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COMPARATIVE STUDY REGARDING THE INFLUENCE OF TWO DIFFERENT SOLVENTS IN THE GC-MS ANALYSIS OF SOME NATURAL ESSENTIAL OILS

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Abstract: *The present study aims to identify and describe the differences occured during the process of ion detection from some natural essential oils, regarding the influence of two different solvents: hexane and methanol in the dissolution of the samples. Three essential oils (Laurus nobilis L., Salvia officinalis* and *Melaleuca alternifolia) were studied with the use of a GC-MS device under the same working conditions, with only one difference, respectively the type of solvent used in the sample preparation.*

• Introduction

Accuracy and precision of a GC-MS method, a synergistic combination of two powerful analytic techniques, can be affected by a number of factors, from the conditioning of the samples (phase, volatility, concentration), to the preparation process (extraction, solvent type, working conditions) and the column suitability regarding the nature of samples.

• Material and method

The research was conducted in the *Antioxidants Systems Laboratory* from the *Horia Cernescu Research Unit* from Banat's University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania", Timisoara, Romania.

The samples to be analyzed were represented by three natural essential oils procured from the romanian market: *Laurus nobilis L., Salvia officinalis* and *Melaleuca alternifolia.*

In order to conduct the analysis, the following steps were crossed:

100 µL of each oil were pipetted in two Screw top Vials (2 mL)

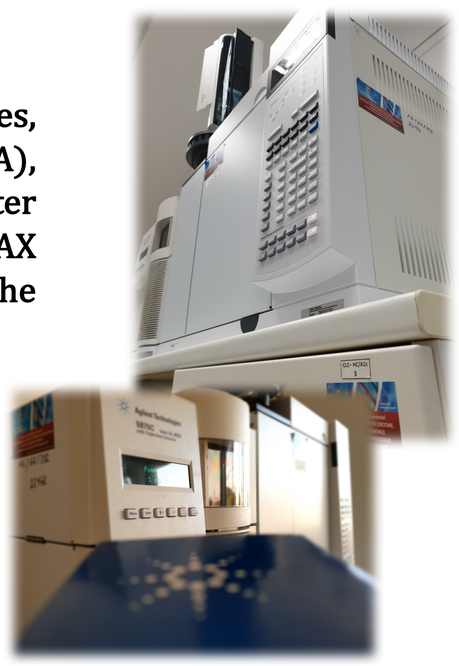
(1) 500 µL from the fist solvent =HEXANE

(2) 500 µL of METHANOL were then added into the second vial

A small portion of the sample thus prepared was then introduced into the injection port of the gas chromatograph.

For the identification of the analytes, a 7820A GC device (Agilent Scientific, USA), coupled with a MSD 5975 Mass Spectrometer and equipped with a capillary column DB WAX (30 m x 250 µm x 0.25 µm) was used. The carrier gas was He, at a flow rate of 1 ml/min.

The analytical parameters of the GC-MS method were the same for both methanol and hexane dissolved samples, as follows: the samples were injected with a 10 µL syringe in a volume of 2 µL (splitless injection). The inlet pressure was 60.688 kpa, the purge flow was set at 50 ml/min and there were three temperature ramps: 230°C (120'), 240°C (120') and 270°C for one hour.

