HS-SPME-GC-MS determination of volatile components in toasted oak chips

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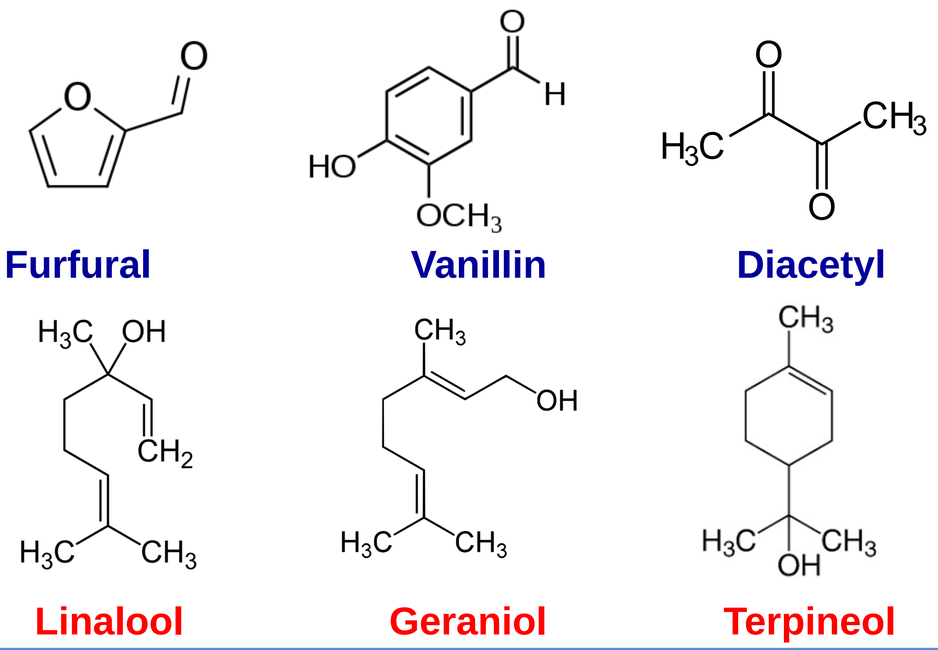
Introduction

Volatile compounds are present in a high content in oak and that have a great impact on wood-matured wine aroma. The main volatiles in oak are volatile phenols, such as guaiacol, eugenol and syringol, phenolic aldehydes such as vanillin and syringaldehyde, furanic aldehydes, such as furfural and oak lactones. In this study, volatile composition of untoasted and toasted oak chips samples produced from oak wood *Quercus* grown in Republic of Macedonia was studied for the first time.

The aim of the work was: (1) characterization of the volatile compounds in oak alternatives (chips and powder) of *Q. Robur* and their possible relationship to the diversity of their form and (2) to study the influence of toasting temperature on the content and changes of different volatile compounds in the oak samples, applying HS-SPME-GC-MS technique.

Chemical structure of some volatile compounds



Materials and methods

Oak samples: oak wood *Quercus robur* from the central part of R. Macedonia

-three sets of oak samples : (i) – open dried (**C-OAD**), (ii) light toasted (LT) 1 h at 120°C (**C-120**) and (iii) medium toasted (MT) 2 h at 170°C (**C-170**).

HS-SPME-GC-MS

✓GC-MS analysis: Agilent system (GC 7890, MS 5975c VL MSD)

