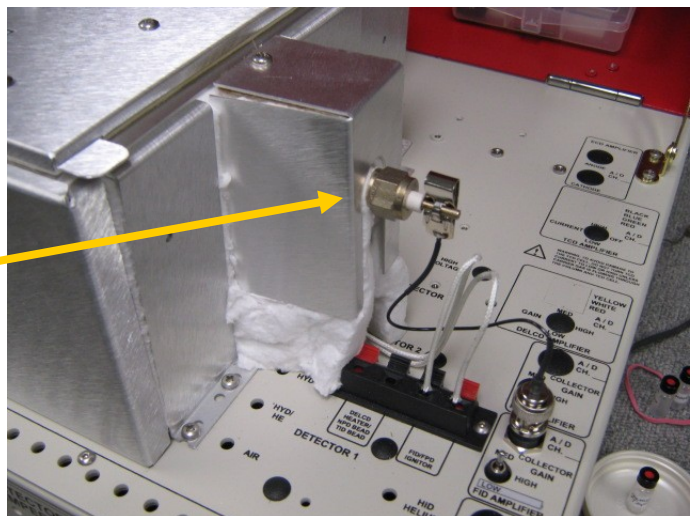
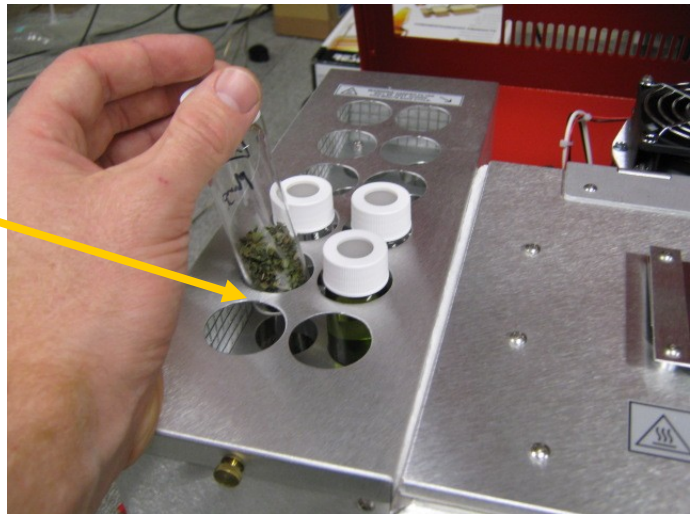
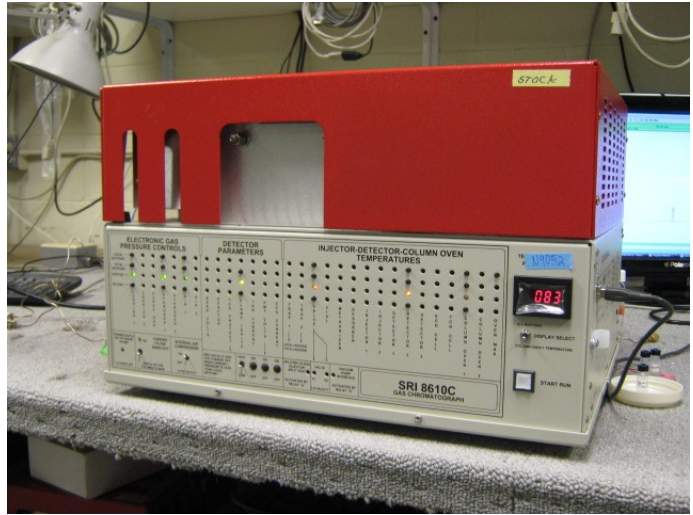


Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

The SRI Medical Herb Potency 8610C GC is shown at right. This GC can also be used to test for the presence of terpenes in cannabis. The word terpene is usually taken to mean the non-psychoactive volatile molecules which make up the characteristic odor of cannabis even though delta-9-THC, CBD and other cannabinoids which are psychoactive, are also terpenes.

The 12 vial sample heater (incubator) aids in extraction for potency testing, but can also be helpful in terpene analysis since the added heat makes the terpenes more concentrated in the gas headspace in the vial.

The GC includes SRI's Flame-ionization Detector (FID) which is sensitive to all the terpene and cannabinoid molecules.



Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

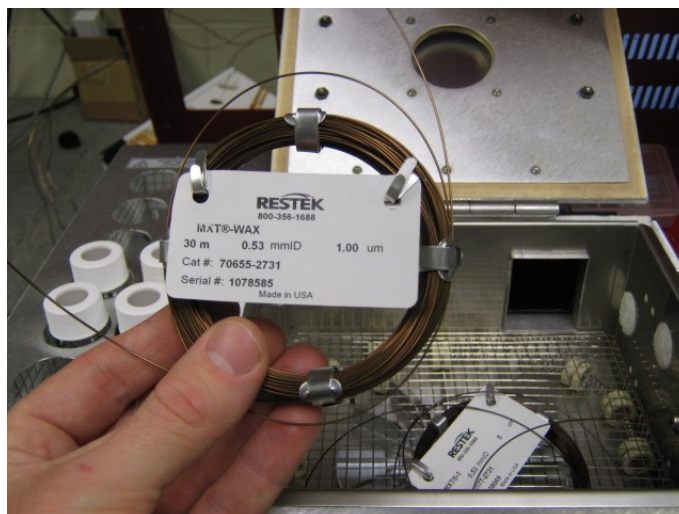
The terpene molecules commonly found in cannabis include:

α -Pinene
 β -Pinene
Camphene
Cineole (Eucalyptol)
 γ -terpinene
 β -Caryophyllene

But there are many more.