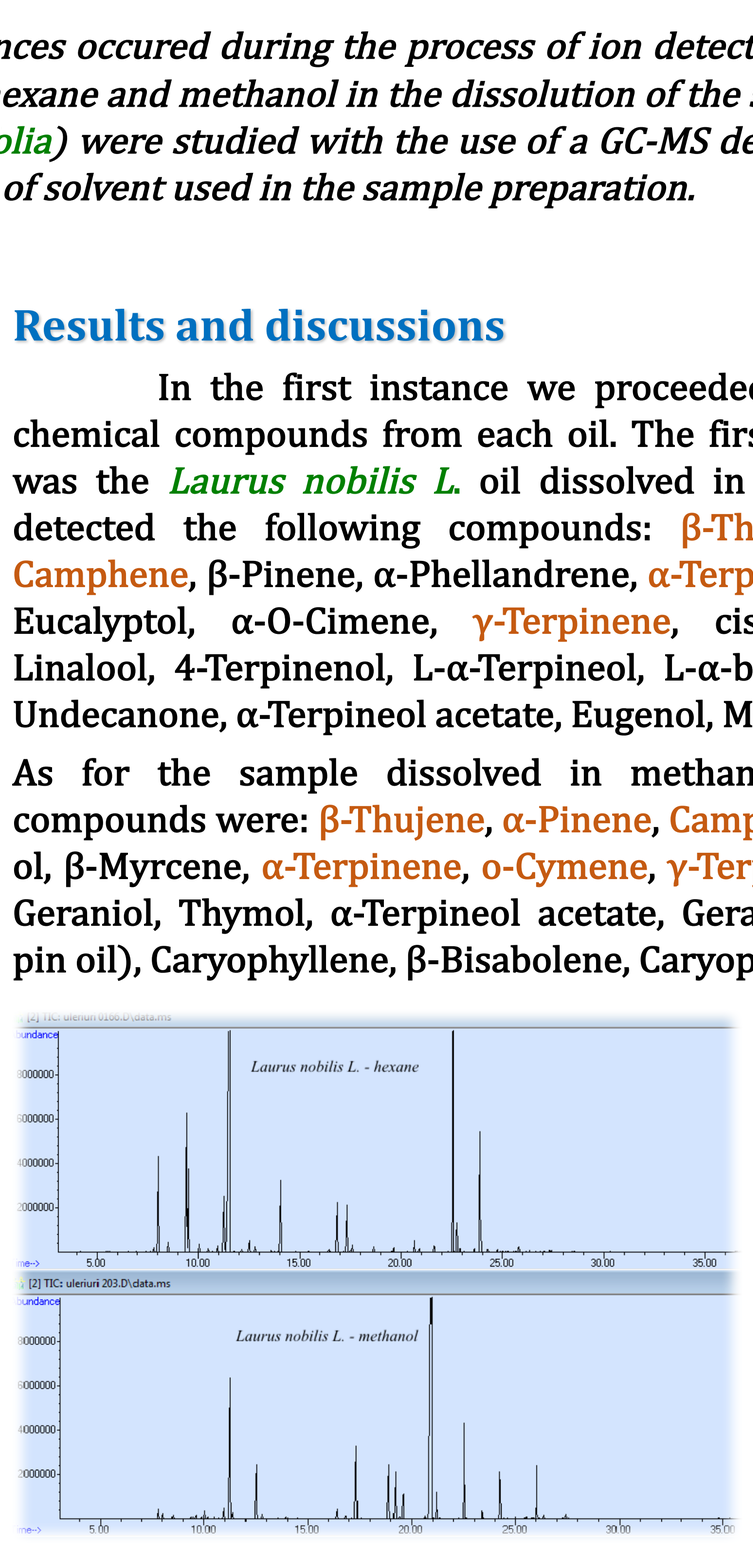


For the identification of the compounds the NIST library was used.

• Results and discussions

In the first instance we proceeded to identify the chemical compounds from each oil. The first to be analyzed was the *Laurus nobilis L.* oil dissolved in hexane. The MS detected the following compounds: β-Thujene, α-Pinene, Camphene, β-Pinene, α-Phellandrene, α-Terpinene, o-Cymene, Eucalyptol, α-O-Cimene, γ-Terpinene, cis-β-Terpineol, β-Linalool, 4-Terpinenol, L-α-Terpineol, L-α-bornyl acetate, 2-Undecanone, α-Terpineol acetate, Eugenol, Methyleugenol.

As for the sample dissolved in methanol the detected compounds were: β-Thujene, α-Pinene, Camphene, 1-Octen-3-ol, β-Myrcene, α-Terpinene, o-Cymene, γ-Terpinene, Camphol, Geraniol, Thymol, α-Terpineol acetate, Geranyl acetate (Bay pin oil), Caryophyllene, β-Bisabolene, Caryophyllene oxide.



As to be seen in the chromatograms above, there are specific compounds that have been detected in both cases (predominantly the main peaks), but there are also compounds that differ from a sample to the other. Another interesting aspect that came across was the amount (% of total) of the analyte which appeared to mismatch between the two samples. For example, in the case of *γ-Terpinene*, in the first sample (H), the amount of te compound was 0,630%, in comparison with the second one (M) in which the detector indicated a concentration of 5,123%.

This interpretation was performed as well for the other two oils, obtaining similar results.

• Conclusion:

In principle, the main peaks were not influenced by the nature of the solvent, however differences were observed in terms of the additional peaks on the chromatograms and the value (%) of the total amount. Mainly, the analytes from the hexane dissolute oils revealed a better performance in comparison with the methanol samples, although a few compounds were favored by the methanol extraction.

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