

# CITRUS ESSENTIAL OIL DETERPENATION BY LIQUID-LIQUID EXTRACTION

Alberto Arce\*, Alicia Marchiaro<sup>1</sup>, José M. Martínez-Ageitos and Ana Soto

*Department of Chemical Engineering, University of Santiago de Compostela, E-15782 Santiago, Spain*

The object of the present work is to evaluate the possibility of carrying out the deterpenation of the citrus essential oil by using a mixture of ethanol and water as a solvent for liquid-liquid extraction. Liquid-liquid equilibrium has been determined for limonene + linalool + ethanol + water quaternary system at 298.15 K. Partitioning and selectivity of extraction were analyzed. Experimental data were correlated using the UNIQUAC and NRTL equations and the energetic parameters of these models at this temperature are determined.

**Keywords:** LLE, limonene, linalool, ethanol, deterpenation, essential oil

**E**ssential oils are vegetable products, which are basically a mixture of terpenic hydrocarbons and oxygenated derivatives such as aldehydes, alcohols and esters. Citrus essential oil is used as a flavouring agent in pharmaceuticals as well as a fragrant ingredient in soaps, detergents, creams, lotions and perfumes. From its components, oxygenated compounds are mainly responsible for the aroma and flavour, and their content has become a definitive parameter in establishing the price of the oil and representing a reference of quality.

In a previous work (Arce et al., 2004), we have showed the possibility of carrying out the citrus essential oil deterpenation using a mixture of ethanol and water as a solvent for liquid-liquid extraction. In that work, the citrus oil was considered as a binary mixture of limonene and linalool, and we studied liquid-liquid equilibrium (LLE) for ternary systems involved in the process. However, only the study of quaternary LLE would allow the knowledge of the influence of limonene/linalool proportion

in essential oil, the percentage of water in the solvent, and essential oil/solvent ratio, on the partitioning and selectivity of extraction.

With this in mind, liquid-liquid equilibrium has been determined for Limonene + Linalool + Ethanol + Water quaternary system at 298.15 K. Partitioning and selectivity of the extraction were analyzed. Experimental data were correlated using the UNIQUAC and NRTL equations and the energetic parameters of these models at this temperature were determined.

\* Author to whom correspondence may be addressed.  
E-mail address: equa@ccc@usc.es

# Citrus Essential Oils Extraction And Deterpenation

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## **Table of Contents Citrus Essential Oils Extraction And Deterpenation**

1. Understanding the eBook Citrus Essential Oils Extraction And Deterpenation
  - The Rise of Digital Reading Citrus Essential Oils Extraction And Deterpenation
  - Advantages of eBooks Over Traditional Books
2. Identifying Citrus Essential Oils Extraction And Deterpenation
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Citrus Essential Oils Extraction And Deterpenation
  - User-Friendly Interface
4. Exploring eBook Recommendations from Citrus Essential Oils Extraction And Deterpenation
  - Personalized Recommendations
  - Citrus Essential Oils Extraction And Deterpenation User Reviews and Ratings
  - Citrus Essential Oils Extraction And Deterpenation and Bestseller Lists

5. Accessing Citrus Essential Oils Extraction And Deterpenation Free and Paid eBooks
  - Citrus Essential Oils Extraction And Deterpenation Public Domain eBooks
  - Citrus Essential Oils Extraction And Deterpenation eBook Subscription Services
  - Citrus Essential Oils Extraction And Deterpenation Budget-Friendly Options
6. Navigating Citrus Essential Oils Extraction And Deterpenation eBook Formats
  - ePub, PDF, MOBI, and More
  - Citrus Essential Oils Extraction And Deterpenation Compatibility with Devices
  - Citrus Essential Oils Extraction And Deterpenation Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Citrus Essential Oils Extraction And Deterpenation
  - Highlighting and Note-Taking Citrus Essential Oils Extraction And Deterpenation
  - Interactive Elements Citrus Essential Oils Extraction And Deterpenation
8. Staying Engaged with Citrus Essential Oils Extraction And Deterpenation
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Citrus Essential Oils Extraction And Deterpenation
9. Balancing eBooks and Physical Books Citrus Essential Oils Extraction And Deterpenation
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Citrus Essential Oils Extraction And Deterpenation
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Citrus Essential Oils Extraction And Deterpenation
  - Setting Reading Goals Citrus Essential Oils Extraction And Deterpenation
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Citrus Essential Oils Extraction And Deterpenation
  - Fact-Checking eBook Content of Citrus Essential Oils Extraction And Deterpenation
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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