

# Safely using Methanol for Cannabis Oil Extractions

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## Abstract:

Methanol is a form of alcohol made from plant material and is commonly known as Wood Alcohol. This form of alcohol is toxic in high quantities so it is known NOT to be safe for human consumption. But the reality is, our bodies produce methanol, and we eat and drink methanol daily in small quantities. The US Federal Drug Administration defines 3000ppm (3mg) as the maximum allowable concentration at once, and 30000ppm (30mg) over 10 hours. The following test was designed to measure the final methanol levels in a cannabis oil extraction after performing a purge through distillation. The goal of this paper is to determine if using methanol as a solvent for Cannabis Oil extraction, can result in safe residual concentrations. This paper reports the results of three tests, with samples taken Before and After the distillation purge, totalling 6 lab results.

## Conclusions:

All three tests show a starting methanol concentration well under the FDA's limits. The additional purge performed on each test reduces these levels an additional 10x. The results show methanol at such low concentrations that it can be safely used for Cannabis Oil extraction.

## Background:

The following illustration describing 6 steps for Cannabis Oil extraction and subsequent purging of methanol. This procedure was published on an open forum for discussion and comment to validate the viability of the protocol.

### Proposed Safe Cost Effective Home Based Methanol Extraction of Rick Simpson Oil, aka RSO

**Boiling Points**



Water 212 f  
Ethanol 173 f  
Methanol 143 f

Go ahead and scream, get it out of your system, then come back and read through this proposal, this is worth a discussion if nothing else. Here is a cannabis extraction procedure to create Rick Simpson Oil using a novel interdiction to remove the Methanol during final stages of the oil reduction. Basically this works due to the boiling points of all ingredients. Methanol boils off quickly, then the Ethanol, then the final water content leaving a sticky tar. Why even do this? Methanol is substantially cheaper than the cost of retail Ethanol.

In order to protect against impurities, using ACS grade Methanol is a must for its purity. Lesser grades or using Isopropyl may leave potential harmful residues in the final product. As a precaution, the final step of lab testing is a firewall against using tainted oil. If the results come back showing residues, throw it out and start over.


I will point out, beer and wine contain small quantities of Methanol. I will wager, you will ingest more Methanol from a single beer or glass of wine than from one dose of this RSO oil. Here's why - Step 3 takes the reduced extraction then adds a whole cup of Vodka that is a mix of ethanol and water. By the time the Vodka is half boiled off, the Methanol is long gone. Its Physics, plain and simple.

#### Steps

#1 Methanol Soak for Extraction




#2 Distill to reduce down to 50/50 mix of oil & Methanol




#3 Create a reduction by boiling the contents at 212 degrees all the way down to final oil/tar.



#4 Pour in 1/2 cup 100 proof vodka and stir to rehydrate the oil mix.



#5 Complete the reduction by boiling the contents at 212 degrees all the way down to final oil/tar.



#6 Send a sample to the lab to test for solvent residues.



## Process:



These tests were performed on 6.5 ounces of dry decarboxylated plant material, ground up and placed in a 64oz mason jar. First wash was performed using Methanol ACS Reagent for 15 minutes, and a secondary rinse of the same for less than one minute. Both the primary wash and subsequent rinse were combined into a gallon container, filtered through a nylon mesh, then divided into three 32oz quart mason jars. Each jar was labeled A, B, and C. Jars B and C weighed in at 23.44 oz and 23.63 oz respectively. Jar A was not weighed, but visually can be seen below marginally fuller than Jar B.

The chosen rehydration solutions to be used in step #4 are:

For test A – 100% water

For test B – Vodka at 100 proof (50/50 water/ethanol mix)

For test C – Everclear 190 proof (95% ethanol, 5% water)



The distilling setup is a Duxtop 9100mc hotplate and a 2 quart stainless steel pot. The Duxtop hotplate was chosen for its heating control of 100 watt increments starting at 200 watts up to 1800 watts.

The following steps were performed on each sample jar. Starting with sample A, the jar was poured into the pot, heat (800 watts) applied to bring the contents to a boil (phase 1). Heat was reduced to 500 watts when the transition from boiling to bubbling (phase 2) of the oil/methanol solution. Each

bubbling phase was terminated when there was no observable bubbling action, just a smooth layer of oil with wisps of 'smoke' of evaporating oil. As expected, around 2 ml of Cannabis oil was extracted per ounce from the 6.5oz plant material, for a total of 13ml. For the three sample jars A,B & C, there was approximately 4ml of oil present at the end of each reduction.

Given there was only 4ml of distilled oil at the end of stage 3, it was determined 25ml would be sufficient for each re-hydration instead of the suggested 250ml (1 cup) given 25ml is over 6 times the volume of the 4ml present at the end of each stage. Each jar was processed identically except for the re-hydrating solution, as follows -

Jar A was poured in the pot, brought to a boil & simmered till only Cannabis oil remained. A 1-2ml (sample A1) was taken using a 10ml syringe. 25ml of water was added and then simmered down to oil. A 1-2ml (sample A2) was taken using a 10ml syringe. Remaining contents stored for later..

