

Application Note

¹ Stephen Edwards ² Mark Woodruff
¹ U.K. LCMS Services Ltd, Ellesmere Port, UK
² Fortis Technologies Ltd, Cheshire, UK

Cannabinoid Metabolites

Introduction

Cannabinoid analysis has become a new hot topic due to the legalisation of Cannabinoids for both medicinal and recreational use in many states. Whilst there are over 100 cannabinoids known only a few are well researched and known to have a positive effect on the human body. THC is the most well known due to its psychoactive effect on the body, whilst most health benefits are associated with CBD. Anti-inflammatory, anxiety, arthritis and potentially anti-cancer are just some of the benefits people use this medication for. In this application note we look at the analysis of cannabinoids by the use of HPLC with a fast analysis time and good resolution.

“Cannabinoids are associated with a wide variety of health benefits from pain relief to cancer treatment”

Experimental Analysis

The use of a core-shell SpeedCore column allows for high sensitivity and high resolution separations to be achieved for the analysis of 12 common cannabinoids.

In a 7 min run time many of the key cannabinoids can be analysed with high specificity on a C18 column. Sharp peak shapes lead to good sensitivity and resolution.

The method has been optimised to give the best separation of all 12 cannabinoids in a fast throughput time.

Mass Spec allows for structural elucidation of the various cannabinoids. Confirmation of the selectivity of the compounds by this method, means that speed is not compromised but accuracy is paramount, allowing for costs per sample to be minimised.

