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Optimal Processing Condition of Seafood-like Flavoring Sauce by RSM

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Introduction

As seafood processing by-products, enormous seafood processing waste waters (SPWWs) are produced at most seafood processing plants, but management of these waste waters are becoming great burden at small capacity processing plant. Hence, almost of them have been discarded without suitable application methods. And these SPWWs might causes of marine environmental pollution and waste in potential food resources. Basic solution on these problems of SPWWs is the development of valuable products through the recycling technologies. The objective of this study was to determine optimal processing condition (mixing ratio) for the development of seafood-like flavoring sauce from six SPWWs by response surface methodology (RSM).

Materials and Methods

Materials: Six SPWWs including blue mussel cooker effluent (MCE), cockle shell cooker effluent (CCE), oyster cooker effluent (OCE), oyster shuckng water (OSW), squid cooker effluent (SCE) and anchovy cooker effluent (ACE), were donated from seafood processing plants located in southern area in Korea.

Response surface methodology (RSM): Experimental design of RSM to determine optimal mixing ratio of SPWWs was a central composite design for three independent variables at coded five levels (-2, -1, 0, +1 and +2) each, as described by Gontard et al. (1992).

Analysis of amino-N: The content of amino-N was determined by Formol method (1985).

Analysis of taste compounds: 1. Analysis of non-volatile organic acids: Non-volatile organic acids were analyzed by the modified method of Lee et al. (1993). **2. Analysis of ATP related compounds:** Pretreatment of ATP related compounds were determined by the method of Lee et al. (1984). HPLC analysis was conducted by an HP1100 HPLC.

Sensory evaluation and statistical analysis: Sensory evaluation (acceptance test) was performed by 9 sensory panels, and the scoring method with 9 hedonic scale was used.

Statistical analysis was performed by the SAS system (Version 6.12) and the SPSS system.

Results and Discussion

To determine dependent variable on RSM, 4 factors, such as overall acceptance, amino-N content, ATP related compounds content and non-volatile organic acid content, were selected from preliminary experiments. After mixing of MCE, CCE and OCE according to 18 treatments designed by central composite design, 4 factors in 18 mixtures were evaluated and analyzed and then Pearson's correlation analysis between overall acceptance and the other factors in mixtures was conducted. However, there was no factor having significant correlation with overall acceptance in mixtures. Therefore, only one factor, overall acceptance, was used as a dependent variable on RSM. After RSREG procedure, model equation made by significant factors was Y (overall acceptance) = 6.476 + 0.170MCE - 0.200MCE^2 - 0.137OCE^2. From these results, the optimal mixing ratio of each material was determined as 4.2 (MCE), 4.2 (CCE) , 1.9 (OCE) and 0.1 (SCE, OSW and ACE) (w/w), and maximum sensory score of overall acceptance in these conditions was predicted as 6.49.

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