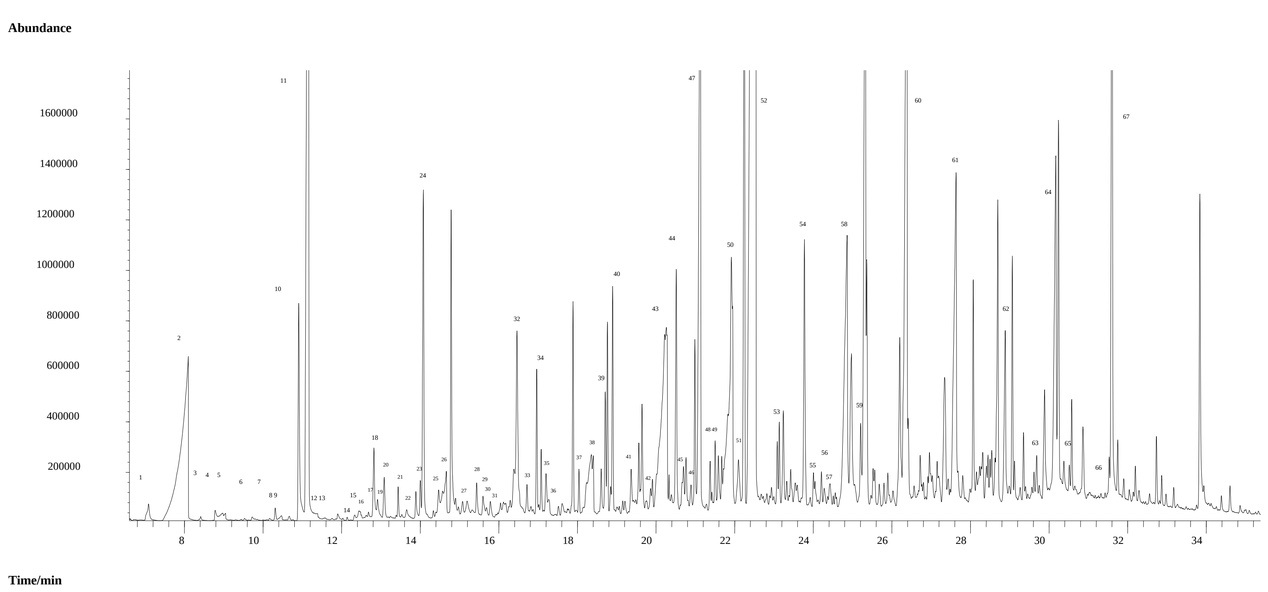
✓Column: HP5MS, 30m*0.25mm*1µm, Agilent Technologies

✓Temperature program: -10 °C for 1 min with a temperature ramp of 8 °C min^{-1} up to 270 °C (holding time 1 min).

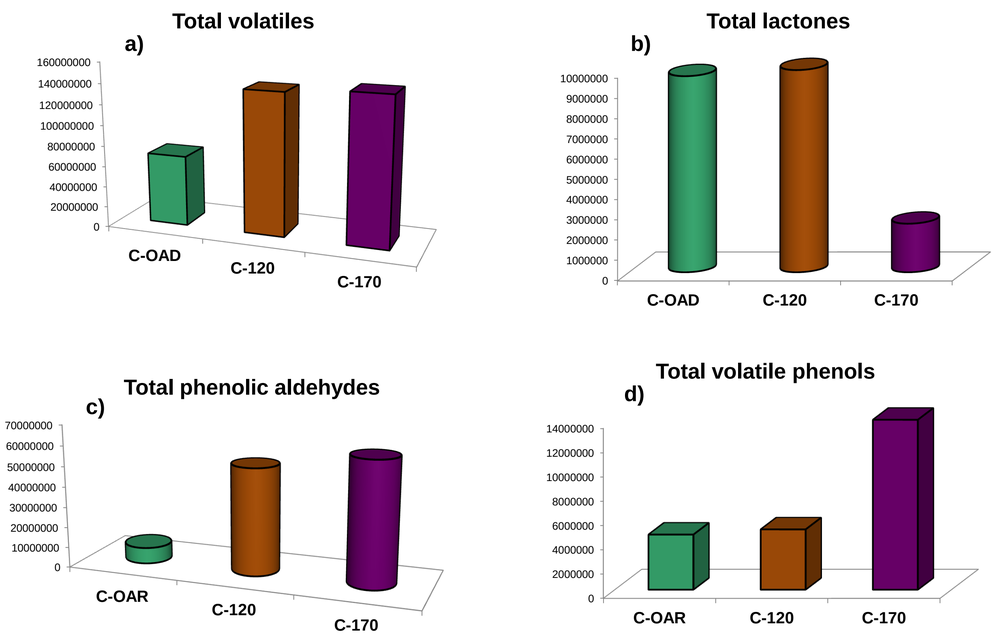
HS-SPME-GC-MS instrumentation

Results and discussion

Total ion chromatogram of the 67 volatilec compounds found in chips oak sample toasted at 120 °C (C-120)



Relative amount of total volatile compounds (a), total lactones (b) in oak samples treated at different temperatures



Conclusion

- ✓ 67 individual volatile compounds have been detected for the first time in oak chips samples from *Quercus* genus grown in Republic of Macedonia.
- ✓ Oak samples were dried at a room temperature (untoasted samples or open air dried) and toasted at 120 and 170 °C
- ✓ All oak samples presented a very complex volatile profile rich in different families of aroma compounds: acids, alcohols, aldehydes, esters, ketones, lactones, phenolic aldehydes, volatile phenols and other compounds.
- ✓ Results showed that heating temperature affect the volatile composition and content of oak samples leading to increased relative amounts of volatile compounds.

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