Many types of columns could be used to separate these molecules, but SRI currently suggests a 30meter MXT-WAX with 1 micron film thickness and .53mm id. The terpene analysis can be performed on other columns but the MXT-WAX provides the best separation.

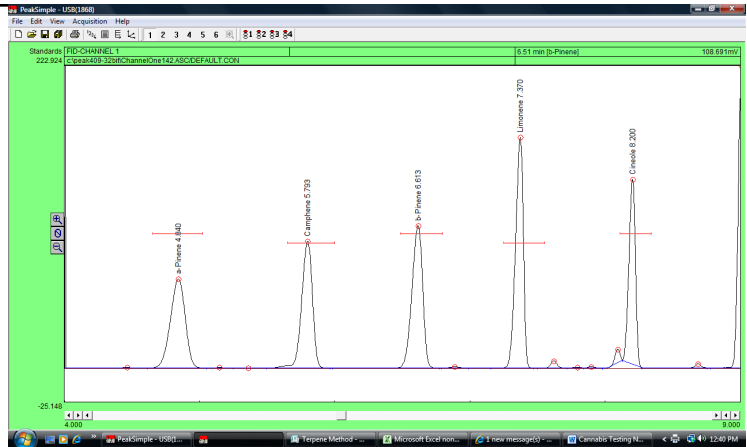
The entire GC plugs into any Windows computer using a USB cable.



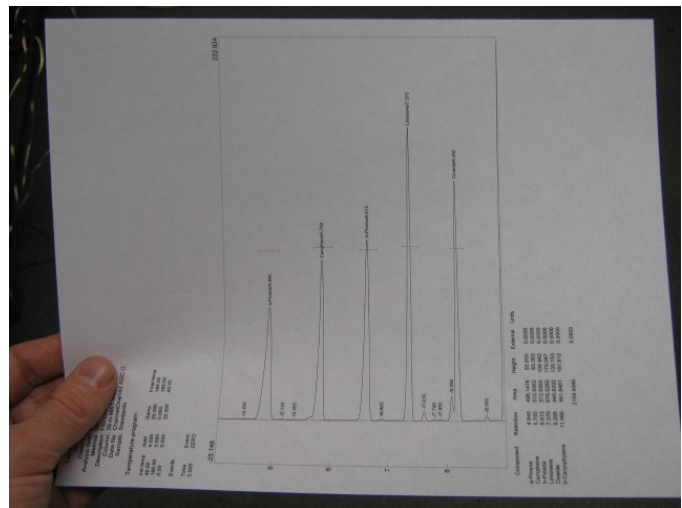
SRI Tech Support 310-214-5092
www.srigc.com

Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

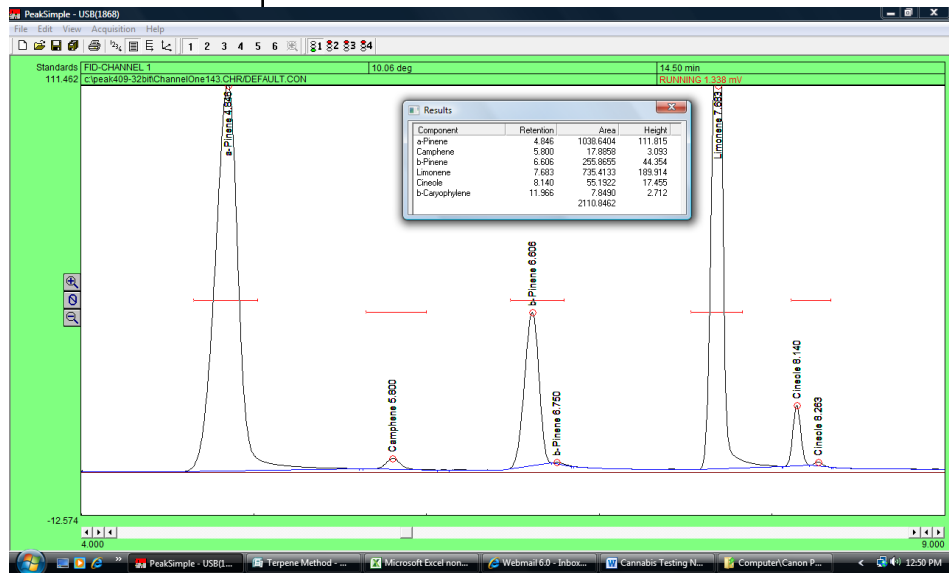
SRI's PeakSimple software is included with the GC. PeakSimple software collects the GC data and generates a qualitative result which can be printed or transferred to other programs such as Excel or Word.



The chromatogram hardcopy print-out at right shows a five terpene standard which was injected to identify these volatile odor compounds.



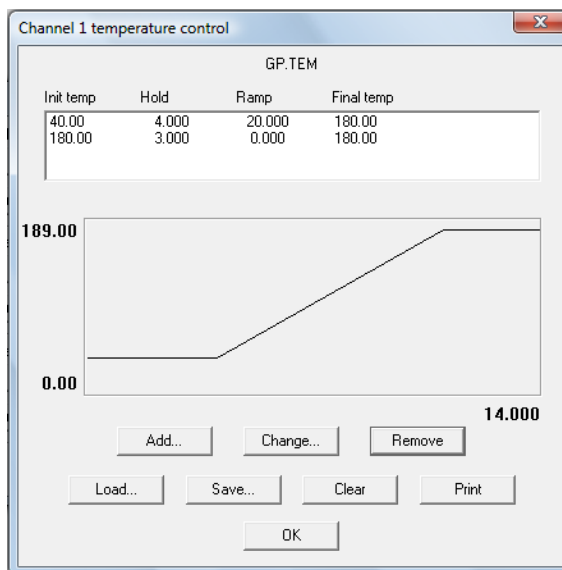
An actual cannabis sample run on the MXT-Wax column is shown at right.



