Ellutia
Chromatography Solutions

Residual Solvents in Cannabis

When Cannabis components are extracted, several potentially harmful compounds are used in the process. They can be left in the extraction and cause harm to consumers. Residual solvents analysis will determine if any solvents have been found within the finished product, and this ensures that consumers are not at risk. Testing for residual solvents is essential.

Hydrocarbon gases as well as organic solvents are used to extract essential oils from cannabis for medicinal products. Residual solvents are any solvents used in extraction that remain in the extracted product. They can be consumed by users in significant quantities.

If Cannabis was to be brought into line with other pharmaceutical testing, each batch of Medicinal Cannabis would need to be tested for potency, flavour profiling and residual solvents. Some manufacturers may use cheap materials in order to produce the products cost-effectively and have a higher profit margin. These cheap materials may have high levels of dangerous solvents. .Residual solvents that are left in the final product can adversely affect patients. For example, if a product that retains high levels of ethanol is used to treat children, it could cause liver damage.

As a result of this danger, testing needs to be taken very seriously due to the harmful nature and severe consequences that the solvents can cause.

Residual solvents in Cannabis were tested by using a readily available standard to show that the compounds can be clearly and easily detected when using an Ellutia 200 Series Gas Chromatograph.

Image 1 - Example of Medicinal Marijuana and extracted Cannabis oil

GC Conditions	
Injector Temperature	230˚C
Detector Type	FID
Detector Temperature	240˚C
Carrier Gas Type	Hydrogen
Constant Pressure	4.65 psi
Split Flow	70 ml min^{-1}
Column Type	EL-VOC 60 m x 0.32 mm x 1.4µm
Temperature Program	
Initial Temperature	40˚C (hold 4 mins)
Ramp 1	4˚C min^{-1} to 200˚C (hold 3 mins)

