

Original Article

Comparative gas chromatography-mass spectroscopy, Fourier transform infrared spectroscopy, and high-performance liquid chromatography analysis of essential oils extracted using 4 methods from the leaves of *Eucalyptus globulus* L.

Abstract

Background: *Eucalyptus globulus* L. (family: Myrtaceae) is one of the world's most widely planted genera. *E. globulus* L., commonly referred to as Tasmanian blue gum, is a fast growing, evergreen tree, native to Tasmania and South-East Australia. Apart from its extensive use in pulp industry, it is also produces *Óleum Eucalypti* (*eucalyptus*-oil) that is extracted on commercial scale in many countries such as China, India, South Africa, Portugal, Brazil, and Tasmania, as a raw material in perfumery, cosmetics, food/beverage, aromatherapy, and phytotherapy. **Materials and Methods:** Traditional hydrodistillation (HD), solvent extraction (SE), ultrasonication (US), and supercritical fluid-extraction (SFE) were conducted for the extraction of essential oil from the leaves of *E. globulus*. Each oil was evaluated in terms of high-performance liquid chromatography (HPLC) and Fourier transform infrared spectroscopy (FTIR) fingerprinting with qualitative and semi-quantitative composition of the isolated essential oil by gas chromatography-mass spectroscopy (GCMS), the extract yield of essential oil was 2.60%, 2.2%, 2.0%, and 3.6% v/v, respectively; for HD, SE, US, and SFE. **Results:** A total of 53 compounds were identified by GCMS. Comparative analysis indicated that SFE was favorable for extraction of monoterpene hydrocarbon, sesquiterpene hydrocarbon, and oxygenated sesquiterpene hydrocarbon. HD, SE, and US had certain advantages in the extraction of aliphatic saturated hydrocarbons organic acid and esters. Overall, FTIR spectra of oil samples obtained by four extraction methods were superimposed with each other showing similar components. The maximum separation of compound seen at 254 nm and lesser at 366 nm by HPLC fingerprinting which again showed superimposed chromatograms. **Conclusion:** It is concluded that different extraction method may lead to different yields of essential oils where the choice of appropriate method is very important to obtained more desired component with higher physiological activities.

Key words:

Essential oil, *Eucalyptus globulus* L.,
Fourier transform infrared spectroscopy,
gas chromatography-mass spectroscopy,
high-performance liquid chromatography,
myrtaceae

Introduction

Eucalyptus globulus (family: Myrtaceae) is one of the world's most widely planted genera.^[1] The leaves

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Gas Chromatographymass Spectrometry In Neurobiology

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Chromatography-mass Spectrometry in Laboratory Medicine, 1975 **Gas Chromatography-Mass Spectrometry** Diane C Turner, Mathias Schäfer, Steven Lancaster, Imran Janmohamed, Anthony Gachanja, Jason Creasey, 2019-11-28 Gas chromatography mass spectrometry GC MS is a powerful way to analyse a range of substances It is used in everything from food safety to medicine It has even been used to protect endangered vultures through analysis of poisonous pesticide molecules in their environment I want to apply this technique where do I begin Is GC MS is the right technique to use How do I prepare my samples and calibrate the instruments This textbook has the answers to all these questions and more Throughout the book case studies illustrate the practical process the techniques used and any common challenges Newcomers can easily search for answers to their question and find clear advice with coloured images on how to get started and all subsequent steps involved in using GC MS as part of a research process Readers will find information on collecting and preparing samples designing and validating methods analysing results and troubleshooting Examples of pollutant food oil and fragrance analysis bring the theory to life The authors use their extensive experience teaching GC MS theory and practice and draw on their combined backgrounds applying the technique in academic and industry settings to bring this practical reference together The authors also design and teach the Royal Society of Chemistry's Pan Africa Chemistry Network GC MS course which is supported by GSK **Practical Aspects of Gas Chromatography/Mass Spectrometry** Gordon M. Message, 1984-10-03 New York Wiley c1984 Gas chromatography / Mass spectrometry (GC/MS) confirmation of drugs : approved guideline, 2002 *Gas Chromatography Mass Spectrometry Applications in Microbiology* Goran Odham, 2014-01-15 Gas Chromatography Bekir Salih, Ömür Çelikbıçak, 2012-03-09 Gas Chromatography involves the study of various vaporizable molecules in chemistry and the other related research fields This analytical method has a number of features and advantages that make it an extremely valuable tool for the identification quantification and structural elucidation of organic molecules This book provides detailed gas chromatography information to applications of biochemicals narcotics and essential oils The details of the applications were briefly handled by the authors to increase their comprehensibility and feasibility This guide should be certainly valuable to the novice as well as to the experienced gas chromatography user who may not have the enough experience about the specific applications covered in this book We believe this book will prove useful in most laboratories where modern gas chromatography is practiced Mass Spectrometry And Gas Chromatography Mrs. Rosenberg, 2003 Advances in Gas Chromatography Xinghua Guo, 2014-02-26 For decades gas chromatography has been and will remain an irreplaceable analytical technique in many research areas for both quantitative analysis and qualitative characterization identification which is still supplementary with HPLC This book highlights a few areas where significant advances have been reported recently and or a revisit of basic concepts is deserved It provides an overview of instrumental developments frontline and modern research as well as practical industrial applications The topics include GC based metabolomics in biomedical plant and microbial research

natural products as well as characterization of aging of synthetic materials and industrial monitoring which are contributions of several experts from different disciplines It also contains best hand on practices of sample preparation derivatization and data processing in daily research This book is recommended to both basic and experienced researchers in gas chromatography Gas Chromatography, Mass Spectrometry Frank A. Settle, Michael A. Pleva, 1988-01-01 Gas Chromatography/mass Spectrometry Hans F. Linskens, John F. Jackson, 1986 **Capillary Gas Chromatography** Halvor Jaeger, 1987 **Lectures on Gas Chromatography 1966** H. A. Szymanski, 2012-06-02 Characteristics of the Phosphate Sensitive Sodium Sulfate Modified Hydrogen Flame Ionization Detector Analysis of Organophosphorus and Organic Iodine Residues by Microwave Powered Emission Spectrometry Gas Chromatography of Amino Acids Recent Advances in Applications of the Microcoulometric Titrating System Automatic Integrators and Gas Chromatography Measurement of Trace Amounts of Inert Gases in Blood by Gas Chromatography Gas Chromatography of Vitamin B6 and Other Vitamins Dual Channel Gas Chromatography Analytical Methods for Pesticides A Modified Hydrogen Flame Ionization

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