

CERTIFICATE OF ANALYSIS:
CRYSTALLINE CANNABIDIOL



Product Name

CC – Crystalline Cannabidiol

Batch Number

190128FE

Manufacture Date

October 07, 2019

Expiration Date

October 2021

Botanical Source

Industrial hemp, grown and processed in Kentucky, USA in compliance with Section 7415 of the Farm Bill and applicable Kentucky State Law and State Department of Agriculture regulations.

Product Description

This product is hemp derived crystalline cannabidiol, isolated through CO₂ extraction and crystal precipitation.

Qualitative Analysis

OBSERVATION	METHOD	RESULT
Foreign Matter	Gross Visual	Absent
Color	Gross Visual	White to Pale Yellow
Molds & Mildews	Gross Visual	Absent
Smell	Olfactory	Odorless to Slight Terpenoid
Product Feel	Tactile	Fine Powder

Quantitative Analysis

Cannabinoid Analysis**

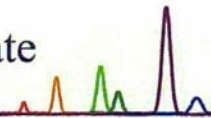
RESULT: PASS

IDENTIFICATION	METHOD	RESULT
Cannabinoid	Liquid Chromatography	%wt/wt
Cannabidiol (CBD)	Liquid Chromatography	103.08%
Cannabidiol (CBD)	Liquid Chromatography	0.36%
Cannabidiolic Acid (CBDA)	Liquid Chromatography	N/D
Cannabinol (CBN)	Liquid Chromatography	N/D
Δ -9-Tetrahydrocannabinol (Δ -9-THC)	Liquid Chromatography	N/D
Cannabichromene (CBC)	Liquid Chromatography	N/D
Tetrahydrocannabinolic Acid (THCA)	Liquid Chromatography	N/D
Cannabigerol Acid (CBGA)	Liquid Chromatography	N/D
Cannabigerol (CBG)	Liquid Chromatography	N/D
Δ -8-Tetrahydrocannabinol (Δ -8-THC)	Liquid Chromatography	N/D

**Denotes third party analysis. Source data available upon request.

LOQ Limit of quantitation

N/D None detected above the limits of detection



Certificate ID: **67281**
 Client Sample ID: **190128FE**
 Lot Number: **190128FE**
 Matrix: **Isolates - CBD**

Received: **10/8/19**

Scan QR Code for authenticity



Authorization: Jon Podgorni, Lead Research Chemist	Signature: <i>Jon Podgorni</i>	Date: 10/23/2019
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The data contained within this report was collected in accordance with the requirements of ISO/IEC17025:2017. I attest that the information contained within the report has been reviewed for accuracy and checked against the quality control requirements for each method. These results relate only to the test article listed in this report. Reports may not be reproduced except in their entirety.

CN: Cannabinoid Profile & Potency [WI-10-17 & WI-10-17-01] Analyst: RAS Test Date: 10/16/2019

The client sample was analyzed for plant-based cannabinoids by Liquid Chromatography (LC). Due to the unique precision and accuracy demands of assay testing for highly purified materials, samples were prepared in class-A volumetric glassware and quantitated against a single point calibration function. Five replicate injections of cannabidiol (CBD) certified reference standard are averaged to derive the calibration function and verify injection precision less than 2% RSD. For components other than CBD, the relative response factor of the identified component is used for quantitation. Relative response factors are calculated from certified reference standards. Relative percent difference (RPD) of the Laboratory Duplicate for this sample preparation batch was less than 2%. Assay values exceeding 100.00% are scientifically valid and result from the unavoidable accumulation of uncertainty at every stage of sampling and analysis.

