

Flare Mixed-Mode Column: Melaleuca 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 column was used to separate the components in Melaleuca essential oil.

Melaleuca tree (tea tree) was used by aboriginal tribes to treat wounds and skin infections.¹ According to an essential oils handbook, Melaleuca has twelve times the antiseptic power of phenol and strong immune-building properties.¹ Recent studies suggest that Melaleuca can be used as an antibacterial,²⁻⁸ antifungal,⁹⁻¹³ anti-inflammatory,¹⁴⁻¹⁷ and antiviral agent.¹⁸ Melaleuca has also been used to treat boils and acne.^{17,19-20}

Melaleuca is composed of many compounds, including monoterpenes, phenols, sesquiterpenes, alcohols and sesquiterpene alcohols.¹

Experimental

Gradient elution was used to separate the mixture of compounds that comprise the Melaleuca essential oil. A known component of the oil was purchased from Sigma-Aldrich (St. Louis, MO).

Sample: 5 µL of Melaleuca essential oil (dōTERRA Intl., Orem, UT) dissolved in 1 mL of acetonitrile

Column: Flare Mixed-Mode Column (4.6×33 mm, 4.0 µm)

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

Injection Volume: 2 µL

Temperature: 35 °C

Flow Rate: 1.0 mL/min

Detection: Multiwavelength UV/Vis Diode Array (214 nm)

Needle Wash: 1 min with methanol

Mobile Phase: Gradient

A: 10 mM phosphate buffer, pH 8

B: Acetonitrile

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

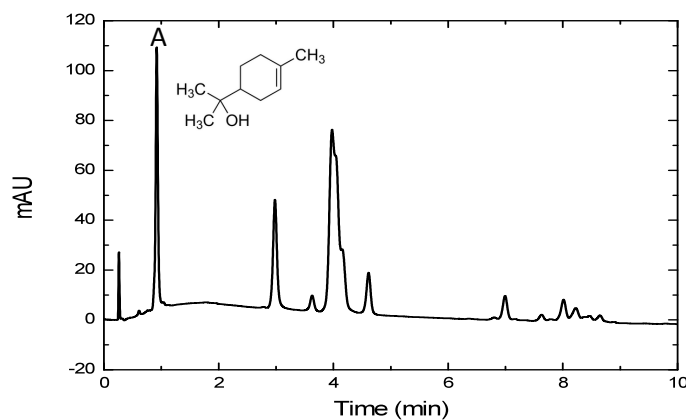


Figure 1. Gradient separation of Melaleuca essential oil (214 nm).

Results and Discussion

The retention time of terpineol (A) was obtained by injecting it on the Flare column. The retention time was compared with the peak present in the Melaleuca essential oil. Its retention time was 0.88 min.

References

- (1) *Modern Essentials*; 3 ed.; Abundant Health: Spanish Fork, UT, 2011.
- (2) Banes-Marshall, L.; Cawley, P.; Phillips, C. A. *British Journal of Biomedical Science* **2001**, *58* (3), 139-145.
- (3) Carson, C. F.; Cookson, B. D.; Farrelly, H. D.; Riley, T. V. *Journal of Antimicrobial Chemotherapy* **1995**, *35* (3), 421-424.
- (4) Carson, C. F.; Hammer, K. A.; Riley, T. V. *Microbios* **1995**, *82* (332), 181-185.
- (5) Carson, C. F.; Hammer, K. A.; Riley, T. V. *Journal of Antimicrobial Chemotherapy* **1996**, *37* (6), 1177-1178.
- (6) Ferrini, A. M.; Mannoni, V.; Aureli, P.; Salvatore, G.; Piccirilli, E.; Ceddia, T.; Pontieri, E.; Sessa, R.; Oliva, B. *International Journal of Immunopathology and Pharmacology* **2006**, *19* (3), 539-544.
- (7) Hammer, K. A.; Carson, C. E.; Riley, T. V. *International Journal of Antimicrobial Agents* **2008**, *32* (2), 170-173.
- (8) Longbottom, C. J.; Carson, C. F.; Hammer, K. A.; Mee, B. J.; Riley, T. V. *Journal of Antimicrobial Chemotherapy* **2004**, *54* (2), 386-392.
- (9) Buck, D. S.; Nidorf, D. M.; Addino, J. G. *Journal of Family Practice* **1994**, *38* (6), 601-605.
- (10) Hammer, K. A.; Carson, C. F.; Riley, T. V. *American Journal of Infection Control* **1996**, *24* (3), 186-189.
- (11) Hammer, K. A.; Carson, C. F.; Riley, T. V. *Journal of Antimicrobial Chemotherapy* **2004**, *53* (6), 1081-1085.
- (12) Mondello, F.; De Bernardis, F.; Girolamo, A.; Cassone, A.; Salvatore, G. *Bmc Infectious Diseases* **2006**, *6*.
- (13) Satchell, A. C.; Saurajen, A.; Bell, C.; Barnetson, R. S. C. *The Australasian journal of dermatology* **2002**, *43* (3), 175-178.
- (14) Caldefie-Chezet, F.; Fusillier, C.; Jarde, T.; Laroye, H.; Damezi, M.; Vasson, M. P.; Guillot, J. *Phytotherapy Research* **2006**, *20* (5), 364-370.
- (15) Caldefie-Chezet, F.; Guerry, M.; Chalchat, J. C.; Fusillier, C.; Vasson, M. P.; Guillot, J. *Free Radical Research* **2004**, *38* (8), 805-811.
- (16) Hart, P. H.; Brand, C.; Carson, C. F.; Riley, T. V.; Prager, R. H.; Finlay-Jones, J. J. *Inflammation Research* **2000**, *49* (11), 619-626.
- (17) Koh, K. J.; Pearce, A. L.; Marshman, G.; Finlay-Jones, J. J.; Hart, P. H. *British Journal of Dermatology* **2002**, *147* (6), 1212-1217.
- (18) Farag, R. S.; Shalaby, A. S.; El-Baroty, G. A.; Ibrahim, N. A.; Ali, M. A.; Hassan, E. M. *Phytotherapy Research* **2004**, *18* (1), 30-35.
- (19) Bassett, I. B.; Pannowitz, D. L.; Barnetson, R. S. *Medical Journal of Australia* **1990**, *153* (8), 455-&.
- (20) Enshaieh, S.; Jooya, A.; Siadat, A. H.; Iraj, F. *Indian Journal of Dermatology Venereology & Leprology* **2007**, *73* (1), 22-25.