Jar B was poured in the pot, brought to a boil & simmered till only Cannabis oil remained. A 1-2ml (sample B1) was taken using a 10ml syringe. 25ml of 100 proof vodka was added and then simmered down to oil. A 1-2ml (sample B2) was taken using a 10ml syringe. Remaining contents stored for later..

Jar C was poured in the pot, brought to a boil & simmered till only Cannabis oil remained. A 1-2ml (sample C1) was taken using a 10ml syringe. 25ml of 190 proof vodka was added and then simmered down to oil. A 1-2ml (sample C2) was taken using a 10ml syringe. Remaining contents stored for later..



## Observations:

The use of a stand-alone 2 quart pot versus a double boiler was used since this is the typical home setup using a consumer grade water distiller as pictured in Step #2 of the above original proposal.

The picture to the right was taken during Test A, Step #3 as the Methanol was bubbling and dispersing. The test terminated when there were no visible bubbles left in the oil. Wisps of 'smoke' indicated the temperature was raised high enough to cause oil evaporation.



The one uncontrolled aspect of the tests was terminating the simmering reduction when there were

no observable bubbles in the oil. This probably was the contributing factor to the wide range of results at the end of Step #3, shown in the table below.

**Lab results summary:**

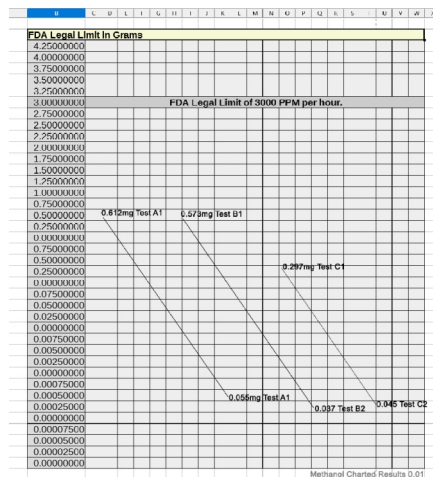
The actual lab test results are presented below. This table shows the "Residual Solvents" portion of each test. Any solvent that was Not Detectable (nd) before and after, have been eliminated here for brevity. Only 4 of the 16 potential solvents were detected. FDA sets 3000PPM as Methanol's limit.

Jar	Step #3			Step #5		
A	solvents	PPM	in mg	Solvents	PPM	in mg
	Acetone	20	0.020	Acetone	nd	0.000
	Ethanol	34	0.034	Ethanol	nd	0.000
	Ethyl Acetate	nd	0.000	Ethyl Acetate	nd	0.000
	Methanol	612	0.612	Methanol	55	0.055
B						
	Acetone	20	0.020	Acetone	nd	0.000
	Ethanol	36	0.036	Ethanol	167	0.167
	Ethyl Acetate	nd	0.000	Ethyl Acetate	nd	0.000
	Methanol	573	0.573	Methanol	37	0.037
C						
	Acetone	18	0.018	Acetone	nd	0.000
	Ethanol	22	0.022	Ethanol	4340 est.	4.340
	Ethyl Acetate	nd	0.000	Ethyl Acetate	33	0.033
	Methanol	297	0.297	Methanol	45	0.045

Tests A and B used water in the purge and shows over a 10 fold reduction of methanol at Step #5. Test C shows a lower starting Methanol PPM but resulted in the same range of final PPM.

Test C2 Step #5 shows 4340 PPM of Ethanol which is an estimate by the lab. I think I might have re-used a cleaned syringe for that sample, having used ethanol for the cleaning. The methanol levels are consistent with the prior tests, so this is not considered a problem.

Here is a chart showing the test results on a visual scale to show how much solvent remains in relation to the FDA's limits. This chart is presented below full page for closeup viewing.





# Test A1, Step #3 results:

327 N Tower Ave  
 Centralia WA 98531  
 (360) 559-6261  
 mail@prxslab.com

## Certificate of Analysis



**A1**

Client:  
 Address:

License:

Lab ID: P200715-2 001  
 Date Received: 7/15/2020  
 Analysis Completed: 7/17/2020

Original Global ID: n/a  
 Lab Global ID: n/a  
 Sample Type: Full Extract Cannabis Oil

### Cannabinoid Concentration Analysis

	Result (%)		Result (%)
CBC	n/a	Total THC <sup>1</sup>	n/a
CBCA	n/a	Total CBD <sup>2</sup>	n/a
CBD	n/a	Total Cannabinoids <sup>3</sup>	n/a
CBDVA	n/a		
CBDV	n/a		
CBDVA	n/a		
CBG	n/a		
CBGA	n/a		
CBL	n/a		
CBN	n/a		
CBNA	n/a		
CBT	n/a		
THCA	n/a		
THCV	n/a		
THCVA	n/a		
Δ-8 THC	n/a		
Δ-9 THC	n/a		

Method: HPLC

Notes: <sup>1</sup> Total THC = THCA x 0.877 + Δ9 THC.

<sup>2</sup> Total CBD = CBDVA x 0.877 + CBD.

<sup>3</sup> Sum of all cannabinoids without a conversion factor applied to THCA or CBDA.