67281-CN

ID	Weight %	Concentration (mg/g)	
D9-THC	ND	ND	
THCV	ND	ND	
CBD	103.08	1030.81	
CBDV	0.36	3.58	
CBG	ND	ND	
CBC	ND	ND	
CBN	ND	ND	
THCA	ND	ND	
CBDA	ND	ND	
CBGA	ND	ND	
D8-THC	ND	ND	
exo-THC	ND	ND	
Total	103.44	1034.39	0% Cannabinoids (wt%) 103.1%
Max THC	ND	ND	
Max CBD	103.08	1030.81	

Limit of Quantitation (LOQ) = 0.05 wt%

Max THC (and Max CBD) are calculated values for total cannabinoids after heating, assuming complete decarboxylation of the acid to the neutral form. It is calculated based on the weight loss of the acid group during decarboxylation: Max THC = (0.877 x THCA) + THC. This calculation does not include other cannabinoid isomers (eg. D8-THC and exo-THC). ND = None detected above the limits of detection (LOD), which is half of LOQ.

EA: Elemental Analysis [WI-10-13]

Analyst: JFD

Test Date: 10/17/2019

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67281-EA

Symbol	Metal	Conc. ¹ (µg/kg)	RL (µg/kg)	Limits ² (µg/kg)	Status
Al	Aluminum	679	50	-	
As	Arsenic	ND	50	200	PASS
Cd	Cadmium	ND	50	200	PASS
Ca	Calcium	2,602	500	-	
Cr	Chromium	95	50	300	PASS
Co	Cobalt	ND	50	300	PASS
Cu	Copper	369	50	3,000	PASS
Fe	Iron	694	50	-	
Pb	Lead	ND	50	500	PASS
Mg	Magnesium	8,208	50	-	
Mn	Manganese	ND	50	-	
Hg	Mercury	ND	50	100	PASS
Mo	Molybdenum	ND	50	1,000	PASS
Ni	Nickel	ND	50	500	PASS
P	Phosphorus	6,237	500	-	
K	Potassium	ND	500	-	
Se	Selenium	ND	50	-	
Ag	Silver	ND	50	700	PASS
S	Sulfur	ND	500	-	
Sn	Tin	2,856	500	6,000	PASS
Zn	Zinc	444	50	-	

1) ND = None detected to the Method Detection Limit (MDL)

2) USP recommended maximum daily limits for inhalational drug product.

MB1: Microbiological Contaminants [WI-10-09]

Analyst: MM

Test Date: 10/9/2019

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67281-MB1

Symbol	Analysis	Results	Units	Limits*	Status
AC	Total Aerobic Bacterial Count	<100	CFU/g	100,000 CFU/g	PASS
CC	Total Coliform Bacterial Count	<100	CFU/g	1,000 CFU/g	PASS
EB	Total Bile Tolerant Gram Negative Count	<100	CFU/g	1,000 CFU/g	PASS
YM	Total Yeast & Mold	<100	CFU/g	10,000 CFU/g	PASS

Note: All recorded Microbiological tests are within the established limits.

MB2: Pathogenic Bacterial Contaminants [WI-10-10]

Analyst: LabAdmin

Test Date: 10/10/2019

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67281-MB2

Test ID	Analysis	Results	Units	Limits*	Status
67281-ECPT	E. coli (O157)	Negative	NA	Non Detected	PASS
67281-SPT	Salmonella	Negative	NA	Non Detected	PASS

Note: All recorded pathogenic bacteria tests passed.

MY: Mycotoxin Testing [WI-10-05]

Analyst: CJB

Test Date: 10/10/2019

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67281-MY

Test ID	Date	Results	MDL	Limits	Status*
Total Aflatoxin	10/10/2019	< MDL	2 ppb	< 20 ppb	PASS
Total Ochratoxin	10/10/2019	< MDL	3 ppb	< 20 ppb	PASS

TP: Terpenes Profile [WI-10-27]

Analyst: CMA

Test Date: 10/11/2019

The client sample was analyzed by Head-Space Gas Chromatography (HS-GC). The collected data was compared to data collected for certified reference standards at known concentrations. All values are semiquantitative estimates based on recorded peak areas relative to terpene calibration data.