The terpenes alpha-Pinene, Camphene, beta-Pinene, Limonene, and Cineole are identified on the chromatogram.

Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

Set the column oven temperature as shown at right. It is best not to exceed 180C or the MXT-WAX column may be damaged.



Set the Integration parameters as shown.

Channel 1 integration

Peak detection sensitivity

Peak: 95.00 %

Base line: 60.00 %

Area reject: 1.000

Standard weight: 1.000

Sample weight: 100.000

Spike channel

None

1

2

3

4

5

6

Merge results from channels:

1

2

3

4

5

6

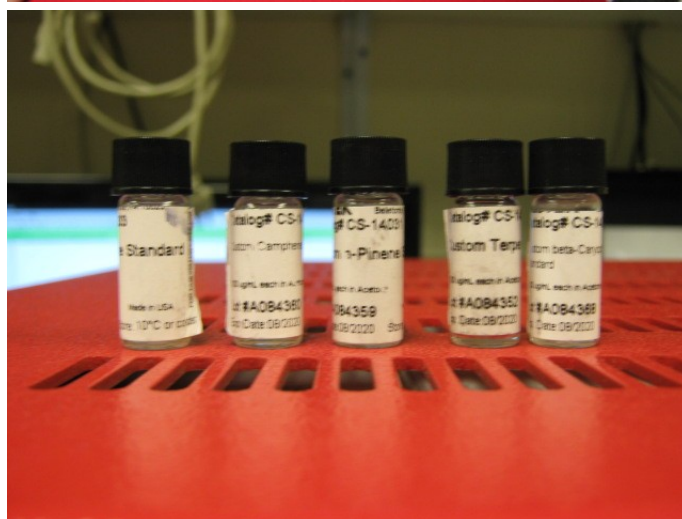
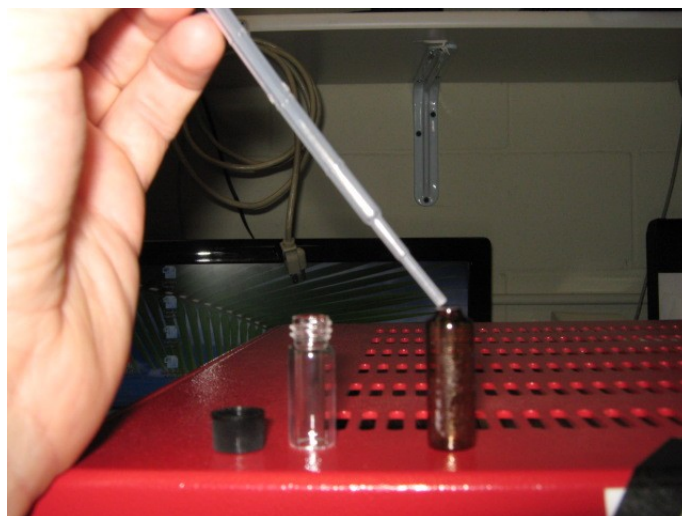
OK Cancel

Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

In order to identify terpenes in cannabis obtain the standards from a chromatography supplier like Restek (restek.com) (800) 356-1688.

Break the glass ampoule and transfer the contents into a 2ml septum vial (Restek #21154 and #24495). Restek provides one free vial with each standard.

You will end up with one vial per terpene standard. There are 5-10 main terpenes in cannabis.



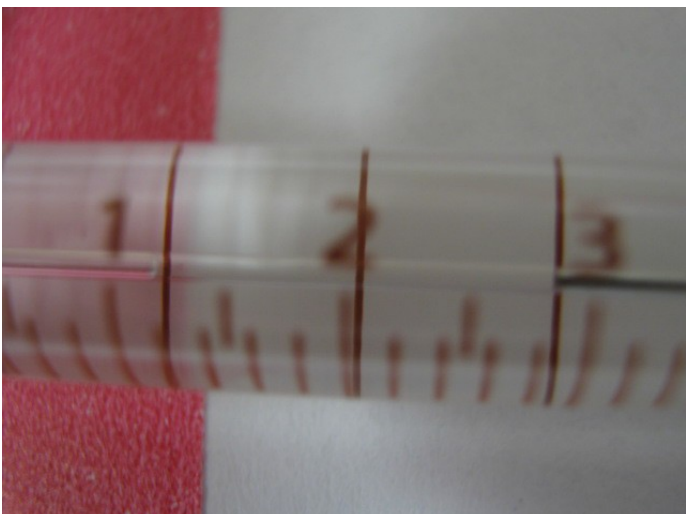
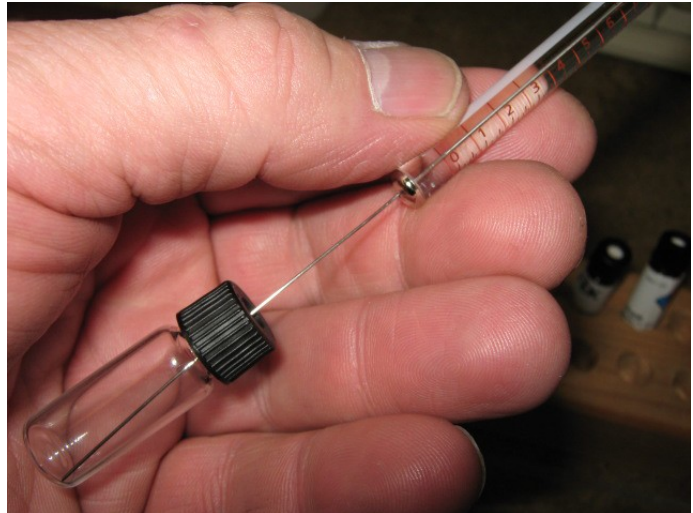
Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

