

THE ANALYSIS OF WINE VOLATILES DERIVED FROM OAK

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The deuterium-labelled standards, [²H₃]-guaiacol, [²H₃]-4-methylguaiacol, [²H₄]-4-ethylphenol, [²H₄]-*trans*-oak lactone, [²H₄]-*cis*-oak lactone and [2H₃]-vanillin, were synthesised and utilised in a new method employing gas chromatography-mass spectrometry (GC/MS) to determine the concentration of guaiacol, 4-methylguaiacol, 4-ethylphenol, 4-ethylguaiacol, *cis*- and *trans*-oak lactone and vanillin in wine or extracts of oak shavings in a single analysis. The method can employ either liquid-liquid extraction or solid-phase microextraction (SPME), and is rapid, robust, precise and accurate.

Under certain conditions there was artefactual generation, to varying degrees, of guaiacol, 4-methylguaiacol, *cis*-oak lactone and vanillin during the analysis of oak extracts, especially when diethyl ether extraction and injector block temperatures at or above 225°C were employed. These artefacts could be avoided by using SPME or by using liquid-liquid extracts with pentane or pentane:ether (2:1) injected at 200°C providing spot checks using SPME were done. The analytical methodology accounted for co-eluting peaks in different matrices and mass spectral ratio drift.

61 different commercial bottled single-variety Australian red wines were analysed.

Cis-oak lactone was of primary importance to the aroma and flavour of the wines, 4-ethylphenol and 4-ethylguaiacol were moderately important, vanillin was of slight importance and the other volatiles were less likely to impart significant effects. Some varietal trends were observed. There was more guaiacol in the Shiraz wines than that of the other varieties; more 4-ethylphenol in Cabernet Sauvignon than Pinot Noir and Shiraz; less *cis*-oak lactone in Pinot Noir than Shiraz and Cabernet Sauvignon.

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