67281-TP

Compound	ppm	Terpene Profile	Compound	ppm	Terpene Profile	
beta-myrcene			camphene			
isopulegol			L-fenchone			
menthol			beta-pinene			
cis-nerolidol			eucalyptol			
trans-nerolidol			alpha-terpinene			
gamma-terpinene			delta-3-carene			
alpha-bisabolol			alpha-pinene			
linalool			D-limonene			
beta-caryophyllene			geraniol			
caryophyllene oxide			cis-beta-ocimene			
guaial			alpha-ocimene			
sabinene			alpha-phellandrene			
alpha-humulene			terpinolene			
p-cymene						
	ppm 0.00	5.00	10.00	ppm 0.00	5.00	10.00
Total Terpene: <0.1 wt%						

VC: Analysis of Volatile Organic Compounds [WI-10-28]

Analyst: CMA

Test Date: 10/10/2019

The client sample was analyzed by Head-Space Gas Chromatography (HS-GC). The collected data was compared to data collected for certified reference standards at known concentrations.

67281-VC

Compound	CAS	Amount ¹	Limit ²	RL	Status
Propane	74-98-6	ND	1,000 ppm	100	PASS
Isobutane	75-28-5	ND	1,000 ppm	100	PASS
Butane	106-97-8	ND	1,000 ppm	100	PASS
Methanol	67-56-1	ND	3,000 ppm	100	PASS
Pentane	109-66-0	ND	5,000 ppm	100	PASS
Ethanol	64-17-5	ND	5,000 ppm	100	*
Acetone	67-64-1	ND	5,000 ppm	100	PASS
Isopropanol	67-63-0	ND	5,000 ppm	100	PASS
Acetonitrile	75-05-8	ND	410 ppm	100	PASS
Hexane	110-54-3	ND	290 ppm	100	PASS
Heptane	142-82-5	ND	5,000 ppm	100	PASS

1) ND = Not detected at a level greater than the Reporting Limit (RL).

2) In ppm, based on USP recommended limits for residual solvents, adopted by the Massachusetts Department of Public Health for cannabis concentrates and extracts on 3/31/16. Butane/Propane limits are based on limits established for state of Colorado.

(*) For ethanol, as many formulations contain flavorings based on ethanol extracts of natural products, no status has been assigned.

END OF REPORT



PACIFIC AGRICULTURAL LABORATORY

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21830 S.W. Alexander Ln. • Sherwood, OR 97140 • Ph 503.626.7943 • pacaglab.com

GenCanna Global
4274 Colby Rd.
Winchester, KY 40391

Report Number: P193122
Report Date: October 22, 2019
Client Project ID:

Client Sample ID: 190128FE
PAL Sample ID: P193122-03

Sample Date: 10/07/2019
Received Date: 10/08/2019
Extraction Date: 10/14/2019

Certificate of Analysis

Table with 10 columns: Analysis Date, Analyte, Amount Detected, LOQ (mg/kg), Notes, Analysis Date, Analyte, Amount Detected, LOQ (mg/kg), Notes. Includes JASBC 69(3):121-126, 2011 (GC-MS/MS) data.

Handwritten signature of Rick Jordan



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Certificate of Analysis
(Continued)

Table with 10 columns: Analysis Date, Analyte, Amount Detected, LOQ (mg/kg), Notes, Analysis Date, Analyte, Amount Detected, LOQ (mg/kg), Notes. Contains two sections of data for JASBC 69(3):121-126, 2011 (GC-MS/MS) and (LC-MS/MS).

Handwritten signature of Rick Jordan



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Table with 10 columns: Analysis Date, Analyte, Amount Detected, LOQ (mg/kg), Notes, Analysis Date, Analyte, Amount Detected, LOQ (mg/kg), Notes. Contains data for JASBC 69(3):121-126, 2011 (LC-MS/MS) (Continued) listing various pesticides and their detection results.

Rick Jordan, Laboratory Manager



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Extraction Date: 10/14/2019

Notes and Definitions

<u>Notes</u>	<u>Definition</u>
LOQ	Limit of Quantitation
ND	Not Detected
*	Not included under current scope of accreditation

The results contained in this report relate only to the items tested.
 The results reflect the condition of the samples as received by PAL.
 Samples will be stored for a minimum of 60 days after the final report is issued, as described in our Quality Manual.
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 PAL is accredited to ISO/IEC 17025:2017 Standard, by PJLA, Accreditation #64422, Testing.

Rick Jordan, Laboratory Manager