To qualitatively identify each terpene, the standard must be injected into the GC. Rinse the syringe first, then: use the 10uL syringe delivered with the GC (SRI #8670-9550) to withdraw 3-4uL of the standard. Puncture the septum rather than open the vial to avoid letting the methanol solvent evaporate each time the vial is opened. Pump the plunger several times to get rid of air bubbles.

With 3-4uL of liquid in the syringe, hold the needle vertically or at least slanted upwards so any air bubbles will rise toward the needle. With air bubbles removed, push the plunger to the 1uL mark. It is important to be as precise as possible. Wipe the needle with your fingers or a tissue to remove any liquid from the outside of the needle.

Pull the plunger back to the 3uL mark and note the amount of liquid. It should be 1.6-1.8 uL because the needle also contains .6-.8uL and this adds to the 1uL you measured with the plunger.

Leave the plunger at the 3uL mark.

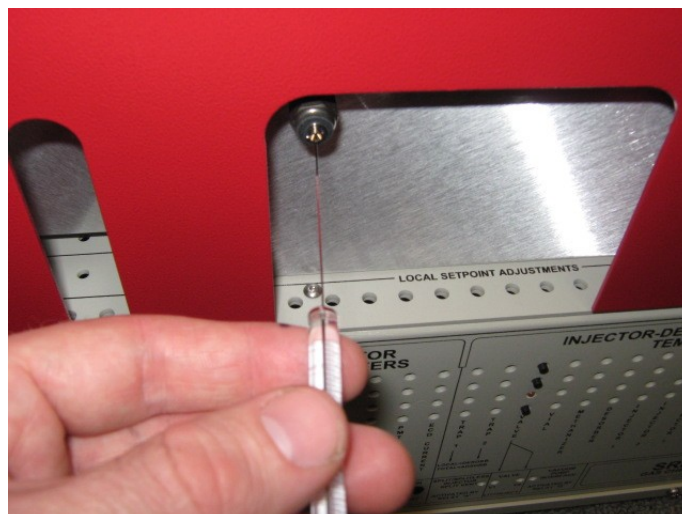


Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

With the plunger still at the 3uL mark, place the needle up against the septum of the injection port (but not poking through it yet).

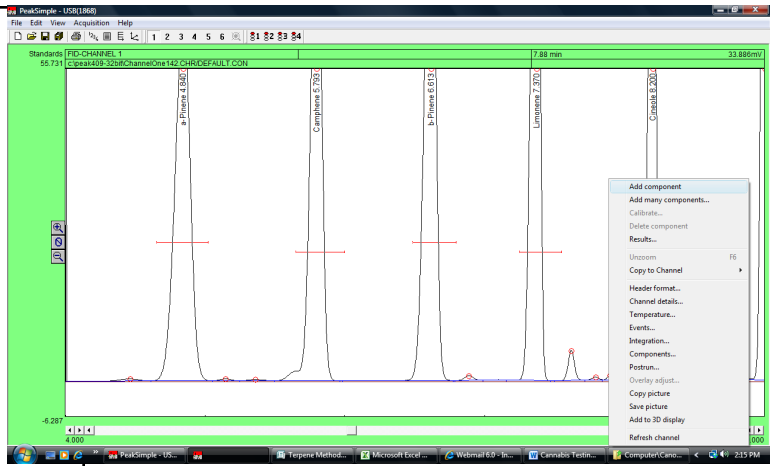
Press the Start Run button or press the spacebar on the keyboard.

Insert the syringe all the way through the septum as far as it will go. Immediately depress the plunger. Twist the syringe one half turn (to wipe off any liquid on the tip of the needle) and then withdraw the syringe.

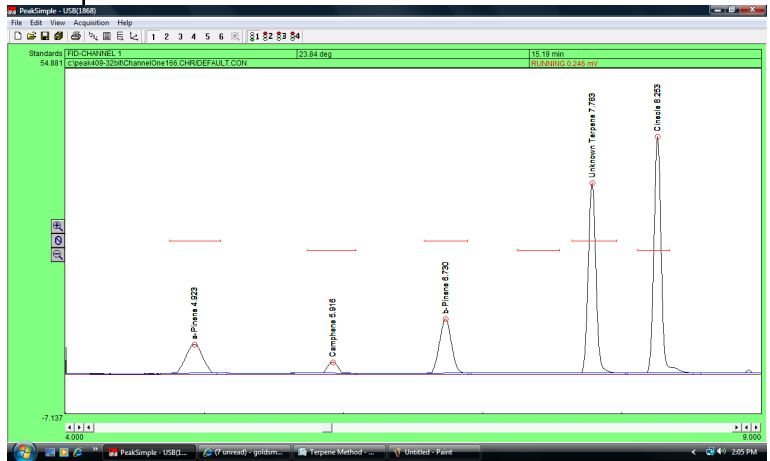


Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

For this terpene standard we have five peaks. Identify the peaks so that each peak is defined by a “retention window”. See the PeakSimple tutorial describing the process of creating retention windows.



