Effects of Deep Seawater and Its Salt on Food Quality in Food Processing (2)

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Summary

Recently, Muroto deep seawater (DSW) has grown popular in the preparation of various foods, being said to improve food quality and taste. Recent scientific studies of DSW and its salts have been carried out to determine their characteristics and effects on food quality and taste. This study aims to elucidate the characteristics of DSW regarding cooked flavor by means of stoichiometry in order to develop a method of analyzing the cooked flavor components.

The water samples in this study were DSW, surface seawater, water desalinated by means of ultra filtration, 3.5% (w/w) saline and Milli-Q water. The method for quantitative determination of cooked flavor components was established. Solid microextraction (SPME) was employed to determine head space gas (HSG) components over heated amino acid-sugar reaction mixtures in vials. The final conditions for extraction and analysis were as follows: SPME fiber, Carboxen-Polydimethylsiloxane (CAR/PDMS) in 75 μm thickness; pre-incubation, 10 min at 40°C; incubation, 30 min at 40°C; internal standard, 1-hexanol. The analysis was carried out by GC and GC-MS. The values of three or more replicates were determined statistically. The samples for cooked flavor, consisting of each amino acid (Gly, Ala, Ser, Met and Val) and glucose in each water medium adjusted to the same pH (7.8) as DSW, were heated 10 or 15 hr at 100°C.

The common compounds formed as cooked flavor in all 5 samples were pyrazine, 2,3-butandione and 1-hydroxy-2-propanone. Furfural, acetaldehyde, 2-methyl propanal, methional and dimethyl disulfide were also detected. It was ascertained that the amount of most volatile components formed by cooking was higher in the DSW sample than in the other water media samples. In the Ala-glucose reaction mixture the relative peak area of acetaldehyde in the DSW medium was 1.1 to 1.7 times that in other media; in the Gly and Val mixtures the levels of acetaldehyde and 2-methyl propanal were 1.1 to 1.8 times and 1.6 to 2.9 times, respectively, that in other media. In the Met mixture, similarly, those of methanthiol, dimethyl disulfide and methional were 1.6 to 3.8, 1.6 to 8.2 and 1.6 to 3.0 times that in other media. It was thus suggested that the Strecker reaction was accelerated in the DSW medium.