### Foreign Matter Screening

	Result (%)	WSLCLB Limit	Pass/Fail
Stems	n/a	< 5	n/a
Seeds	n/a	< 2	n/a
Other	n/a	< 2	n/a

Method: Visual / Microscopy

### Water Activity Analysis

	Result (aW)	WSLCLB Limit	Pass/Fail
Water Activity	n/a	< 0.65	n/a

Method: Hygrometer

### Moisture Content Analysis

	Result (%)	WSLCLB Limit	Pass/Fail
Moisture Content	n/a	< 15	n/a

Method: Gravimetric

### Terpene Concentration Analysis

	Result (%)		Result (%)
Alpha-Bisabolol	n/a	D-Limonene	n/a
Alpha-Humulene	n/a	Fenchone	n/a
Alpha-Pinene	n/a	Gamma-Terpinene	n/a
Alpha-Terpinene	n/a	Geraniol	n/a
Alpha-Terpineol	n/a	Guaiol	n/a
Beta-Caryophyllene	n/a	Isopulegol	n/a
Beta-Myrcene	n/a	Linalool	n/a
Beta-Pinene	n/a	Nerolidol	n/a
Borneol	n/a	Ocimene	n/a
Camphene	n/a	P-Cymene	n/a
Citral	n/a	Pulegone	n/a
Citronellol	n/a	Terpinolene	n/a
Delta-3-Carene	n/a	2-Piperidinone	n/a
Dihydrocarveol	n/a	Total Terpenes:	n/a

Method: GC-FID

### Microbiological Screening

	Result (CFU/g)	WSLCLB Limit	Pass/Fail
Enterobacteriaceae	n/a	< 10,000	n/a
E. coli	n/a	*	n/a
Salmonella	n/a	*	n/a

Method: FDA BAM

Notes: \* Not detected in 1 gram.

### Mycotoxin Screening

	Result (ppb)	WSLCLB Limit	Pass/Fail
Aflatoxin	n/a	< 20	n/a
Ochratoxin	n/a	< 20	n/a

Method: ELISA

### Residual Solvent Screening

	Result (ppm)	WSLCLB Limit	Pass/Fail
Acetone	20	n/a	n/a
Benzene	nd	n/a	n/a
Butanes	nd	n/a	n/a
Chloroform	nd	n/a	n/a
Cyclohexane	nd	n/a	n/a
Dichloromethane	nd	n/a	n/a
Ethanol	34	n/a	n/a
Ethyl Acetate	nd	n/a	n/a
Heptanes	nd	n/a	n/a
Hexanes	nd	n/a	n/a
Isopropanol	nd	n/a	n/a
Methanol	612	n/a	n/a
Pentanes	nd	n/a	n/a
Propane	nd	n/a	n/a
Toluene	nd	n/a	n/a
Total Xylene	nd	n/a	n/a

Method: GC-FID HS-FET

This report was reviewed by:

Megan Stang, Project Manager on July 17th, 2020

This report was approved by:

Elizabeth Doar, Laboratory Administrator on July 17th, 2020



Not all testing listed above is included in our A2LA Scope of Accreditation. Please consult A2LA Certificate #4803.01 for a list of accredited tests.

The abbreviations nd, n/a, etc., and test stand for not detected, not applicable, estimated value, and too numerous to count respectively.

Testing results are certified by scientific examination of a single sample, as identified by the Sample ID, provided by the Producer/Processor. The sample, as received, was homogenized before subsamples were drawn for specific analysis. Praxis Laboratory and its staff did not observe or participate in the sample selection process, and cannot confirm the authenticity of the sample or its representativeness of the associated lot/batch. The results pertain only to the sample tested and no other sample.

# Test A2, Step #5 results:

327 N Tower Ave  
 Centralia WA 98531  
 (360) 559-6261  
 mail@prxslab.com

## Certificate of Analysis



A2

Client:  
 Address:

License:

Lab ID: P200715-2 002  
 Date Received: 7/15/2020  
 Analysis Completed: 7/17/2020

Original Global ID: n/a  
 Lab Global ID: n/a  
 Sample Type: Full Extract Cannabis Oil

### Cannabinoid Concentration Analysis

	Result (%)		Result (%)
CBC	n/a	Total THC <sup>1</sup>	n/a
CBCA	n/a	Total CBD <sup>2</sup>	n/a
CBD	n/a	Total Cannabinoids <sup>3</sup>	n/a
CBDa	n/a		
CBDV	n/a		
CBDVA	n/a		
CBG	n/a		
CBGA	n/a		
CBL	n/a		
CBN	n/a		
CBNA	n/a		
CBT	n/a		
THCA	n/a		
THCV	n/a		
THCVA	n/a		
Δ-8 THC	n/a		
Δ-9 THC	n/a		

Method: HPLC

Notes: <sup>1</sup> Total THC = THCA x 0.877 + Δ9 THC.

<sup>2</sup> Total CBD = CBDa x 0.877 + CBD.

<sup>3</sup> Sum of all cannabinoids without a conversion factor applied to THCA or CBDA.