After qualitatively identifying the five terpene standards we can identify the same terpenes on subsequent sample runs of actual cannabis.



Navigate to the View/Results screen to see the report.

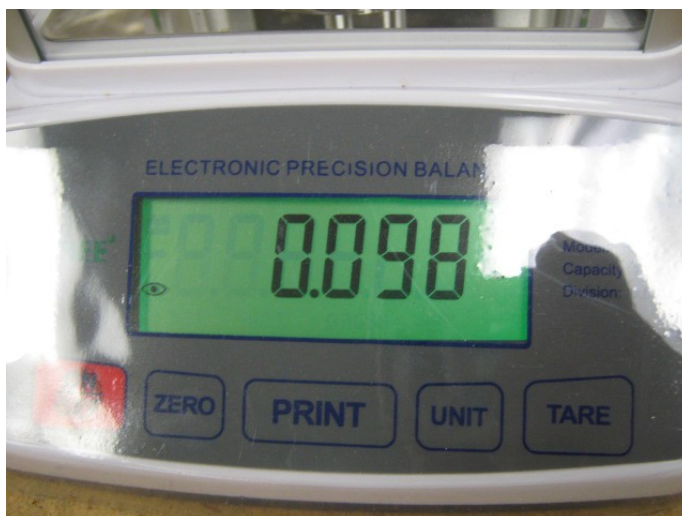
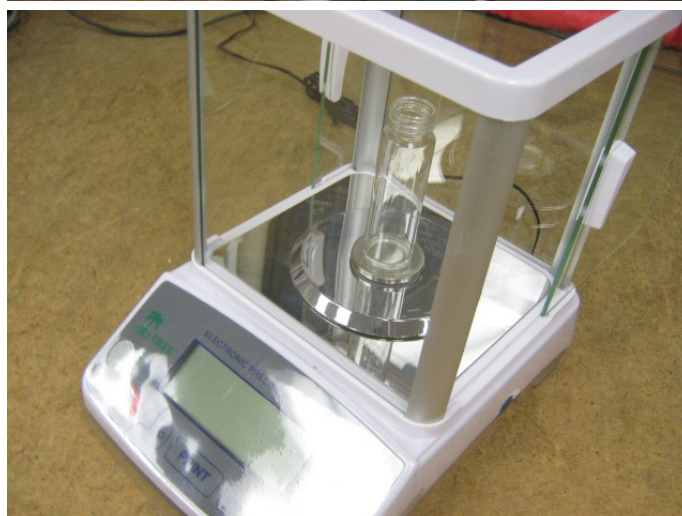
Component	Retention	Area	Height	External	Units
a-Pinene	4.923	42.8834	5.219	0.0000	
Camphene	5.916	9.6742	1.967	0.0000	
b-Pinene	6.730	56.7784	9.717	0.0000	
Limonene	0.000	0.0000	0.000	0.0000	
Unknown Terpene	7.783	128.6957	34.155	0.0000	
Cineole	8.253	151.3854	42.477	0.0000	
		389.4171		0.0000	

Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

Remove the cap from a 40mL vial and place it on a balance capable of reading 1 milligram (.001 gram). A balance like this can be purchased brand new for less than \$300 on eBay.

With the 40mL vial on the balance, tare the reading (make the reading 0.000). Carefully add 100 milligrams of manicured cannabis to the vial. Drop the bits of cannabis into the vial slowly until the reading is close to 100 milligrams.

Don't worry if you are slightly under or above 100. In the photo at right, the reading is 98 milligrams which is close enough. Qualitative terpene analysis does not depend on an exact measurement of sample, but the operator may find it advantageous to use the same sample for a subsequent potency analysis. In this case, the reading on the scale will be important in properly measuring the cannabis sample. See the PeakSimple tutorial describing Medical Cannabis Potency.



Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

Seal the cap of the 40mL vial and let it sit for 30 minutes in the incubator.

Use a 3mL gas syringe to extract 1mL of gas from the “headspace” of the sample vial.

Inject the contents of the syringe into the injection port and start the run as shown previously.

The picture at right shows a terpene sample vial filled to the neck with extraction solvent and ready to be injected for cannabis potency analysis. See the PeakSimple tutorial describing the process for Medical Cannabis Potency Testing.



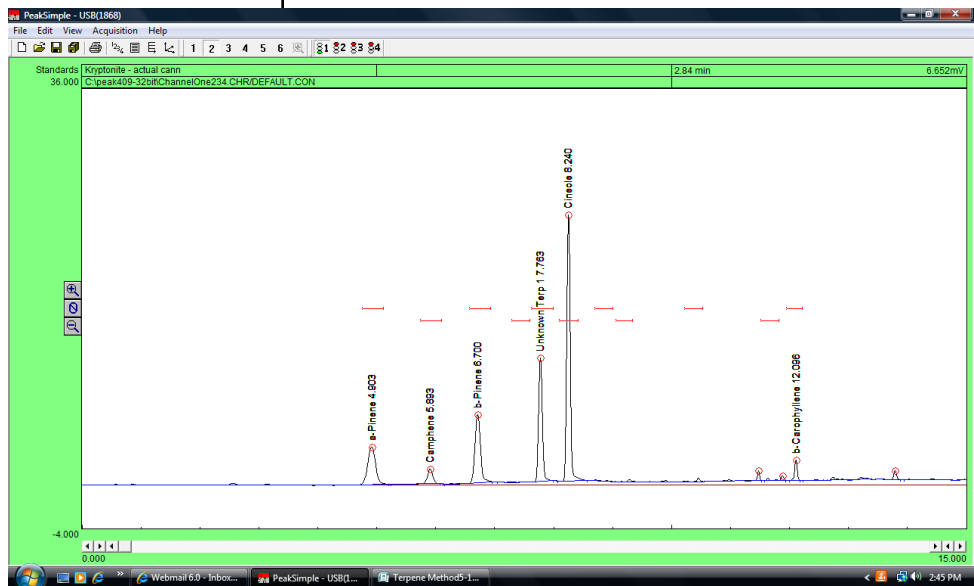
Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

A real cannabis sample will look something like the chromatogram at right.

There may be several peaks under your known standard retention windows, there may be several unidentified terpenes without retention times.

The Results screen will display the area counts of all peaks detected and identified with retention windows.

Print the chromatogram and results for a hardcopy record of the analysis.

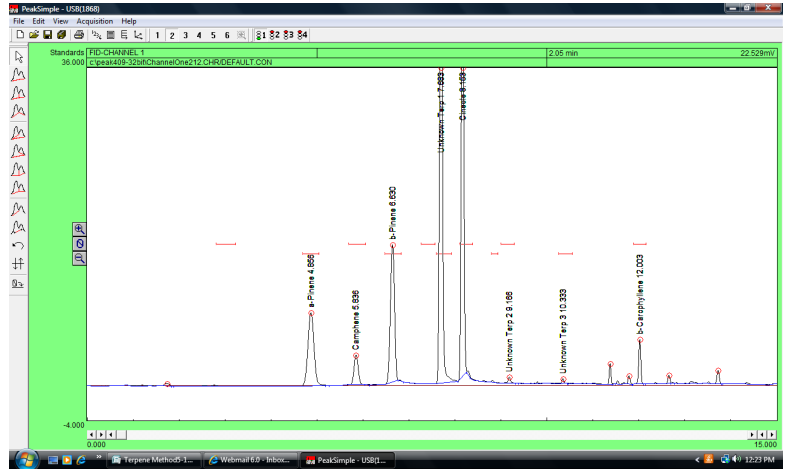


Component	Retention	Area	Height	External	Units
a-Pinene	4.886	717.7417	82.088	0.0000	
Camphene	5.843	15.6040	2.852	0.0000	
b-Pinene	6.590	205.5464	34.766	0.0000	
Limonene	7.446	2.2932	0.839	0.0000	
Cineole	8.136	51.6308	17.160	0.0000	
b-Caryophyllene	11.980	4.5623	1.743	0.0000	
		997.3784		0.0000	

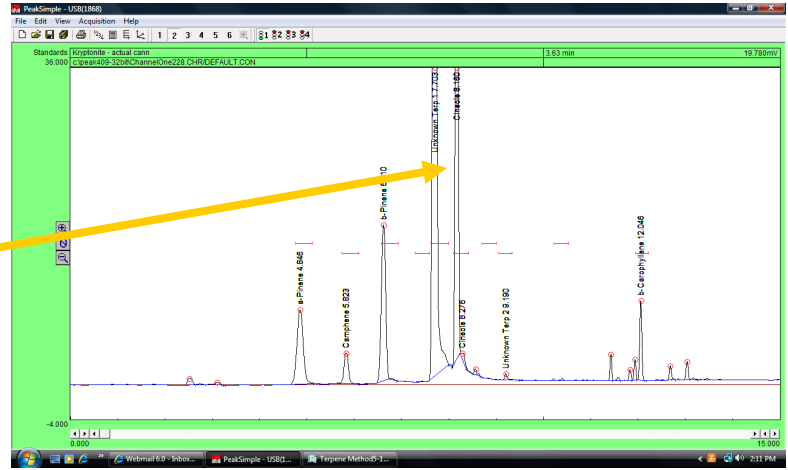
Each row in this results table contains the calculated results for a single peak or

Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

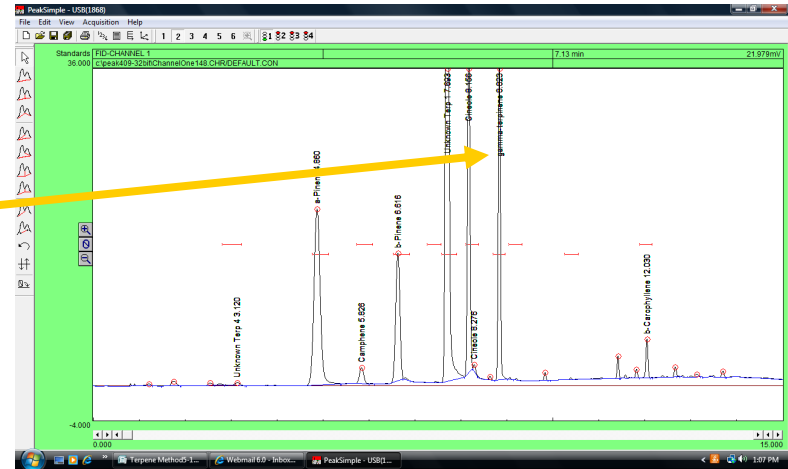
Here is what terpene analysis on the strain King Louie 13 OG looks like. Notice the presence of at least six terpenes: α - and β -Pinene, Camphene, Myrcene, Cineole, and β -Carophyllene.



