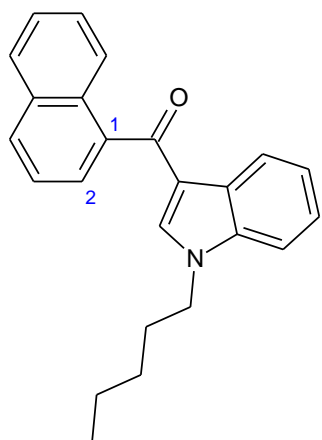


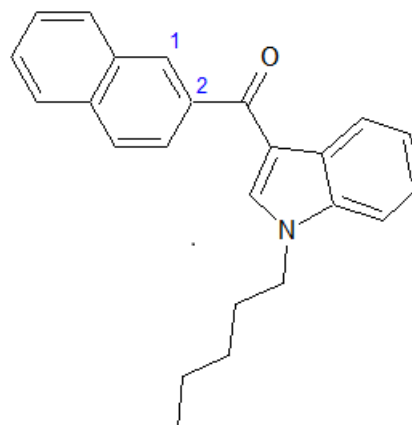
## Analysis of JWH-018 Isomers by GC-IR and GC-MS

The National Institute of Standards and Technology (NIST) in collaboration with the Drug Enforcement Administration (DEA) hosted an Emerging Trends in Synthetic Drugs Workshop in 2013. A speaker compared JWH-018 with one of its isomers. The mass spectrum of JWH-018 (the 1'naphthyl structure) was analyzed and compared to the 2'naphthyl isomer of JWH-018. The most significant difference between the two mass spectra was the peak at 324 amu (loss of 17). The analysis of two standards of these JWH isomers on the DiscovIR GC-IR system are also presented herein and show a dozen points of differentiation in the fingerprint region of the IR spectrum.

The DiscovIR-GC chromatogram of a multicomponent sample of contraband with a small amount of JWH-018 is also presented. JWH-018 elutes at 21.9 minutes at approximately 290°C. The use of cryogenics enables the DiscovIR-GC to produce a high quality spectrum from 0.5 µg of JWH-018 in this challenging sample. The level of performance far exceeds the capabilities of older light pipe technologies in terms of sensitivity, resolution, and the ability to run high temperature gradients. Temperature gradients ramping above 300°C are necessary to analyze many of the synthetic cannabinoids compounds which have been banned in recent years.

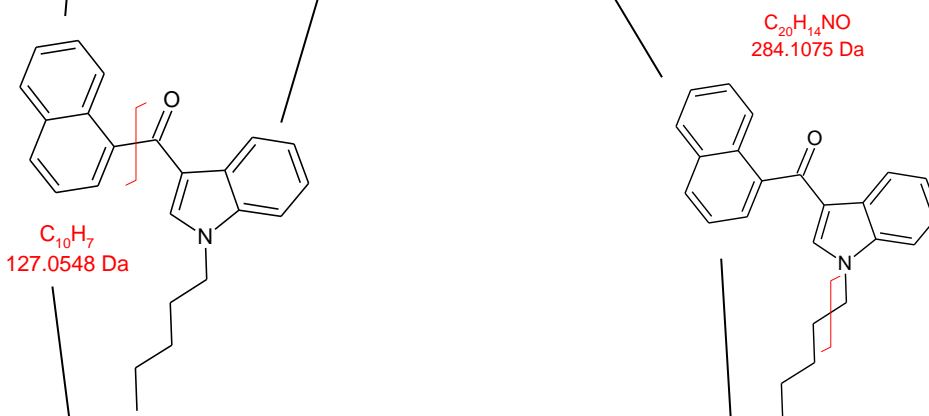
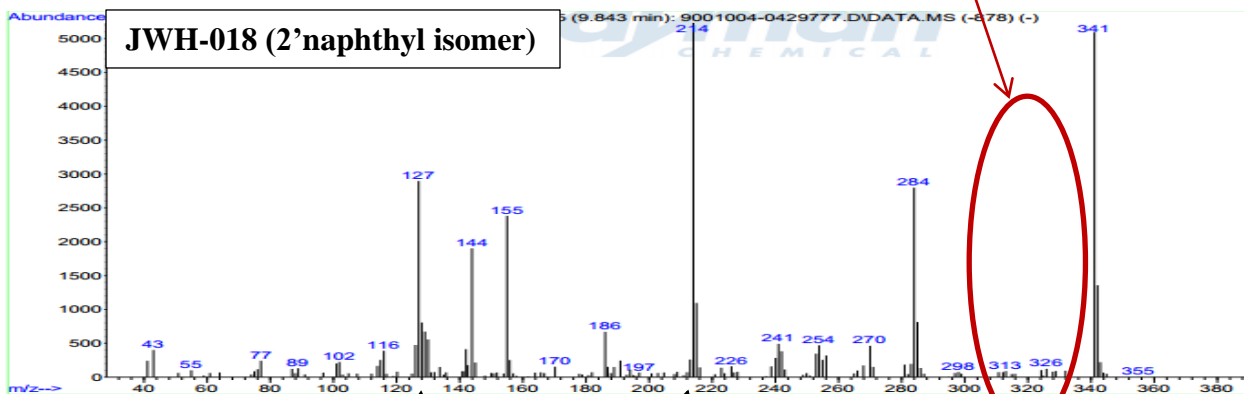


