Analysis of Essential Oils by Ultra Fast GC: an Effective Technique for 30-Fold Speed Increase

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Overview

Purpose: Ultra Fast Gas Chromatography is applied to the analysis of essential oils. By means of direct resistively split injection and a ultra fast program, the Ultra Fast Gas Chromatography achieves a 30-fold speed increase in the analysis time compared to conventional GC.

Methods: Essential oils are diluted 1:200 in cyclohexane and 1 µl of the resulting solution is then injected in split mode in the Ultra Fast GC.

Results: The analysis is achieved within 30 fold speed increase with respect to the conventional GC methods with great accuracy and precision. The separation of critical pairs is optimized by choosing the properly selective stationary phase.

Introduction

An Essential Oil is the product of the hydrodistillation of a plant or part of it. They mainly consists of terpenes and their oxygenated derivatives. Essential oils are generally used in flavor and fragrance formulations in the food, cosmetic and pharmaceutical fields.

Essential oils can be identified by means of their characteristic odors and aromas, and by their chemical composition, which is strongly variable in accordance with environmental factors, variety, geographical origin, and growing conditions. Identification and quantification of essential oils is a complex laboratory task.

The instrumentation that is usually employed for the GC methods is based on the use of a conventional GC coupled with a detector such as FID or ECD.

UFGC is a well known technique that can provide an analysis with speed increased of several fold. Its use in GC is usually not recommended, however, due to the high cost of the instrumentation.

UFGC include those techniques with a high heating rate, usually up to 100 °C/min.

Applications of UFGC include the analysis of essential oils. By means of direct resistively split injection and a ultra fast program, the Ultra Fast Gas Chromatography achieves a 30-fold speed increase in the analysis time compared to conventional GC.

Results

Essential oils are diluted 1:200 in cyclohexane and 1 µl of the resulting solution is then injected in split mode in the Ultra Fast GC.

Conclusions

A 30-fold reduction of the analysis time in the characterization of essential oils was obtained by applying Ultra Fast GC with direct resistively split injection technique. The perfect agreement with the conventional GC method validates the new technique, and the fast and reliable analysis of these complex mixtures may be applied to any essential oils with high performance.

References