Analysis of d9-Tetrahydrocannabinol (THC) Using Pyroprobe

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Application Note
Cannabis

Abstract
This application note demonstrates thermal extraction of a THC standard RSDs at 3.14%

Introduction
Cannabidiol (CBD), derived from the cannabis plant, has a growing interest in nutraceutical and pharmaceutical industries. Similar in structure to psychoactive δ9-Tetrahydrocannabinol (THC) found in marijuana, non-intoxicating CBD is being credited with helping treat many medical issues. Diluted in hemp seed oil, CBD oil is a complex natural product, containing many volatile and non-volatile constituents. As demonstrated in an earlier application note[1], the Pyroprobe helped clarify constituents in CBD oil by separating ingredients based on their volatility, then pyrolyzing the non-volatile portion, like the oil itself. In this application note, a thermal extraction setpoint was determined for accurate CBD quantification in CBD oil. CBD oil must contain less than 0.3% THC to be considered federally legal, therefore THC must also be quantified. A method for THC analysis with the Pyroprobe was developed, and RSDs were determined.

Experimental Setup
An internal standard solution of methyl stearate in acetone was prepared at the final concentration of 1 µg/µL. This internal standard was added to a THC standard in Methanol at concentration of 1 µg/µL (Restek P/N 34067) with 50:50 ratio, so the resulting concentration of for both THC and methyl stearate in the stock standard solution was 0.5 µg/µL. Since THC could decompose with prolonged exposure under elevated temperature, UV, and air, the stock standard solution was added to Drop-In-Sample-Chamber (DISC) tubes just prior to analysis. Seven aliquots of 1 µL each were added to 7 DISC tubes using a 1.0 µL syringe. Samples were then pyrolyzed using a CDS Model 6200 Pyroprobe and analyzed by a mainstream GC/MS. Base peaks of m/z 74 and 299.2 were chosen for methyl stearate and THC respectively to calculate area ratios.

Experimental Parameters

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Pyroprobe:		GC/MS	
DISC Chamber:	300°C 30min	Column:	5% phenyl (30m x 0.25mm)
		Carrier:	Helium 1.25mL/min
Trap Rest:	50°C		75:1 split
Trap Final:	325°C 10min	Injector:	300°C
		Oven:	80°C for 10 minutes
Interface:	300°C		15°C/min to 320°C
Transfer Line:	350°C	Ion Source:	250°C
Valve Oven:	350°C	Mass Range:	35-600amu

Results
Figure 1 showed the Total Ion Chromatograms from the 7 samples. The RSDs were calculated based the iron ratio between the internal standard and the THC. An RSD of 3.4% was observed.

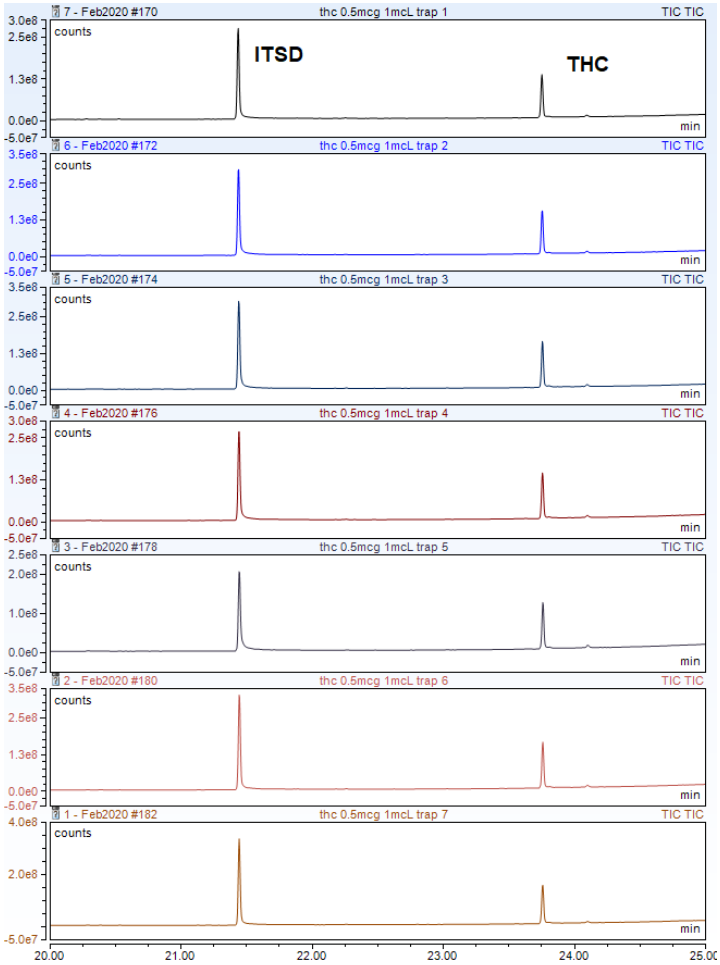

Figure 1. Seven analyses of THC at 300°C.

Table 1. Area Ratio of m/z 74 (ITSD):299.2 (THC) from the seven runs

	Area Ratio	
Rep 1	5.49	
Rep 2	5.30	
Rep 3	5.54	
Rep 4	5.27	
Rep 5	5.01	
Rep 6	5.49	RSD
Rep 7	5.27	3.4%

Conclusion

This application note presented an thermal external method by 6200 Pyroprobe on THC. The 3.4% RSD validated this method for further quantification studies.

References

1. Sam, K., App Note #201: Investigative Multi-Step and Quantitative Analysis of Cannabidiol Oil using the Pyroprobe, CDS Analytical