

Determination of 11 cannabinoids in Industrial Hemp using \$14,990 HPLC from CTInstruments

Accurate determination of cannabinoids in industrial hemp is important from regulatory compliance point of view to meet the permissible 0.3% THC limit. We present an easy-to-use, accurate, reliable, and affordable HPLC for measuring 11 cannabinoids in a variety of samples. This application note describes analysis of industrial hemp.

HPLC Features

- Reciprocating Pump
- Rheodyne 7725i Injector
- CTI HPLC Software
- UV/VIS Detector
- Temperature-controlled Column Compartment

HPLC Specifications

Flow Rate	0.001 - 5mL/min
Max Pressure	6,300 psi
Flow Accuracy	≤±1%
Flow Precision	RSD <0.1%
Qualitative Repeatability	RSD ≤0.2% (Naphthalene/ Methanol standards)
Quantitative Repeatability	RSD ