OXIDATION IN THAI FISH SAUCE

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M.Sc. (BIOTECHNOLOGY)

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ABSTRACT

In general, fish sauce can be stored in a closed container for more than three years at room temperature. Once it is opened, however, its flavor and color change rapidly. Oxidation is hypothesized to affect off-flavor formation and browning of fish sauce during storage. The aim of this study was to monitor the oxidative parameters during storage, such as browning development, total hydroperoxide, fatty acid profile, and volatile compounds. Moreover, the factors related to oxidative browning development were also studied.

During storage under accelerated conditions at 40°C and room temperature (30°C), browning and total hydroperoxide content increased in the fish sauce when exposed to the air. Twenty-two volatile compounds were monitored by solid-phase microextraction (SPME) combined with gas chromatography-mass spectrometry (GC-MS). The relationships between browning and changes in volatile compounds were established by principal component analysis (PCA). 2-Methylbutanal, 2-methyl-2-butenal, dimethyltrisulfide, methional, benzaldehyde and benzeneacetaldehyde were positively correlated with browning during storage. To study the effects of oxygen, high-pure oxygen was directly bubbled into fish sauce, resulting in browning development, total hydroperoxide content, and changes in volatile compounds as in fish sauce normally exposed to the air. Free-radicals were formed after oxygen bubbling as detected by Electron spin resonance (ESR) technique. Effects of metal ion (Fe²⁺, Fe³⁺) and chelating agent (EDTA) on oxidative browning were also studied. Browning development, total color difference (ΔE*), and total phenolic content were not significantly different among control and experimental groups. Therefore, these metal ions and chelating agent could not enhance or retard the oxidative browning. If the organic fraction were eliminated from the fish sauce sample, the rate of oxidative browning and hydroperoxide formation decreased.

KEY WORDS: FISH SAUCE / OXIDATION / VOLATILE COMPOUNDS / BROWNING / HYDROPEROXIDE

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