

Abstract

Whiskey is typically aged for at least three years before it is sold on the market. The aging process refers to the long-term storage of the freshly distilled whiskey usually in wood vessels such as barrels. Over time, reactions occur between the distillate and container that can significantly alter and enhance the flavor and odor of the final product. As an example, the flavorful phenolic aldehydes vanillin and syringaldehyde give aged whiskeys pleasant aromas. They are normally formed through the oxidation of lignin, a polyphenolic component of wood, by ethanol in the unaged whiskey.

The aim of this research was to determine a way to rapidly age whiskey. During this study, organic compounds that impart flavor in white whiskey and mature whiskey were analyzed using gas chromatography-mass spectrometry (GC-MS). It was determined that the concentration for vanillin was 0.0081 mg/L in white whiskey while the concentration in the mature whiskey was approximately 0.9 mg/L. For syringaldehyde, the concentration in the white whiskey was 1.5 mg/L while in the mature whiskey, it was 19 mg/L. Different methods of rapidly extracting organic compounds that impart flavor to mature whiskeys, from oak wood, were then systematically tested. These varying methods involved different sonication parameters, as well as by sonicating and freezing ethanol with wood chips. The last method yielded the highest amounts for extracted vanillin, which were 3.5 mg/L, while for syringaldehyde the amount was 96 mg/L. Thus, this technique produced yields that were significantly larger than the baseline values obtained from the mature whiskey sample, approximately 4-fold and 5-fold higher for vanillin and syringaldehyde, respectively.