This is a strain called Gush. Notice how, like many strains, it is highly concentrated in both myrcene and cineole. Also known as eucalyptol, cineole smells spicy, camphor-like, refreshing, and minty.



This sample of Green Crack has high concentrations of γ -terpinene. This terpene has a characteristic low-intensity lemon smell and is commonly used as an aromatic in foods, soaps, perfumes, and flavors.

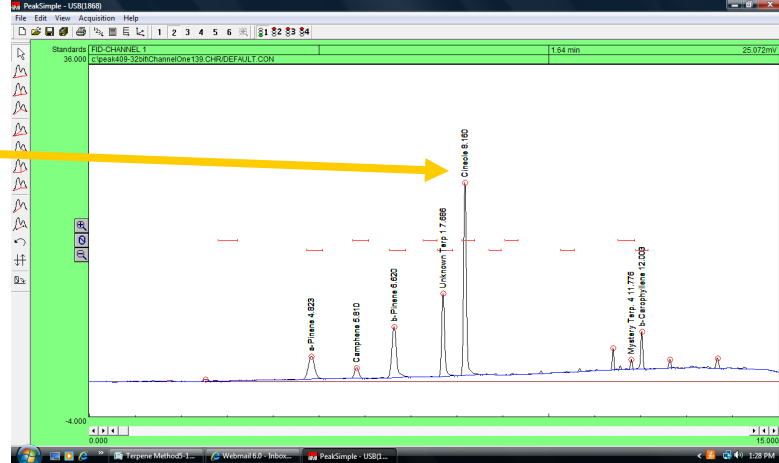
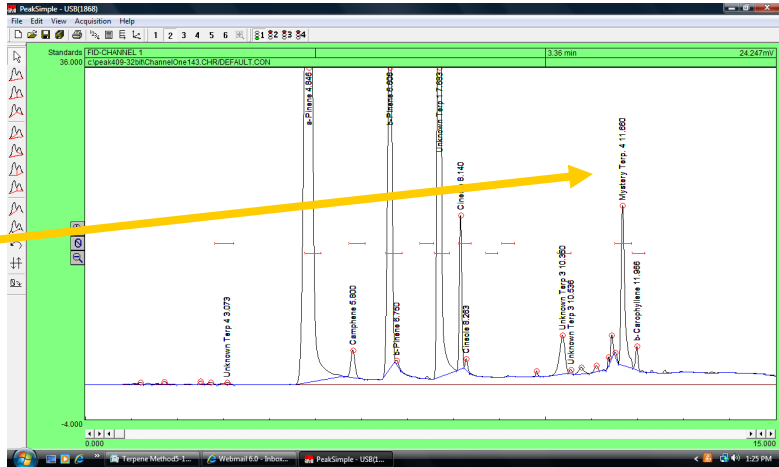
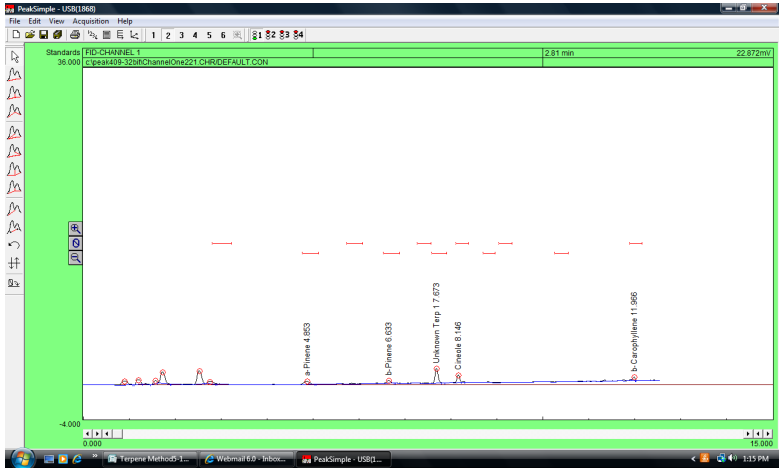


Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

This sample was from visibly low-quality medical cannabis called Mango. Notice its overall low terpene concentrations.

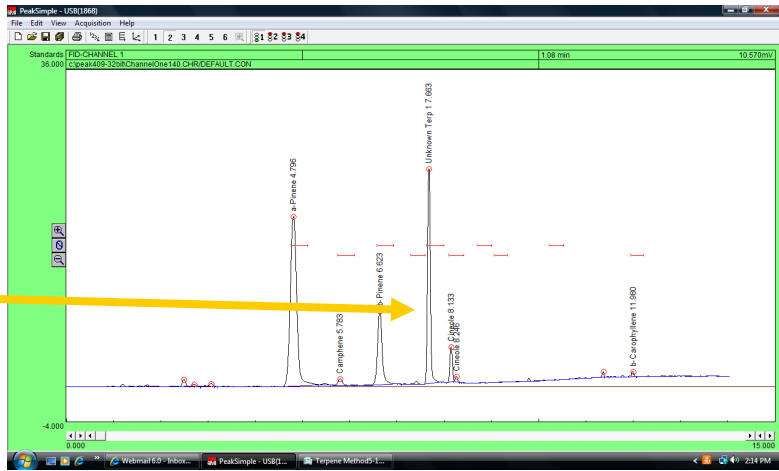
This sample of Blue Dream was very high in overall terpene levels. Notice its high concentrations of an unknown terpene.

This is a strain called Super Sour Diesel. This chromatogram shows that it has the highest concentrations of the terpene cineole.

