Use of Protease Inhibitors in Seafood Products

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I. INTRODUCTION

Protease is the generic name given to those enzymes hydrolyzing the peptide bond in proteins and some synthetic substrates and coded as the EC 3.4.11-99.X. subgroup in the enzyme classification. Proteases, including peptidases and proteinases, are polyfunctional enzymes catalyzing the hydrolytic degradation of proteins. They are involved in several physiological functions, both extracellular and intracellular, such as proenzyme activation in coagulation, complement activation, food digestion, endocrine and neural communication, and developmental and differentiating processes. Intracellular protein degradation of functional proteins and turnover of amino acids is achieved by cathepsins and proteasomes. Proteases are involved in some of these functions by exerting control over developmental and cellular maintenance processes. Proteases are also involved in the response of organisms to infections and pathologies. In turn, protease activity is controlled by several mechanisms, including enzyme inhibition, by naturally occurring protease inhibitors. Most protease inhibitors controlling physiological processes affect the enzyme activity reversibly. In food technology, proteolysis is used to modify the functional and nutritional properties of food proteins. However, in some examples in food processing, proteolysis by endogenous proteases causes deterioration of functional proteins (autoproteolysis). For more detail on the latter the reader is referred to Chapter 15.

This chapter focuses on the control of unwanted proteolysis in seafood processing by inhibition of the responsible enzymes. A functional definition of