

QUANTIFICATION OF 31 IMPORTANT FERMENTATION-DERIVED AROMA COMPOUNDS IN WINE

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Fermentation-derived compounds represent the major group of volatile compounds present in wine. These compounds include ethyl esters, acetates, acids and alcohols and they have diverse sensory properties and sensory detection thresholds. In order to study the contribution of fermentation volatiles to wine aroma, we developed a precise and robust method to accurately quantify 31 fermentation products that were considered to be relevant to wine aroma. The method utilised headspace solid-phase microextraction (HS-SPME) coupled with gas chromatography - mass spectrometry (GC-MS) for stable isotope dilution analysis (SIDA) with deuterium labelled analogues as the internal standards. Since the analytes are commonly found in wine at a wide range of concentrations, have varied chemical properties and volatilities, SIDA was used to ensure accuracy as each analyte has virtually identical physical and chemical properties to its corresponding deuterium labelled standard.

Several research groups within the Australian Wine Research Institute are utilising this method successfully to compare the concentration of fermentation-derived aroma compounds in red and white wines made under different conditions. These include various fermentation conditions and varying yeast nutrient levels, different yeast species, yeast strains and yeast hybrids and after malo-lactic fermentation of wine with different bacteria. This analysis has also been used to help build a chemical composition database on a set of white wines in an effort to relate sensory to compositional data in those wines. Further applications could include investigations into the effects of different viticultural and winemaking practices on the concentration of these important aroma volatiles in red and white wines.