KINETICS OF SALMON (*ONCHORHYNCHUS GORBUSCHA*) QUALITY CHANGES DURING THERMAL PROCESSING

ABSTRACT

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The objective of this study was to investigate the reaction kinetics along with changes in salmon quality during high temperature thermal processing. Small samples (D 30 mm × H 6 mm) cut from pink salmon (*Oncorhynchus gorbuscha*) fillets were sealed in aluminum containers and heated in an oil bath to simulate a commercial thermal process. A thorough examination of the quality changes occurring during heating were conducted by investigating quality attributes of raw and cooked salmon, including color, shear force to break muscle fibers, cook loss, area shrinkage, lipid composition and thiamin content. The kinetics of reactions leading to the quality changes were evaluated.

Significant quality deterioration occurred in all of the studied quality attributes as reflected in color changes, increased cook losses, shrinkage, muscle toughening, lipid oxidation and thiamin losses. However, no measurable loss in polyunsaturated fatty acid (PUFA) was observed during thermal treatments at 121.1 °C for up to 2 hrs. Addition of salt (1.5% w/w) reduced the cook loss, area shrinkage and shear force of the heated salmon muscle, as well as slightly darkening the color compared to muscle samples to which no salt was added.

Mathematical models were developed relating changes in different quality attributes with heating conditions including processing temperatures from 100 to 131.1 °C and heating time from 90 min to 3 hrs with rate constants, activation energy and reaction order determined. Heat-induced shear force changes were compared between salmon and chicken muscle to gain insights into the mechanism(s) underlying the shear force change based on physical, chemical and structural changes in the muscle during heating.

The results of this study increase the understanding of quality changes in salmon during high temperature thermal processing, and provide kinetic models that can be used to design or optimize thermal processes for high quality shelf-stable food products.