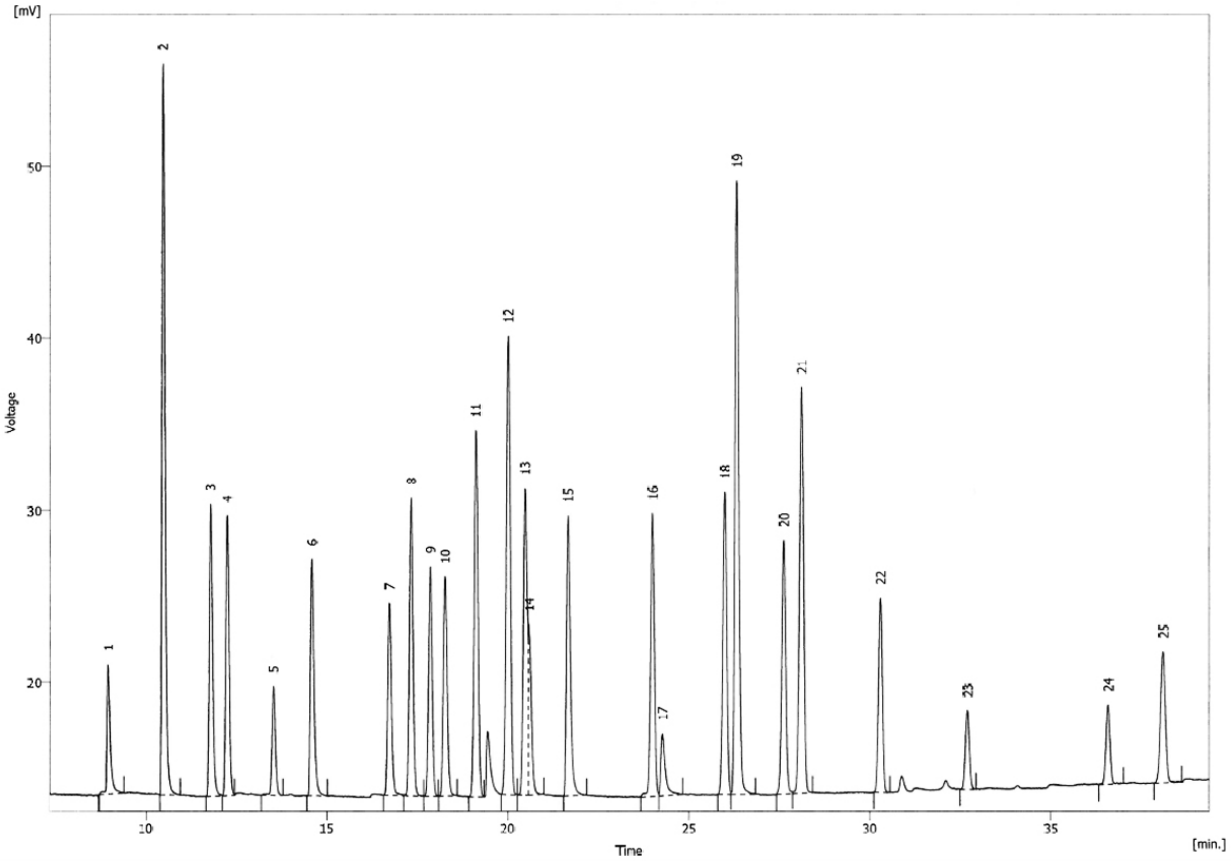

Figure 1 - A 0.5 uL injection of a Residual Solvent mix standard

1. Methanol,
2. Ethanol
3. 2-Propanol,
4. Acetone,
5. Methyl Acetate,
6. 1-Propanol,
7. sec-Butanol,
8. 2-Butanone,
9. Ethyl Acetate,
10. iso-Butanol,
11. Tetrahydrofuran,
Acetic Acid (breakdown product),
12. Methyl Cellusolve,
13. Cyclohexane,
14. iso-Propyl Acetate,
15. n-Butanol,
16. 1-Methoxy-2-Propanol,
17. n-Propyl Acetate,
18. 4-Methyl-2-Pentanone,
19. 2-Ethoxyethanol,
20. iso-Butyl Acetate,
21. Toluene,
22. Butyl Acetate,
23. Methyl Cellusolve Acetate,
24. 2-Ethoxyethyl Acetate
25. Cyclohexanone

In order for residual solvents to be extracted, the components will need to enter the gas phase, and so headspace sampling was used for this purpose. The samples were placed in a headspace autosampler and the sample was heated to encourage the volatile compounds to excite and enter the gas phase. Once this has happened, sampling can take place. The gas sample was injected into the 200 series GC-FID. The GC conditions can be found on the previous page. The GC paired with the EL2000H headspace autosampler creates a low cost, reliable and efficient combination.

As shown in figure 1, all components normally found when testing residual solvents were detected, and detected clearly with low noise output.

Equipment used

Main Instruments

200 Series GC with FID
Part no. 20500130
Ellutia Manual Headspace
Part no. 30501001
Ellution Software
Part no. 23001001
Colibrick
Part no. 23001022
ELM-VOC 60 m x 0.32 mm x 1.8 µm column
Part no. 51100905

Headspace Autosampler

Ellutia EL2000H - Headspace Autosampler - 42 position
Part no. 30500013
Ellutia EL2100H - Headspace Autosampler - 14 position
Part no. 30500014
GC Mounting Kit for EL2000H/ EL2100H Autosampler
Part no. 30500018

Accessories

20 ml Headspace Vials
Part no. 30500022
20 ml Crimp caps for Headspace Vials
Part no. 30500023
1 ml Gas Tight Syringe
Part no. 20511206

For more information on this application, equipment used or ordering, please visit: www.ellutia.com or email: info@ellutia.com.

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UK Tel: +44 (0)1353 669916 Fax: +44 (0)1353 669917
USA Tel: +1 843 259 2307
Germany Tel: +49 (0)561 400 0430 Fax: +49 (0)561 400 0429
Email: info@ellutia.com Website: http://www.ellutia.com