JWH-018 original (1'naphthyl)

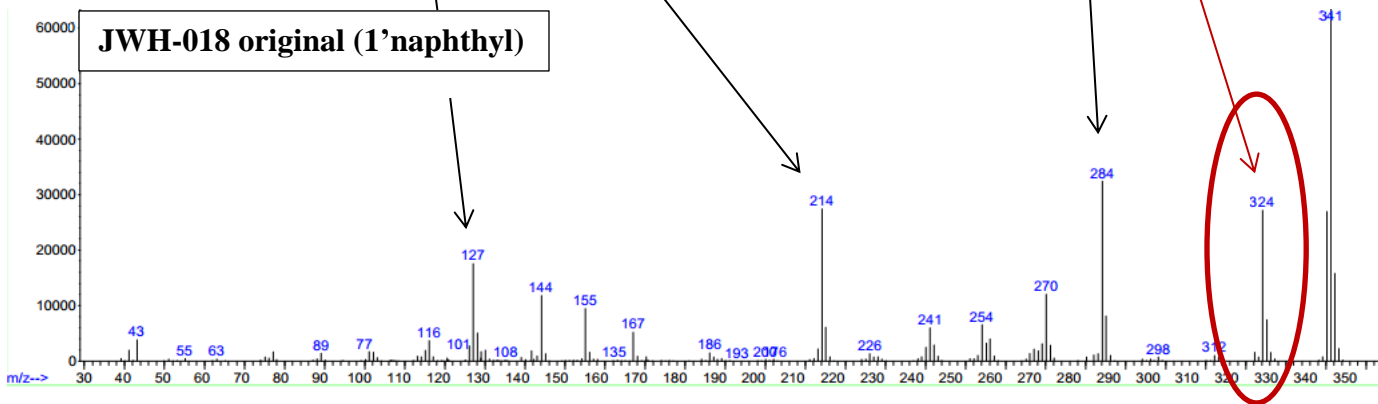


JWH-018 (2'naphthyl) isomer

No peak at m/z 324 (loss of 17)

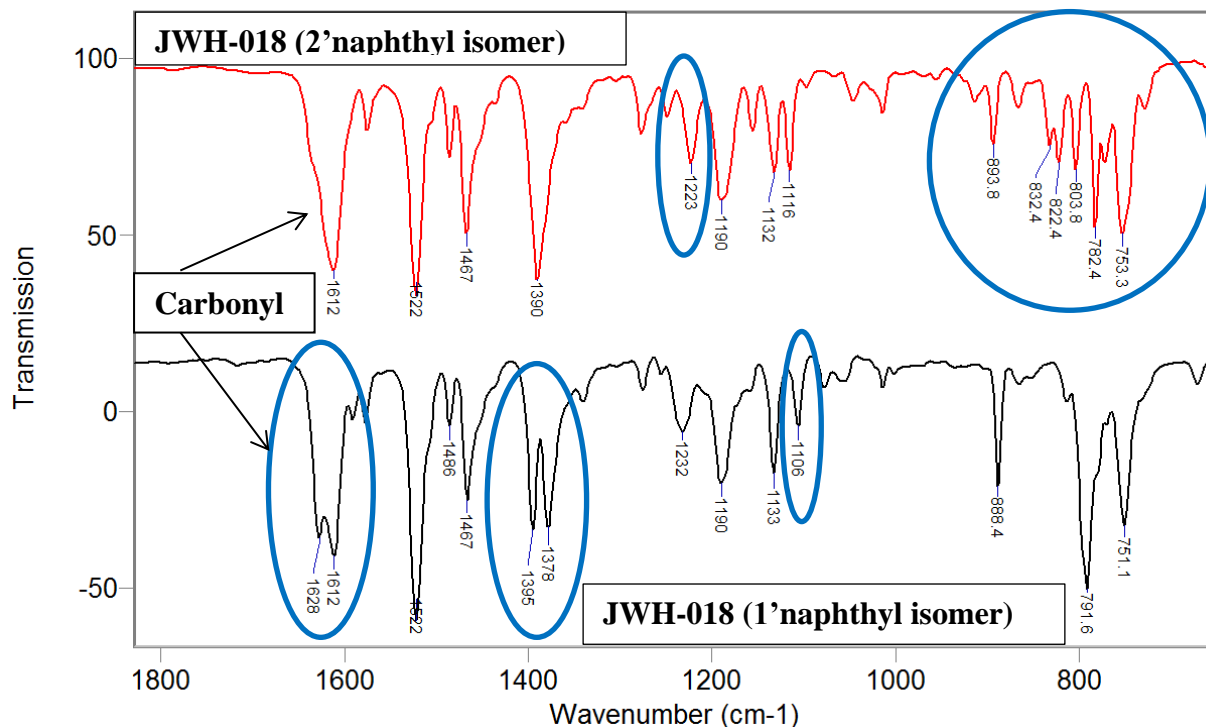


Peak at m/z 324 (loss of 17)



# DiscovIR-GC<sup>®</sup> Infrared Spectra

Twelve points of differentiation increases confidence in the identification.