### Foreign Matter Screening

	Result (%)	WSLCB Limit	Pass/Fail
Stems	n/a	< 5	n/a
Seeds	n/a	< 2	n/a
Other	n/a	< 2	n/a

Method: Visual / Microscopy

### Water Activity Analysis

	Result (aW)	WSLCB Limit	Pass/Fail
Water Activity	n/a	< 0.65	n/a

Method: Hygrometer

### Moisture Content Analysis

	Result (%)	WSLCB Limit	Pass/Fail
Moisture Content	n/a	< 15	n/a

Method: Gravimetric

### Terpene Concentration Analysis

	Result (%)		Result (%)
Alpha-Bisabolol	n/a	D-Limonene	n/a
Alpha-Humulene	n/a	Fenchone	n/a
Alpha-Pinene	n/a	Gamma-Terpinene	n/a
Alpha-Terpinene	n/a	Geraniol	n/a
Alpha-Terpineol	n/a	Guaialol	n/a
Beta-Caryophyllene	n/a	Isopulegol	n/a
Beta-Myrcene	n/a	Linalool	n/a
Beta-Pinene	n/a	Nerolidol	n/a
Borneol	n/a	Ocimene	n/a
Camphene	n/a	P-Cymene	n/a
Citral	n/a	Pulegone	n/a
Citronellol	n/a	Terpinolene	n/a
Delta-3-Carene	n/a	2-Piperidinone	n/a
Dihydrocarveol	n/a	Total Terpenes:	n/a

Method: GC-FID

### Microbiological Screening

	Result (CFU/g)	WSLCB Limit	Pass/Fail
Enterobacteriaceae	n/a	< 10,000	n/a
E. coli	n/a	*	n/a
Salmonella	n/a	*	n/a

Method: FDA BAM

Notes: \* Not detected in 1 gram.

### Mycotoxin Screening

	Result (ppb)	WSLCB Limit	Pass/Fail
Aflatoxin	n/a	< 20	n/a
Ochratoxin	n/a	< 20	n/a

Method: ELISA

### Residual Solvent Screening

	Result (ppm)	WSLCB Limit	Pass/Fail
Acetone	nd	n/a	n/a
Benzene	nd	n/a	n/a
Butanes	nd	n/a	n/a
Chloroform	nd	n/a	n/a
Cyclohexane	nd	n/a	n/a
Dichloromethane	nd	n/a	n/a
Ethanol	nd	n/a	n/a
Ethyl Acetate	nd	n/a	n/a
Heptanes	nd	n/a	n/a
Hexanes	nd	n/a	n/a
Isopropanol	nd	n/a	n/a
Methanol	55	n/a	n/a
Pentanes	nd	n/a	n/a
Propane	nd	n/a	n/a
Toluene	nd	n/a	n/a
Total Xylene	nd	n/a	n/a

Method: GC-FID HS-FET

This report was reviewed by:

Megan Stang, Project Manager on July 17th, 2020

This report was approved by:

Elizabeth Doar, Laboratory Administrator on July 17th, 2020



Certificate #4803.01

Not all testing listed above is included in our AZLA Scope of Accreditation. Please consult AZLA Certificate #4803.01 for a list of accredited tests.

The abbreviations nd, n/a, e.v., and etc stand for not detected, not applicable, estimated value, and too numerous to count respectively.

Testing results are certified by scientific examination of a single sample, as identified by the Sample ID, provided by the Producer/Processor. The sample, as received, was homogenized before subsamples were drawn for specific analysis. Praxis Laboratory and its staff did not observe or participate in the sample selection process, and cannot confirm the authenticity of the sample or its representativeness of the associated lot/batch. The results pertain only to the sample tested and no other sample.

# Test B1, Step #3 results:

327 N Tower Ave  
Centralia WA 98531  
(360) 559-6261  
mail@prxslab.com

## Certificate of Analysis



B1

Client:  
Address:

License:

Lab ID: P200715-2 003  
Date Received: 7/15/2020  
Analysis Completed: 7/17/2020

Original Global ID: n/a  
Lab Global ID: n/a  
Sample Type: Full Extract Cannabis Oil

### Cannabinoid Concentration Analysis

	Result (%)		Result (%)
CBC	n/a	Total THC <sup>1</sup>	n/a
CBCA	n/a	Total CBD <sup>2</sup>	n/a
CBD	n/a	Total Cannabinoids <sup>3</sup>	n/a
CBDA	n/a		
CBDV	n/a		
CBDVA	n/a		
CBG	n/a		
CBGA	n/a		
CBL	n/a		
CBN	n/a		
CBNA	n/a		
CBT	n/a		
THCA	n/a		
THCV	n/a		
THCVa	n/a		
Δ-8 THC	n/a		
Δ-9 THC	n/a		

Method: HPLC

Notes: <sup>1</sup> Total THC = THCA x 0.877 + Δ9 THC.

<sup>2</sup> Total CBD = CBDA x 0.877 + CBD.

<sup>3</sup> Sum of all cannabinoids without a conversion factor applied to THCA or CBDA.

