Identification and Quantification of the Main Off-Flavors in Wine by GC/MS

Application Note

Authors

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Introduction

The quality of wines is often dependent on very small quantities of many components present in the beverage. Besides the commonly known cork taint caused by 2,4,6-Trichloroanisole (TCA), other off-flavors or undesirable aroma characteristics can also be present. According to their concentration in the wine, these compounds can lead to wine spoilage. Wines have been described as dusty, mouldy or containing fungus-like odors. Geosmin, with an extremely low olfactory threshold in wine of down to 50 ng/L, can lead to a distinctive earthy and musty flavor and may also contribute to the cork taint.

These off-flavors in wine can best be analyzed using a polar, polyethylene glycol or wax column after a concentration step using C18 SPE and a sample clean-up step using SAX SPE. The sample clean-up step will, to a large extent, remove the high molecular weight pigments and free fatty acids (C2 to C18) that could lead to a rapid deterioration of column performance.

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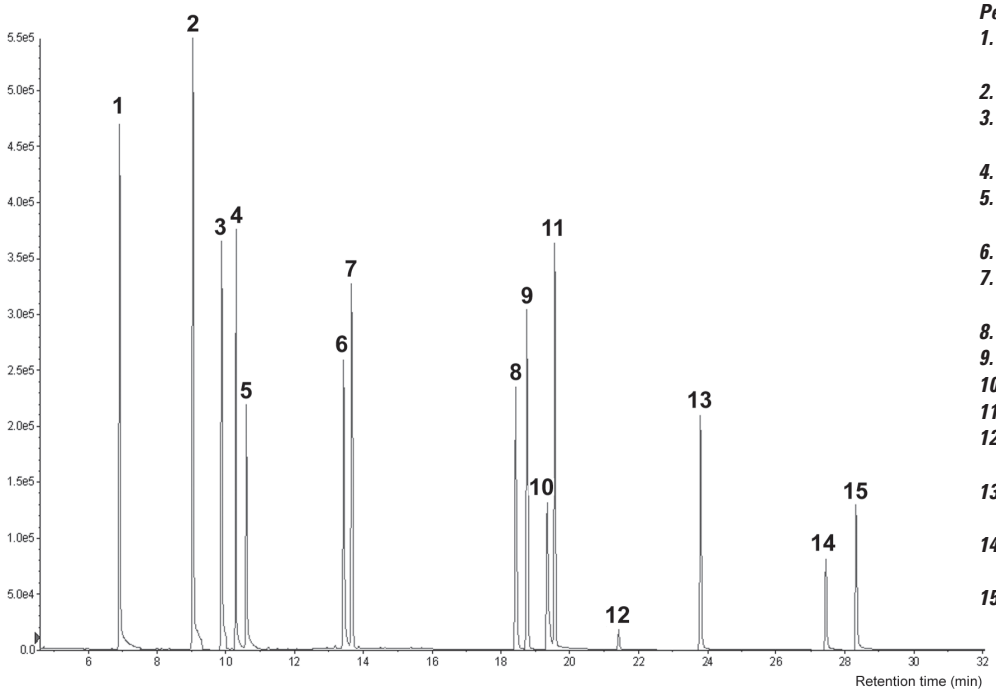
Conditions

Technique:	GC
Column:	CP-Wax 52 CB, 30 m x 0.25 mm df = 0.25 mm (part number CP8713)
Sample Size:	5 µg/mL
Sample Solvent:	Acetone
Carrier Gas:	Helium, constant flow, 1.2 mL/min
Injector:	Splitless mode
Injection Volume:	1.0 µL
Temperature:	70 °C to 240 °C with 5 °C/min
Detection:	MS, EI in SIM



Peak Identification

1. ***1-octen-3-one (metallic/mushroom like odor)***
2. ***(+) fenchone (mud like odor)***
3. ***2-Isopropyl-3-methoxypyrazine IPMP (mud like odor)***
4. ***1-octen-3-ol (fungus like odor)***
5. ***3-isopropyl-2-Ethoxypyrazine (internal standard)***
6. ***(+) fenchol (mud like odor)***
7. ***2-methyl-iso-borneol 2-MIB (earthy/musty odor)***
8. ***2,4,6-Trichloroanisole TCA (cork taint)***
9. ***(±) geosmin (earthy/musty odor)***
10. ***Hexanoic acid (goat odor)***
11. ***Guaiacol (smoky odor)***
12. ***cis-decahydro-1-naphthol (internal standard)***
13. ***2,3,5,6-Tetrachloroanisole TrCA (mould/dust odor)***
14. ***2,4,6-Tribromoanisole TBA (mould odor)***
15. ***2,3,4,5,6-Pentachloroanisole PCA (dust odor)***

Figure 1. Identification and quantitation of the main off-flavors in wine by GC/MS

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