

Multiband Spectroscopic Evaluation of Soup Stock from Kombu

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Dashi (soup stock) is an essential part of Japanese cuisine. It is important to cook based on the characteristics of the dashi as well as the appropriate dashi for cooking. Regarding kombu (kelp)dashi, which is a typical type of dashi, the extraction temperature is an important factor in cooking as well as the characteristics of kombu. On the other hand, there are many examples of research on amino acids which are representative of umami components, regarding the characterization of kombu dashi, and there are few examples of research that considers the complexity of mineral components, which are thought to affect off-taste. This study aimed to get a good grasp of the influences of the extraction temperature on the extraction behaviors by measuring the glutamic acid concentration and the X-ray fluorescent, ultraviolet-visible and infrared spectra.

A freezer bag containing 1 dm³ of mineral water (hardness of about 30) was heated in a water tank of a low-temperature cooker (BONIQ Pro, Hayama-Colony inc.), and 30 g of cut kombu (1st grade, harvested in Toi, Hokkaido, Japan) was added into the mineral water after reaching the set temperature of 333 or 353 K. Additionally, the extraction was performed at 278 K using a constant temperature water bath. The dashi was sampled at the specified time until 60 min at 333 or 353 K and for 24h at 278 K, and the glutamic acid concentration and the multiband spectra were measured.

The acquired data presented that the extraction temperature affected not only the amount of the extracted components but also the balances of the extracted components and the kinetics. The dashi with different characteristics by changing the extraction temperature could be available even if the same kombu was used. By performing principal component analysis using the standardized values based on the characteristics of the dashi extracted at 333 K for 60 min, it was considered that the first and second principal components were respectively related to the extraction time and temperature. These results suggested the possibility to design the extracting the kombu dashi with different taste characteristics according to the multiband spectroscopic information.