### Foreign Matter Screening

	Result (%)	WSLCLB Limit	Pass/Fail
Stems	n/a	< 5	n/a
Seeds	n/a	< 2	n/a
Other	n/a	< 2	n/a

Method: Visual / Microscopy

### Water Activity Analysis

	Result (aW)	WSLCLB Limit	Pass/Fail
Water Activity	n/a	< 0.65	n/a

Method: Hygrometer

### Moisture Content Analysis

	Result (%)	WSLCLB Limit	Pass/Fail
Moisture Content	n/a	< 15	n/a

Method: Gravimetric

### Terpene Concentration Analysis

	Result (%)		Result (%)
Alpha-Bisabolol	n/a	D-Limonene	n/a
Alpha-Humulene	n/a	Fenchone	n/a
Alpha-Pinene	n/a	Gamma-Terpinene	n/a
Alpha-Terpinene	n/a	Geraniol	n/a
Alpha-Terpineol	n/a	Guaialol	n/a
Beta-Caryophyllene	n/a	Isopulegol	n/a
Beta-Myrcene	n/a	Linalool	n/a
Beta-Pinene	n/a	Neralidol	n/a
Borneol	n/a	Ocimene	n/a
Camphene	n/a	P-Cymene	n/a
Citral	n/a	Pulegone	n/a
Citronellol	n/a	Terpinolene	n/a
Delta-3-Carene	n/a	2-Piperidinone	n/a
Dihydrocarveol	n/a	Total Terpenes:	n/a

Method: GC-FID

### Microbiological Screening

	Result (CFU/g)	WSLCLB Limit	Pass/Fail
Enterobacteriaceae	n/a	< 10,000	n/a
E. coli	n/a	*	n/a
Salmonella	n/a	*	n/a

Method: FDA BAM

Notes: \* Not detected in 1 gram.

### Mycotoxin Screening

	Result (ppb)	WSLCLB Limit	Pass/Fail
Aflatoxin	n/a	< 20	n/a
Ochratoxin	n/a	< 20	n/a

Method: ELISA

### Residual Solvent Screening

	Result (ppm)	WSLCLB Limit	Pass/Fail
Acetone	20	n/a	n/a
Benzene	nd	n/a	n/a
Butanes	nd	n/a	n/a
Chloroform	nd	n/a	n/a
Cyclohexane	nd	n/a	n/a
Dichloromethane	nd	n/a	n/a
Ethanol	36	n/a	n/a
Ethyl Acetate	nd	n/a	n/a
Heptanes	nd	n/a	n/a
Hexanes	nd	n/a	n/a
Isopropanol	nd	n/a	n/a
Methanol	573	n/a	n/a
Pentanes	nd	n/a	n/a
Propane	nd	n/a	n/a
Toluene	nd	n/a	n/a
Total Xylene	nd	n/a	n/a

Method: GC-FID HS-FET

This report was reviewed by:

Megan Stang, Project Manager on July 17th, 2020

This report was approved by:

Elizabeth Doar, Laboratory Administrator on July 17th, 2020



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# Test B2, Step #5 results:

327 N Tower Ave  
Centralia WA 98531  
(360) 559-6261  
mail@prxslab.com

## Certificate of Analysis



B2

Client:  
Address:

License:

Lab ID: P200715-2 004  
Date Received: 7/15/2020  
Analysis Completed: 7/17/2020

Original Global ID: n/a  
Lab Global ID: n/a  
Sample Type: Full Extract Cannabis Oil

### Cannabinoid Concentration Analysis

	Result (%)		Result (%)
CBC	n/a	Total THC <sup>1</sup>	n/a
CBCA	n/a	Total CBD <sup>2</sup>	n/a
CBD	n/a	Total Cannabinoids <sup>3</sup>	n/a
CBDa	n/a		
CBDV	n/a		
CBDVA	n/a		
CBG	n/a		
CBGA	n/a		
CBL	n/a		
CBN	n/a		
CBNA	n/a		
CBT	n/a		
THCA	n/a		
THCV	n/a		
THCVA	n/a		
Δ-8 THC	n/a		
Δ-9 THC	n/a		

Method: HPLC

Notes: <sup>1</sup> Total THC = THCA x 0.877 + Δ9 THC.

<sup>2</sup> Total CBD = CBDA x 0.877 + CBD.

<sup>3</sup> Sum of all cannabinoids without a conversion factor applied to THCA or CBDA.

### Foreign Matter Screening

	Result (%)	WSLCB Limit	Pass/Fail
Stems	n/a	< 5	n/a
Seeds	n/a	< 2	n/a
Other	n/a	< 2	n/a

Method: Visual / Microscopy

### Water Activity Analysis

	Result (aW)	WSLCB Limit	Pass/Fail
Water Activity	n/a	< 0.65	n/a

Method: Hygrometer

### Moisture Content Analysis

	Result (%)	WSLCB Limit	Pass/Fail
Moisture Content	n/a	< 15	n/a

Method: Gravimetric

### Terpene Concentration Analysis

	Result (%)		Result (%)
Alpha-Bisabolol	n/a	D-Limonene	n/a
Alpha-Humulene	n/a	Fenchone	n/a
Alpha-Pinene	n/a	Gamma-Terpinene	n/a
Alpha-Terpinene	n/a	Geraniol	n/a
Alpha-Terpineol	n/a	Guaiaol	n/a
Beta-Caryophyllene	n/a	Isopulegol	n/a
Beta-Myrcene	n/a	Linalool	n/a
Beta-Pinene	n/a	Nerolidol	n/a
Borneol	n/a	Ocimene	n/a
Camphene	n/a	P-Cymene	n/a
Citral	n/a	Pulegone	n/a
Citronellol	n/a	Terpinolene	n/a
Delta-3-Carene	n/a	2-Piperidinone	n/a
Dihydrocarveol	n/a	Total Terpenes:	n/a

Method: GC-FID

### Microbiological Screening

	Result (CFU/g)	WSLCB Limit	Pass/Fail
Enterobacteriaceae	n/a	< 10,000	n/a
E. coli	n/a	*	n/a
Salmonella	n/a	*	n/a

Method: FDA BAM

Notes: \* Not detected in 1 gram.