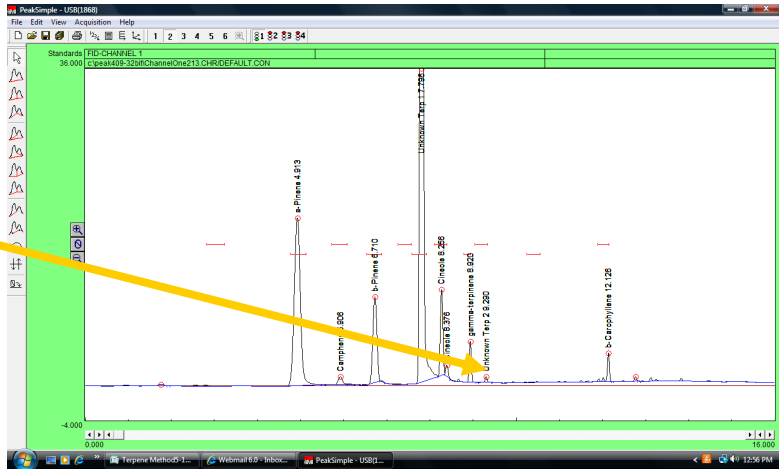


Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

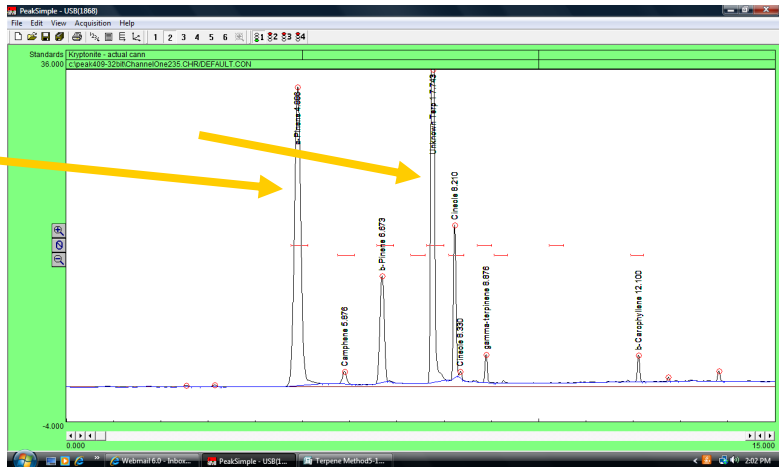
This is from a sample named Allen Wrench. Notice the high concentration of myrcene. This is typical of most strains as myrcene is the most common terpene in cannabis. Myrcene has a clove-like, earthy, vegetative, citrusy-mango smell.



This strain, AK-47, has a small concentration of an as yet unidentified terpene.

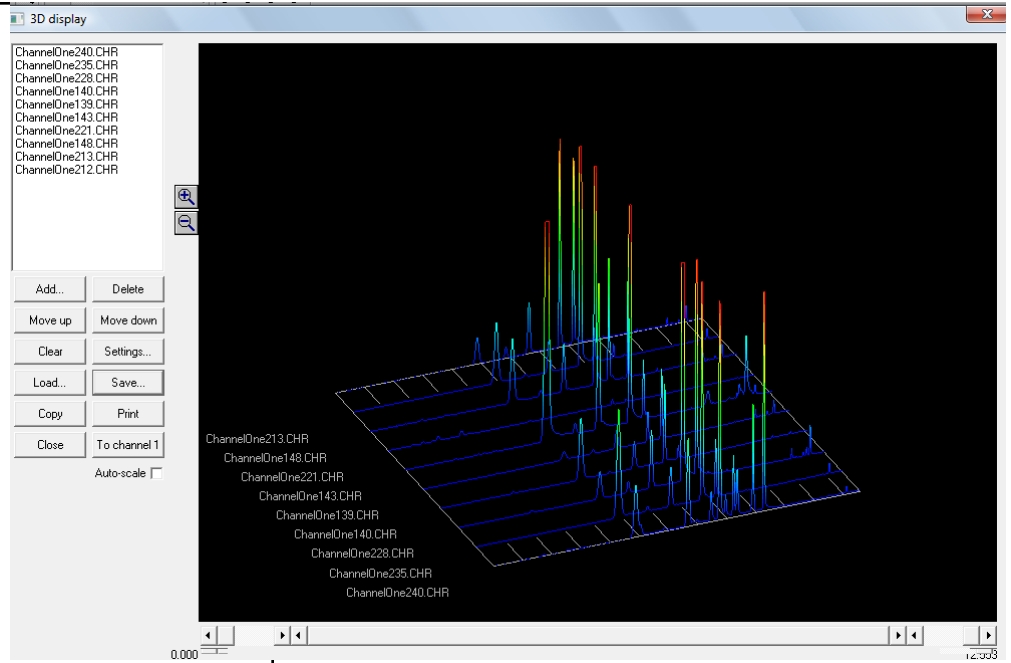


This is an outdoor variety of the strain Strawberry. Notice the nearly similar levels of alpha-pinene and myrcene. The terpene alpha-pinene has the characteristic odor of pine trees and is used in cleaning products like Pine-sol.



Medical Cannabis Terpene Measurement using the SRI 8610C FID GC

The user can display multiple terpene analysis runs on PeakSimple's 3D display. This feature makes it easy to compare multiple cannabis strains and to look for patterns.



This last terpene analysis is from a strain called Blueberry Jack. Notice the number of significant peaks (well over ten) compared to the usual cannabis sample.

SRI Instruments welcomes your feedback, knowledge and experience with terpene analysis. Please contact us if you have any questions or information to provide.

