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Fish and Fishery Products Analysis

A Theoretical and Practical Perspective

 Springer

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This novel and informative book discusses the various aspects of seafood quality. The book is divided into 7 broad sections, each tackling a different aspect. The first section covers the general aspects relevant to the nutritional quality of the fish and the various extraction protocols for macro-/ micro-nutrients. The second section provides insights into handling and the principles of thermal and non-thermal processing techniques for commercially important fishery products. The quality standards and safety concerns in the seafood industry and consumption are discussed in this section. The freshness indices of the processed products including biochemical, microbiological and toxicological characteristics are also included. The third section discusses the physico-chemical characteristics and quality parameters of potable water/ ice. The fourth section includes the quality assessment of various toxicants related to seafood products. The fifth section deals with the specific aspects such as principle, instrument and procedures of conventional and novel analytical instruments relevant to the seafood industry. The sixth section deals with the seafood waste management including solid and liquid seafood wastes. Presently, there is a great awareness regarding environmental sustainable processing/ preservation techniques. The final chapter discusses the bioactive compounds from under-utilized marine sources showing pharmaceutical/ nutraceutical applications.

ISBN 978-981-32-9573-5



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5.1 Instruments Used for Physiochemical Analysis

5.1.1 pH Meter

The pH meter is an electronic device for measuring the pH (acidity or alkalinity) of a sample. It was only in 1909 that the concept of pH (hydrogen ion concentration) was introduced by Soren Peter Lauritz Sørensen and an electrode for pH measurements was realized in the year 1922 by W.S. Hughes (Nikhil et al. 2016).

5.1.1.1 pH Meter Probe

The probe is a key part of the pH meter. It is a rodlike structure usually made up of glass. At the bottom of the probe, there is a bulb, which is sensitive part of a probe that contains the sensor.

The pH electrode is typically an ion-selective electrode (ISE) that responds to one specific ion in solution, the hydrogen ion. The most common forms of pH electrode are the glass electrode (Fig. 5.1a) and the combination electrode (Fig. 5.1b) which contains an inbuilt calomel reference electrode. Typical glass pH electrodes are made of thin glass porous membrane sealed at the end (the glass bubble) of a hard glass tube containing 0.1 M hydrochloric acid, into which is immersed a silver chloride-coated silver wire. The pH of the internal solution varies from 1.0 (by using 0.1 M HCl) to 7.0 (different buffers are used by different manufacturers). This silver/silver chloride electrode acts as an internal reference that generates a constant potential. The porous membrane is typically 0.1 mm thick, the outer and inner 10 nm consist of a hydrated gel layer that contains exchange-binding sites for hydrogen or sodium ions. On the inside of the membrane, the ion exchange sites are predominantly occupied by hydrogen ions from the hydrochloric acid, while on the outside, the ion exchange sites are occupied by sodium and hydrogen ions. The bulk of the membrane is a dry silicate layer in which all ion exchange sites are occupied by sodium ions. Most of the coordinated ions in both hydrated layers are free to diffuse into the surrounding solution, while hydrogen ions in the test solution can