Cannabis Analysis III: Improved Separation of Terpenes and Terpenoids
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(Presented at the Loyola University Undergraduate Research Symposium - Spring 2022)

Introduction

The cannabis plant (Cannabis Sativa L.) produces a variety of compounds covering numerous chemical classes such as cannabinoids, terpenes, and terpenoids. Terpenes and terpenoids are responsible for the aroma characteristics and a variety of purported medical benefits. Terpenes are oligomers of isoprene units, whereas terpenoids are oxidized forms of terpenes. Analysis of these compounds is typically performed by Gas Chromatography (GC) via liquid injection or gas injection (Headspace). Due to the wide boiling point range of these compounds, operational cannabis laboratories most often perform the analysis using liquid injection. However, separation of the numerous and wide variety of compounds in the relatively short period of time needed for high throughput is challenging. We have determined that separation (selectivity) of terpenes and terpenoids commonly found in consumer products was improved by modifying GC column stationary phase chemistry. This improvement in selectivity will ultimately improve identification and quantitation of these compounds.

![Cannabidiol (CBD) and Terpenes/Terpenoids](image)

### 23 Terpenes/Terpenoids

- alpha-Pinene
- Camphene
- (-)-beta-Pinene
- beta-Mycene
- delta-3-carene
- alpha-terpine
- p-Cymene
- d-Limonene
- cis-B-ocimene
- trans-B-ocimene
- gamma-Terpinene
- Terpinolene
- (-)-Isopulegol
- Geraniol
- beta-Caryophyllene
- alpha-Humulene
- cis-Nerolidol
- trans-Nerolidol
- ()-Guaiol
- delta-Caryophyllene oxide
- ()-alpha-Bisabolol
- Eucalyptol

**Current Commercial Selectivity**

**Stock Terpene/Terpenoid Preparation:** Standard solutions of terpenes were purchased at 1.0 mg/mL in isopropanol and diluted to 0.1 mg/mL with isopropanol.

**GC-MS Analysis:** All analyses were performed on an Agilent 7890A/5975C GC-MSD

### Experimental

**Figure 1:** Chromatograms of 23 terpene/terpenoid mixture on low polarity (top) and mid-polarity (bottom) GC columns.

**Results**

**5% di-phenyl - 95% polymethylsiloxane**

**6% (phenyl/cyanopropyl) - 94% polymethylsiloxane**

**Conclusions/Future Work**

- Separation of the terpene/terpenoid std mixture was improved using both column chemistries.
- 23 of 23 terpene/terpenoids were separated on the 5% di-phenyl - 95% polymethylsiloxane column (20 baseline separated).
- 21 of 23 terpene/terpenoids were separated on the 6% (di-phenyl/cyanopropyl) - 94% polymethylsiloxane column (19 baseline separated).
- Future work: identify each component with standards and optimize methods.

**References**

