

Flare Mixed-Mode Column: Eucalyptus Essential Oil

Landon A. Wiest,¹ David S. Jensen,² Andrew J. Miles,² Andrew E. Dadson,² Matthew R. Linford¹
Department of Chemistry and Biochemistry, Brigham Young University¹ and Diamond Analytics²
1260 South 1600 West, Orem, Utah 84058, USA

Introduction

The Flare Mixed-Mode/C₁₈ was used to separate the components in eucalyptus essential oil.

Eucalyptus essential oil vapor is used for asthma,¹ bronchitis,² flu,³ respiratory viruses,⁴ and for sanitizing.⁵⁻⁶ Topical uses include help with bronchitis,⁷ congestion,⁸ ear inflammation,⁹ inflammation,¹⁰⁻¹¹ lice,¹² and overextended muscles and pain.¹³

Recent studies suggest that eucalyptus can also be used as an analgesic,¹⁴ antibacterial,¹⁵⁻¹⁶ anti-inflammatory,¹⁰ antiviral,¹⁷ and insecticidal agent,¹⁸⁻¹⁹ and can also reduce blood pressure.²⁰

Eucalyptus is composed of many compounds, including monoterpenes, alcohols and aldehydes.¹³

Experimental

Gradient elution was used to separate the mixture of compounds that comprise the eucalyptus essential oils. Known components of the oil, including pinene and terpineol, were purchased from Sigma-Aldrich (St. Louis, MO).

Sample: 5 μ L of Eucalyptus essential oil (dōTERRA Intl., Orem, UT) dissolved in 1 mL of acetonitrile

Column: Flare Mixed-Mode Column (4.6 \times 33 mm, 4.0 μ m)

System: Agilent 1290 UHPLC, binary pump, DAD, ChemStation software

Injection volume: 2 μ L

Temperature: 35 $^{\circ}$ C

Flow Rate: 1.0 mL/min

Detection: UV at 214 nm

Needle Wash: 1 min with methanol

Mobile Phase: Gradient

A: 10 mM phosphate buffer, pH 8

B: Acetonitrile

Time (min)	%Water	%ACN
0	70	30
12	30	70

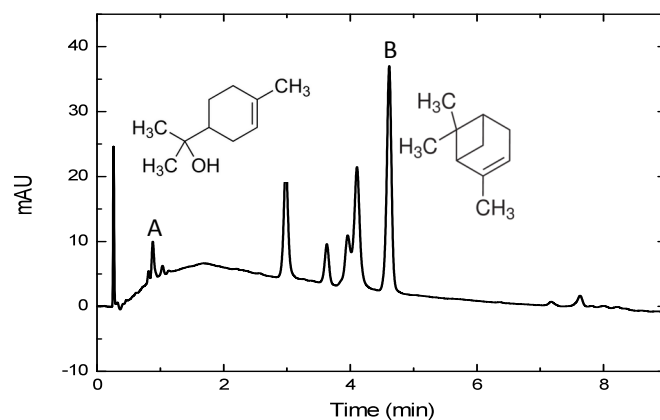


Figure 1. Gradient separation of eucalyptus essential oil (214 nm).

Results and Discussion

The retention times of terpineol (A) and pinene (B) were obtained by individually injecting each compound on the Flare column. These retention times were compared with peaks present in the eucalyptus essential oil. They appeared at the following retention

times: 0.88 min (terpineol) and 4.63 min (pinene).

References

- (1) Juergens, U. R.; Dethlefsen, U.; Steinkamp, G.; Gillissen, A.; Repges, R.; Vetter, H. *Respiratory Medicine* **2003**, *97* (3), 250-256.
- (2) Lu, X.-q.; Tang, F.-d.; Wang, Y.; Zhao, T.; Bian, R.-l. *Zhongguo Zhong yao za zhi = Zhongguo zhongyao zazhi = China journal of Chinese materia medica* **2004**, *29* (2), 168-171.
- (3) Pyankov, O. V.; Usachev, E. V.; Pyankova, O.; Agranovski, I. E. *Aerosol Science and Technology* **2012**, *46* (12), 1295-1302.
- (4) Cermelli, C.; Fabio, A.; Fabio, G.; Quaglio, P. *Current Microbiology* **2008**, *56* (1), 89-92.
- (5) Sartorelli, P.; Marquiere, A. D.; Amaral-Baroli, A.; Lima, M. E. L.; Moreno, P. R. H. *Phytotherapy Research* **2007**, *21* (3), 231-233.
- (6) Delaquis, P. J.; Stanich, K.; Girard, B.; Mazza, G. *International Journal of Food Microbiology* **2002**, *74* (1-2), 101-109.
- (7) Siurin, S. A. *Klinicheskaia meditsina* **1997**, *75* (10), 43-45.
- (8) Paul, I. M.; Beiler, J. S.; King, T. S.; Clapp, E. R.; Vallati, J.; Berlin, C. M. *Pediatrics* **2010**, *126* (6), 1092-1099.
- (9) Atta, A. H.; Alkofahi, A. *Journal of Ethnopharmacology* **1998**, *60* (2), 117-124.
- (10) Grassmann, J.; Hippeli, S.; Dornisch, K.; Rohnert, U.; Beuscher, N.; Elstner, E. F. *Arzneimittel-Forschung-Drug Research* **2000**, *50* (2), 135-139.
- (11) Silva, J.; Abebe, W.; Sousa, S. M.; Duarte, V. G.; Machado, M. I. L.; Matos, E. T. A. *Journal of Ethnopharmacology* **2003**, *89* (2-3), 277-283.
- (12) Williamson, E. M.; Priestley, C. M.; Burgess, I. F. *Fitoterapia* **2007**, *78* (7-8), 521-525.
- (13) *Modern Essentials*; 3 ed.; Abundant Health: Spanish Fork, UT, 2011.
- (14) Gobel, H.; Schmidt, G.; Soyka, D. *Cephalalgia* **1994**, *14* (3), 224-234.
- (15) Charles, C. A.; Amini, P.; Gallob, J.; Shang, H. Y.; McGuire, J. A.; Costa, R. *American Journal of Dentistry* **2012**, *25* (4), 195-198.
- (16) Rasooli, I. *International Journal of Infectious Diseases* **2008**, *12* E167-E167.
- (17) Schnitzler, P.; Schon, K.; Reichling, J. *Pharmazie* **2001**, *56* (4), 343-347.
- (18) Ootani, M. A.; Aguiar, R. W. D.; de Mello, A. V.; Didonet, J.; Portella, A. C. F.; do Nascimento, I. R. *Bioscience Journal* **2011**, *27* (4), 609-618.
- (19) Singh, G.; Upadhyay, R. K. *Journal of Scientific & Industrial Research* **1993**, *52* (10), 676-683.
- (20) Lahlou, S.; Figueiredo, A. F.; Magalhaes, P. J. C.; Leal-Cardoso, J. H. *Canadian Journal of Physiology and Pharmacology* **2002**, *80* (12), 1125-1131.