### Mycotoxin Screening

	Result (ppb)	WSLCB Limit	Pass/Fail
Aflatoxin	n/a	< 20	n/a
Ochratoxin	n/a	< 20	n/a

Method: ELISA

### Residual Solvent Screening

	Result (ppm)	WSLCB Limit	Pass/Fail
Acetone	nd	n/a	n/a
Benzene	nd	n/a	n/a
Butanes	nd	n/a	n/a
Chloroform	nd	n/a	n/a
Cyclohexane	nd	n/a	n/a
Dichloromethane	nd	n/a	n/a
Ethanol	167	n/a	n/a
Ethyl Acetate	nd	n/a	n/a
Heptanes	nd	n/a	n/a
Hexanes	nd	n/a	n/a
Isopropanol	nd	n/a	n/a
Methanol	37	n/a	n/a
Pentanes	nd	n/a	n/a
Propane	nd	n/a	n/a
Toluene	nd	n/a	n/a
Total Xylene	nd	n/a	n/a

Method: GC-FID HS-FET

This report was reviewed by:

Megan Stang, Project Manager on July 17th, 2020

This report was approved by:

Elizabeth Doar, Laboratory Administrator on July 17th, 2020



Certificate #4803.01

Not all testing listed above is included in our AZIA Score of Accreditation. Please consult AZIA Certificate #4803.01 for a list of accredited tests.

The abbreviations nd, n/a, <L, <T, and nrc stand for not detected, not applicable, estimated value, and too numerous to count respectively.

Testing results are certified by scientific examination of a single sample, as identified by a Sample ID, provided by the Producer/Processor. The sample, as received, was homogenized before subsamples were drawn for specific analysis. Praxis Laboratory and its staff did not observe or participate in the sample selection process, and cannot confirm the authenticity of the sample or its representativeness of the associated lot/batch. The results pertain only to the sample tested and no other sample.



# Test C1, Step #3 results:

327 N Tower Ave  
Centralia WA 98531  
(360) 559-6261  
mail@prxslab.com

## Certificate of Analysis



C1

Client:  
Address:

License:

Lab ID: P200715-2 005  
Date Received: 7/15/2020  
Analysis Completed: 7/17/2020

Original Global ID: n/a  
Lab Global ID: n/a  
Sample Type: Full Extract Cannabis Oil

### Cannabinoid Concentration Analysis

	Result (%)		Result (%)
CBC	n/a	Total THC <sup>1</sup>	n/a
CBCA	n/a	Total CBD <sup>2</sup>	n/a
CBD	n/a	Total Cannabinoids <sup>3</sup>	n/a
CBDA	n/a		
CBDV	n/a		
CBDDVA	n/a		
CBG	n/a		
CBGA	n/a		
CBL	n/a		
CBN	n/a		
CBNA	n/a		
CBT	n/a		
THCA	n/a		
THCV	n/a		
THCVA	n/a		
Δ-8 THC	n/a		
Δ-9 THC	n/a		

Method: HPLC

Notes: <sup>1</sup>Total THC = THCA x 0.877 + Δ9 THC.

<sup>2</sup>Total CBD = CBDA x 0.877 + CBD.

<sup>3</sup>Sum of all cannabinoids without a conversion factor applied to THCA or CBDA.

### Foreign Matter Screening

	Result (%)	WSLCB Limit	Pass/Fail
Stems	n/a	< 5	n/a
Seeds	n/a	< 2	n/a
Other	n/a	< 2	n/a

Method: Visual / Microscopy

### Water Activity Analysis

	Result (aW)	WSLCB Limit	Pass/Fail
Water Activity	n/a	< 0.65	n/a

Method: Hygrometer

### Moisture Content Analysis

	Result (%)	WSLCB Limit	Pass/Fail
Moisture Content	n/a	< 15	n/a

Method: Gravimetric

### Terpene Concentration Analysis

	Result (%)		Result (%)
Alpha-Bisabolol	n/a	D-Limonene	n/a
Alpha-Humulene	n/a	Fenchone	n/a
Alpha-Pinene	n/a	Gamma-Terpinene	n/a
Alpha-Terpinene	n/a	Geraniol	n/a
Alpha-Terpineol	n/a	Guaiaol	n/a
Beta-Caryophyllene	n/a	Isopulegol	n/a
Beta-Myrcene	n/a	Linalool	n/a
Beta-Pinene	n/a	Neralidol	n/a
Borneol	n/a	Ocimene	n/a
Camphene	n/a	P-Cymene	n/a
Citral	n/a	Pulegone	n/a
Citronellol	n/a	Terpinolene	n/a
Delta-3-Carene	n/a	2-Piperidinone	n/a
Dihydrocarveol	n/a	Total Terpenes:	n/a

Method: GC-FID

### Microbiological Screening

	Result (CFU/g)	WSLCB Limit	Pass/Fail
Enterobacteriaceae	n/a	< 10,000	n/a
<i>E. coli</i>	n/a	*	n/a
Salmonella	n/a	*	n/a

Method: FDA BAM

Notes: \* Not detected in 1 gram.

