

# GC-FID and GC-MS as a tool to screen the influence of wood ageing technologies in the brandies odourless and odourant compounds

Ilda Caldeira<sup>a</sup>, Ofélia Anjos<sup>b,c</sup>, Vera Portal<sup>b</sup>, António Belchior<sup>a</sup>, Sara Canas<sup>a</sup>

The maturation of wine brandies in wooden barrels cause many sensory and physicochemical changes in these alcoholic beverages, namely its flavour modification. Previous work (Caldeira et al. 2008) pointed out the most potent odourant compounds of the wine aged brandies. Some of these compounds proceed from the distillate and others are extracted from the wood.



It was quantified, some odourless compounds, such as methanol and higher alcohols and several odourant compounds in brandies aged in presence of two types of wood fragments (staves (S) and tablets (T)), from two different kinds of woods (Limousin oak wood and Portuguese chestnut wood), and compared with those found in the same with brandy aged in wooden barrels (B).

Methanol and higher alcohols were quantified by GC-FID equipped with a fused silica capillary column of polyethylene glycol according to the official method (NP 3263, 1990). The odourant compounds were quantified by GC-FID and identified by GC-MS (Caldeira et al, 2010).

A taster panel have also profiled these brandies and evaluated their overall quality.



The wood botanical species affected few odourant compounds.

The ageing system is the most discriminant factor, having a significant effect on the level of several odourant compounds (Anova results).

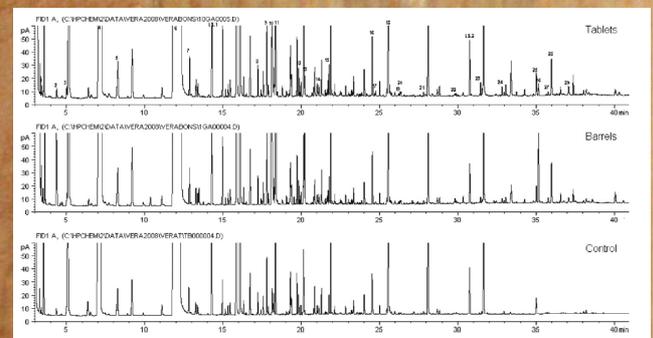
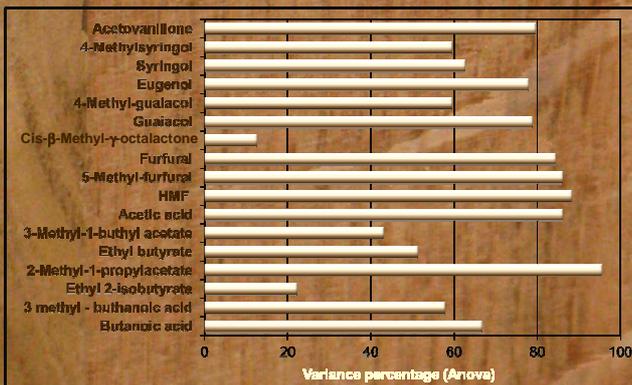


Fig. 3. Chromatograms of control brandy and chestnut aged brandies from different ageing systems.

Peak identification: 1: ethyl-2-methylpropanate (ethyl isobutyrate); 2: methyl-1-propyl acetate; 3: ethyl butyrate; 4: 2-methyl-1-propanol; 5: 3-methyl-1-butyl acetate; 6: 2 + 3-methyl-1-butanol; 7: ethyl hexanoate; I.S.1: 5-methyl-2-hexanol (internal standard 1); 8: trans-2-hexen-1-ol; 9: ethyl octanoate; 10: acetic acid; 11: furfural; 12: linalol; 13: 5-methyl-furfural; 14: butanoic acid; 15: 3-methyl butanoic acid; 16: hexanoic acid; 17: guaiacol; 18: 2-phenylethanol; 19: cis-β-methyl-γ-octalactone; 20: 4-methylguaiacol; 21: malic acid diethyl ester; 22: eugenol; I.S.2,3,4-dimethyl-phenol (internal standard 2); 23: syringol; 24: 4-methylsyringol; 25: dodecanoic acid; 26: HMF; 27: 4-allyl-syringol; 28: vanillin; 29: acetovanillone.

The importance of odourant compounds was also demonstrated by the high linear correlations between their contents and the intensity of several sensory attributes.

	Guaiacol	4MG	4MS	Syringol	Toasted	Coffee
Guaiacol	1					
4-methyl-guaiacol (4MG)	0,9056	1,0000				
4-methyl-syringol (4MS)	0,9336	0,8122	1,0000			
Syringol	0,9124	0,7450	0,9298	1,0000		
Toasted	0,8266	0,7373	0,6923	0,6036	1,0000	
Coffee	0,7464	0,7234	0,6162	0,5079	0,9224	1

The methanol and Superior alcohol's are not good discriminant for aged system or wood factors

The results show the possibility of using the chromatographic results as a tool to discriminate brandies produced with different ageing technologies.

NP 3263,1990.CT 83 Bebidas alcoólicas e espirituosas, Determinação dos teores de etanol, acetato de etilo, metanol, 2-butanol, 1-propanol, 2-metil-1-propanol, 2-propeno-1-ol, 1-butanol, 2-metil-1-butanol + 3-metil-1-butanol.

Caldeira, I., Bruno de Sousa, R., Belchior, A. P., & Climaco, M.C., 2008. Sensory and chemical modifications of wine-brandy aged with chestnut and oak wood fragments in comparison to wooden barrels. *Ciência Téc. Vitiv.* 23 (2) 97-110.

Caldeira I, Anjos O, Portal V, Belchior AP, Canas S. 2010. Sensory and chemical modifications of wine-brandy aged with chestnut and oak wood fragments in comparison to wooden barrels. *Analytica Chimica Acta*, 660: 43-52