

## Flare Mixed-Mode Column: Peppermint Essential Oil

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### Introduction

The Flare Mixed-Mode/C<sub>18</sub> column was used to separate the components in peppermint essential oil.

Peppermint essential oil has been used medicinally to treat asthma,<sup>1-2</sup> bronchitis, candida,<sup>3-5</sup> diarrhea,<sup>6</sup> flu,<sup>7</sup> halitosis,<sup>8</sup> hot flashes,<sup>9</sup> indigestion,<sup>10</sup> migraines,<sup>11</sup> nausea,<sup>12</sup> and vomiting.<sup>13</sup> Peppermint oil is also documented to have antibacterial,<sup>14-16</sup> anti-inflammatory,<sup>17-18</sup> antispasmodic,<sup>2</sup> and antiviral properties,<sup>19-22</sup> and is an aid for digestion and indigestion.<sup>6,23</sup>

Peppermint is composed of many compounds, including phenolic alcohols, ketones, monoterpenes, esters, furanoids, phenols, alcohols, furanocoumarins and sulphides.<sup>13</sup>

### Experimental

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

Sample: 5  $\mu$ L of peppermint essential oil from dōTERRA Intl., Orem, UT, dissolved in 1mL of acetonitrile

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

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

Injection Volume: 2  $\mu$ L

Temperature: 35  $^{\circ}$ C

Flow Rate: 1.0 mL/min

Detection: UV at 230 nm

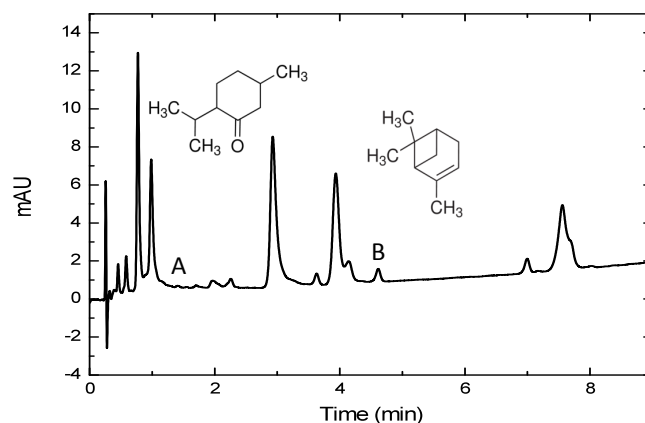
Needle Wash: 1 min with methanol

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 peppermint essential oil (230 nm).

### Results and Discussion

The retention times of menthone (A) and pinene (B) were obtained by individually injecting each compound onto the Flare column. These retention times were compared with peaks present in the peppermint essential oil. They appeared at the following retention times: 1.40 min (menthone) and 4.64 min (pinene).

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