### Mycotoxin Screening

	Result (ppb)	WSLCB Limit	Pass/Fail
Aflatoxin	n/a	< 20	n/a
Ochratoxin	n/a	< 20	n/a

Method: ELISA

### Residual Solvent Screening

	Result (ppm)	WSLCB Limit	Pass/Fail
Acetone	18	n/a	n/a
Benzene	nd	n/a	n/a
Butanes	nd	n/a	n/a
Chloroform	nd	n/a	n/a
Cyclohexane	nd	n/a	n/a
Dichloromethane	nd	n/a	n/a
Ethanol	22	n/a	n/a
Ethyl Acetate	nd	n/a	n/a
Heptanes	nd	n/a	n/a
Hexanes	nd	n/a	n/a
Isopropanol	nd	n/a	n/a
Methanol	297	n/a	n/a
Pentanes	nd	n/a	n/a
Propane	nd	n/a	n/a
Toluene	nd	n/a	n/a
Total Xylene	nd	n/a	n/a

Method: GC-FID HS-FET

This report was reviewed by:

Megan Stang, Project Manager on July 17th, 2020

This report was approved by:

Elizabeth Doar, Laboratory Administrator on July 17th, 2020



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# Test C2, Step #5 results:

327 N Tower Ave  
Centralia WA 98531  
(360) 559-6261  
mail@prxslab.com

## Certificate of Analysis



C2

Client:  
Address:

License:

Lab ID: P200715-2 005  
Date Received: 7/15/2020  
Analysis Completed: 7/17/2020

Original Global ID: n/a  
Lab Global ID: n/a  
Sample Type: Full Extract Cannabis Oil

### Cannabinoid Concentration Analysis

	Result (%)		Result (%)
CBC	n/a	Total THC <sup>1</sup>	n/a
CBCA	n/a	Total CBD <sup>2</sup>	n/a
CBD	n/a	Total Cannabinoids <sup>3</sup>	n/a
CBDa	n/a		
CBDV	n/a		
CBDVA	n/a		
CBG	n/a		
CBGA	n/a		
CBL	n/a		
CBN	n/a		
CBNA	n/a		
CBT	n/a		
THCA	n/a		
THCV	n/a		
THCVA	n/a		
Δ-8 THC	n/a		
Δ-9 THC	n/a		

Method: HPLC

Notes: <sup>1</sup> Total THC = THCA x 0.877 + Δ9 THC.

<sup>2</sup> Total CBD = CBDa x 0.877 + CBD.

<sup>3</sup> Sum of all cannabinoids without a conversion factor applied to THCA or CBDa.

### Foreign Matter Screening

	Result (%)	WSLCLB Limit	Pass/Fail
Stems	n/a	< 5	n/a
Seeds	n/a	< 2	n/a
Other	n/a	< 2	n/a

Method: Visual / Microscopy

### Water Activity Analysis

	Result (aW)	WSLCLB Limit	Pass/Fail
Water Activity	n/a	< 0.65	n/a

Method: Hygrometer

### Moisture Content Analysis

	Result (%)	WSLCLB Limit	Pass/Fail
Moisture Content	n/a	< 15	n/a

Method: Gravimetric

### Terpene Concentration Analysis

	Result (%)		Result (%)
Alpha-Bisabolol	n/a	D-Limonene	n/a
Alpha-Humulene	n/a	Fenchone	n/a
Alpha-Pinene	n/a	Gamma-Terpinene	n/a
Alpha-Terpinene	n/a	Geraniol	n/a
Alpha-Terpineol	n/a	Gualiol	n/a
Beta-Caryophyllene	n/a	Isopulegol	n/a
Beta-Myrcene	n/a	Linalool	n/a
Beta-Pinene	n/a	Nerolidol	n/a
Borneol	n/a	Ocimene	n/a
Camphene	n/a	P-Cymene	n/a
Citral	n/a	Pulegone	n/a
Citronellol	n/a	Terpinolene	n/a
Delta-3-Carene	n/a	2-Piperidinone	n/a
Dihydrocarveol	n/a	Total Terpenes:	n/a

Method: GC-FID

### Microbiological Screening

	Result (CFU/g)	WSLCLB Limit	Pass/Fail
Enterobacteriaceae	n/a	< 10,000	n/a
E. coli	n/a	*	n/a
Salmonella	n/a	*	n/a

Method: FDA BAM

Notes: \* Not detected in 1 gram.