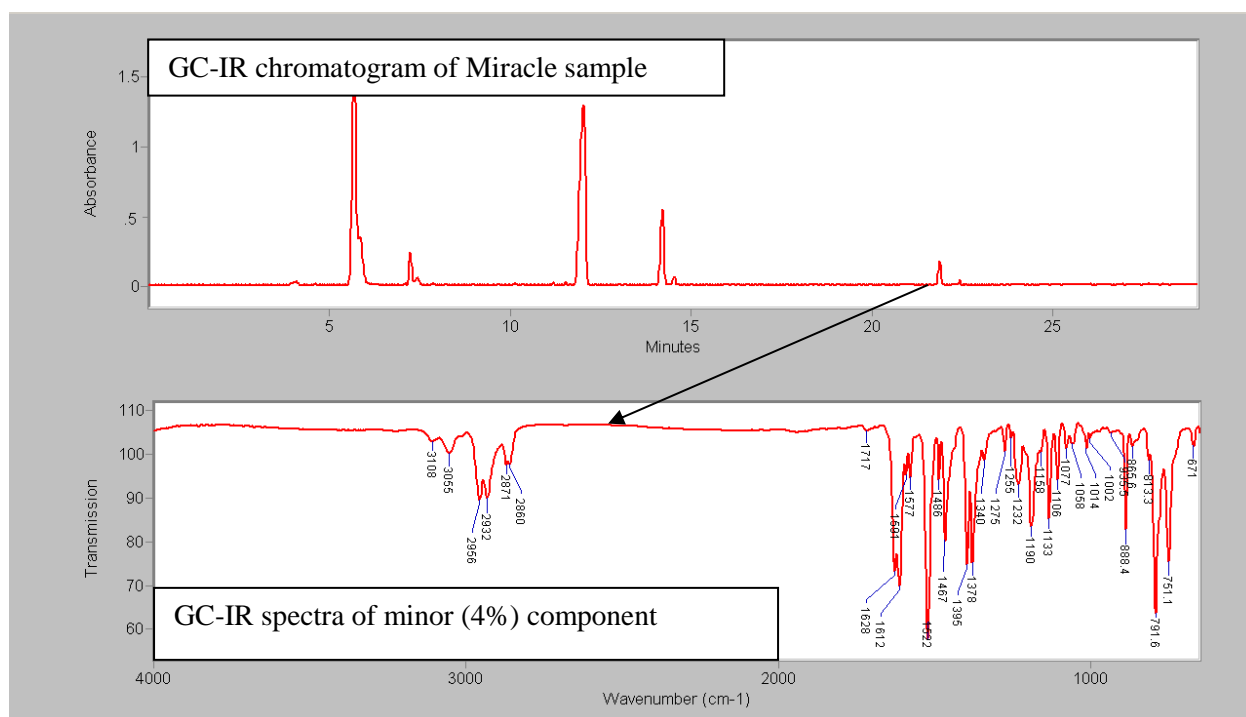


The DiscovIR has important features required for synthetic cannabinoid analysis.

1. Condensing the eluting gas phase peaks onto a cold ZnSe disk concentrates the sample and improves sensitivity.
2. Collecting spectra in the solid phase eliminates centrifugal distortion found in gas phase GC-IR. Rotational modes are eliminated and resolution of infrared spectra is improved.
3. True 4 cm<sup>-1</sup> spectral resolution is necessary to identify a specific isomer and preclude a false positive identification.
4. Cryogenics cool the eluting peaks prior to data acquisition and enable the use of temperature gradient ramps above 300°C.

The chromatogram of a multi component sample is shown in the top half of the figure below. JWH-018 is a minor component eluting at 21.9 minutes at a temperature of 290°C. The JWH-018 represents 4% of the sample based on peak height. The quality spectrum shown below is the result of a rescan acquiring 600 scans of the peak at 21.9 minutes. The 4% peak height corresponds to less than 0.5 µg of JWH-018.

- The DiscovIR-GC infrared spectra have excellent resolution and signal to noise.
- A high quality infrared spectrum is the best technique for the identification of a specific isomer of controlled substances.
- DiscovIR-GC is the best technique to obtain high quality infrared spectra from a complex mixture.



DiscovIR-GC <sup>®</sup> Specifications	
<b>Infrared Spectrum Range</b>	<b>4000-650 cm<sup>-1</sup></b>
<b>Resolution</b>	<b>4 cm<sup>-1</sup></b>
<b>Spectrum Type</b>	<b>Transmittance</b>
<b>ZnSe Sample Disc Capacity</b>	<b>40 hours</b>