelatin, and oyster and crustacean shells.

#### **1.1. Proteins**

- Discarded wastes from fish usually consist of a considerable amount of proteins.
- These fish waste are nutritionally important to isolate value added products, enzymatic and chemical methods are widely used to isolate the protein.
- Fish hydrolysate is the main form of seafood by-products, which can be used as a fish-based fertilizer, animal feed, and human food applications.
- Fish hydrolysates possess a number of biological activities, such as antiproliferative, antioxidant, and inhibitory activity of angiotension-I-converting enzyme (ACE).
- Fish protein hydrolysates with multiple bioactivities could be useful in formulating functional food products that target the reduction of the symptoms of oxidative stress, hypertension, and possibly dyslipidemia, all of which are common to coronary heart disease.

#### **1.2. Peptides**

- Peptides from marine sources have been proved to have significant antioxidant activity with no cytotoxicity.
- Fish peptides can be isolated using liquid extraction and microbial fermentation of proteins.

#### **1.3. Collagen and Gelatin**

- Food and pharmaceutical industries all over the world are witnessing an increasing demand for collagen and gelatin.
- Mammalian gelatins are the most popular and widely used.
- Fish gelatin reportedly possesses similar characteristics to mammalian gelatin, thus, be considered as an alternative gelatin for use in food products.
- Collagen has been extracted from the skin, bones, fins and scales of freshwater and marine fishes.

#### 1.4. Fish Oil

- **Fish oil** is oil derived from the tissues of oily fish.
- Fish oils contain the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), precursors of certain eicosanoids that are known to reduce inflammation in the body and improve hypertriglyceridemia.

## 2. Crustaceans by-products

### 2.1. Chitin and Chitosan

- Chitin is the second most important natural polymer in the world.
- The main sources exploited are two marine crustaceans, shrimp and crabs.
- Chitin and its deacetylated derivative, chitosan, are non-toxic, antibacterial, biodegradable and biocompatible biopolymer.
- Due to these properties, they are widely used for biomedical application.
- The adhesive nature of chitin and chitosan, together with their antifungal and bactericidal character, and their permeability to oxygen, is a very important property associated with the treatment of wounds and burns.
- Due to its bioactive nature and cationic character, **chitosan is used** as nutritional ingredient (**food** additives, functional **food**), antimicrobial and antioxidant agent (**food** protection), for antimicrobial coatings for fruits and vegetables, in anticholesterolemic dietary products, and as nutraceuticals.

## 3. Seaweed by-products and their applications

- Seaweeds are consumed by coastal populations, particularly in Asia.
- Seaweeds are also harvested or cultivated for the extraction of alginate, agar, and carrageenan, which are gelatinous substances (hydrocolloids).
- Alginates are commonly used in wound dressing, tissue engineering and drug delivery.