The Mechanisms of Amber Color Formation in Aged Umeshu (Japanese Plum Liqueur)

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Umeshu (plum liqueur) is a traditional and unique Japanese liqueur. It is made by steeping green Japanese plums in liquor and rock sugar. During a few months to a year before consumption, the umeshu turns from colorless to an amber color. The purpose of this study is to elucidate the undetermined causes of color change in umeshu. First, the degree of browning was measured by absorbance at 450 nm, and the polyphenol (PP) concentration of umeshu was estimated using the Folin-Ciocalteu assay. A consistent increase in the absorbance and PP concentration from 0 to 20 days was observed. Second, when catechol, a typical PP, and mashed plum were exposed to oxygen, browning was observed after approximately 20 days. Third, it was confirmed that sucrose was hydrolyzed under acidic conditions (pH 3.5) in umeshu using the Fehling test for remaining sugar. Fructose as a product of sucrose hydrolysis is converted to 5-hydroxymethyl-2-furaldehyde (HMF), which turns the sample brown. The HMF level in umeshu increased after more than 11 months. These results indicated that the color change in umeshu during the aging process occurred via three steps: 1) extraction of PPs from green Japanese plums using liquor and sugar, 2) oxidation of PPs, and 3) browning of fructose produced by hydrolysis of sucrose. The findings of this study can contribute to the quality control of aged umeshu.

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