### Mycotoxin Screening

	Result (ppb)	WSLCLB Limit	Pass/Fail
Aflatoxin	n/a	< 20	n/a
Ochratoxin	n/a	< 20	n/a

Method: ELISA

### Residual Solvent Screening

	Result (ppm)	WSLCLB Limit	Pass/Fail
Acetone	nd	n/a	n/a
Benzene	nd	n/a	n/a
Butanes	nd	n/a	n/a
Chloroform	nd	n/a	n/a
Cyclohexane	nd	n/a	n/a
Dichloromethane	nd	n/a	n/a
Ethanol	4340 e.v.	n/a	n/a
Ethyl Acetate	33	n/a	n/a
Heptanes	nd	n/a	n/a
Hexanes	nd	n/a	n/a
Isopropanol	nd	n/a	n/a
Methanol	45	n/a	n/a
Pentanes	nd	n/a	n/a
Propane	nd	n/a	n/a
Toluene	nd	n/a	n/a
Total Xylene	nd	n/a	n/a

Method: GC-FID HS-FET

This report was reviewed by:

Megan Stang, Project Manager on July 17th, 2020

This report was approved by:

Elizabeth Doar, Laboratory Administrator on July 17th, 2020

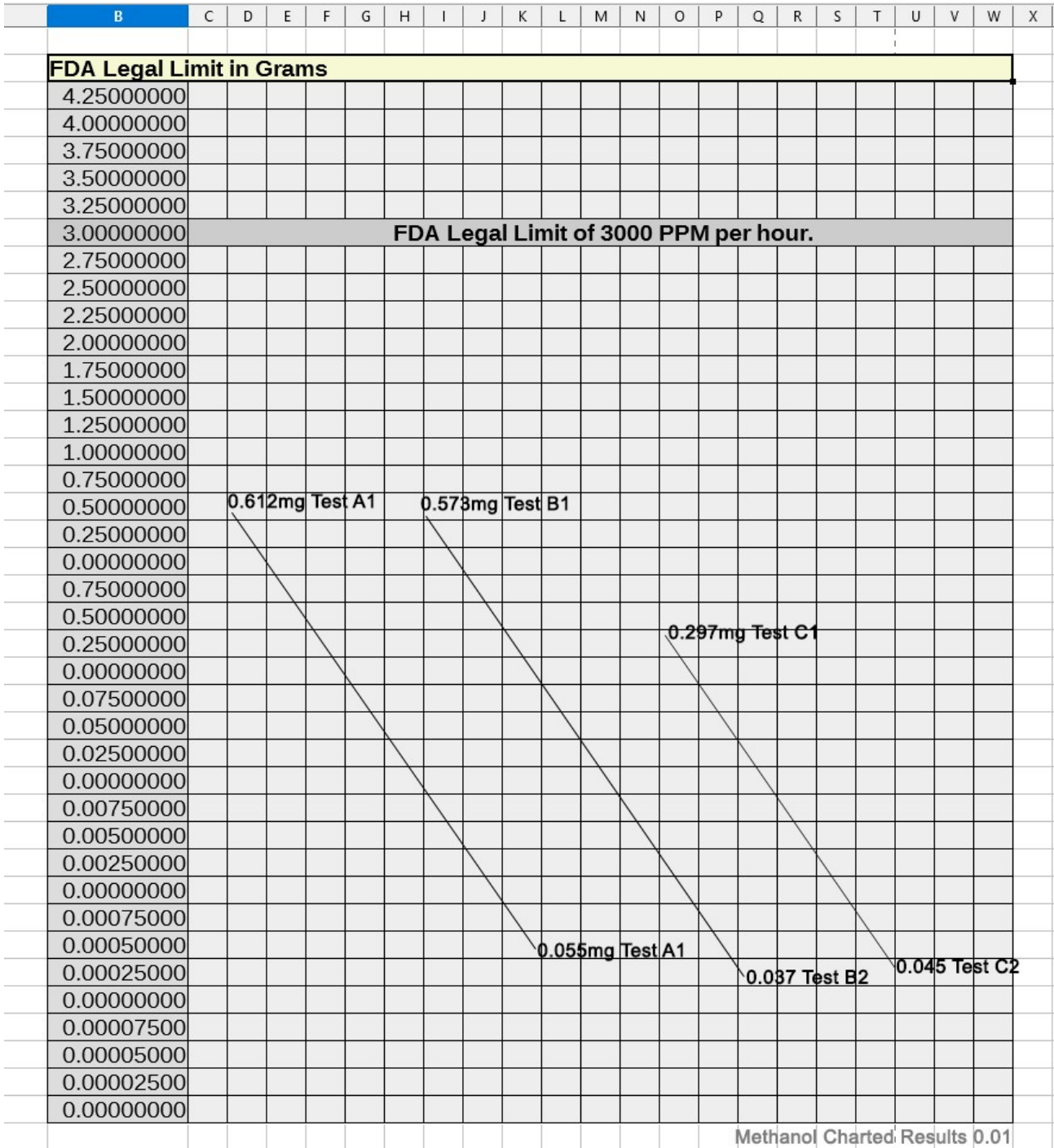


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Visual Chart Showing the Test Results in Comparison to the FDA's Legal Limit



**Further Reading:**

[Residual Methanol in Botanical Dietary Ingredients](#)

HerbalEgram: Volume 11, Issue 8, August 2014

By Deepak Mundkinajeddu, PhD, and Amit Agarwal, PhD