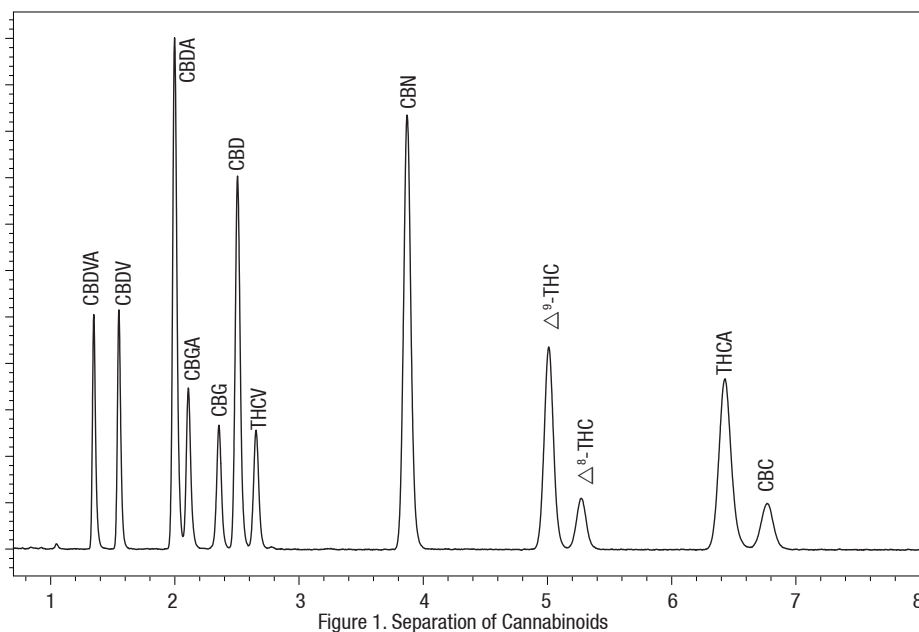


Figure 1. Separation of Cannabinoids

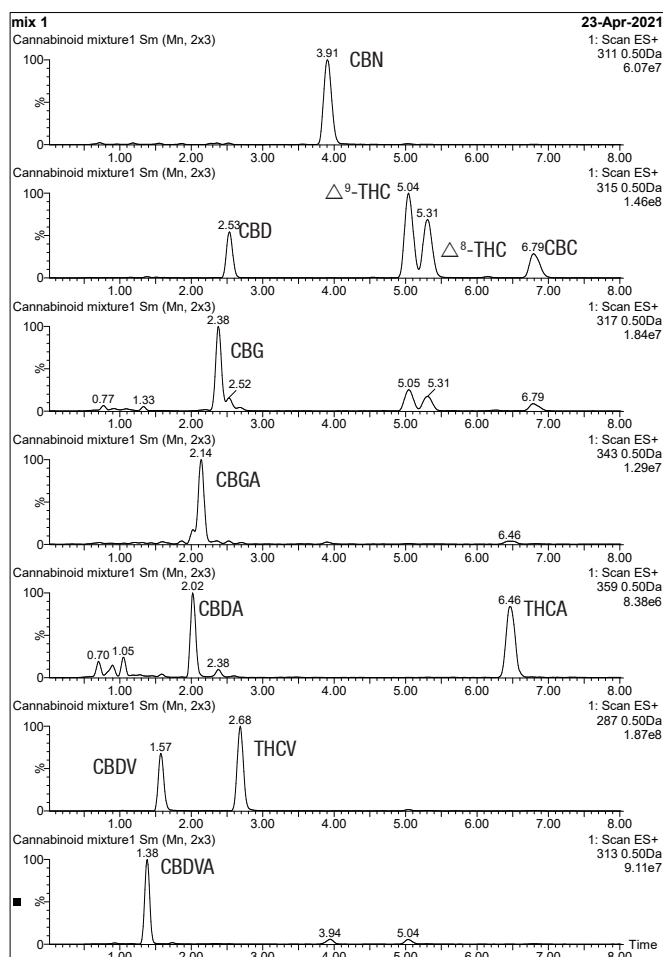


Figure 2. Mass Spec Confirmation

Initial Conditions

Column: 2.6µm SpeedCore® C18

150x2.1mm

p/n SC18-020726

Mobile phase

A: Water + 0.1% formic acid + 8mm Ammonium formate

B: ACN + 0.1% formic acid

Flow Rate: 0.5ml/min

Temp: 25°C

Detection: 220nm

MS Conditions:

Capillary 3500volts

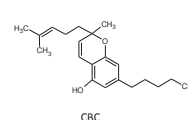
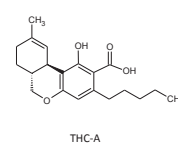
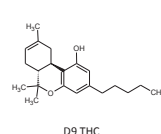
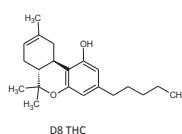
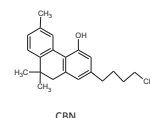
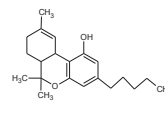
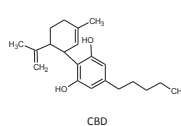
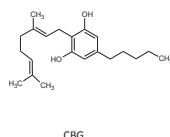
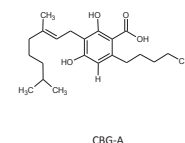
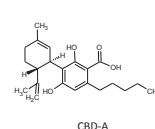
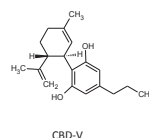
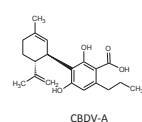
Cone 30volts

Extractor 3volts

RF Lens 0.2v

Desolv temp 450°C

Desolvation flow 500L/hr



Conclusion

In this application note we have shown the separation of 12 cannabinoids in a 8minute run time. Use of the latest SpeedCore column technology has allowed the fast, sensitive, selective resolution of the common cannabinoids commonly thought to hold most medicinal benefit.

HPLC is known to be a robust, reproducible analysis technique, which is key to the accurate quantitation of compounds such as this which are scheduled controlled drugs under US federal law and therefore need to be tightly screened with accuracy paramount. Whilst UV detection works perfectly fine secondary detection with mass spectroscopy confirmation of the compounds allows confidence in the quantitative and qualitative data achieved.

Full resolution of the 12 cannabinoids means that the requirements of the AOAC method 2018.11 are met and that the ability to extract the many matrix that are being used to deliver CBD will not interfere with the qualitative data.

Compounds

1. (CBDVA) Cannabidivarinic acid
2. (CBDV) Cannabidivarin
3. (CBDA) Cannabidiolic acid
4. (CBGA) Cannabigerolic acid
5. (CBG) Cannabigerol
6. (CBD) Cannabidiol
7. (THCV) Tetrahydrocannabivarin
8. (CBN) Cannabinol
9. (Δ^9 -THC) Delta-9-tetrahydrocannabinol
10. (Δ^8 -THC) Delta-8-tetrahydrocannabinol
11. (THCA) Tetrahydrocannabinolic acid
12. (CBC) Cannabichromene

Fortis® and SpeedCore® are a registered trademark of Fortis Technologies. All columns are original manufacturers own.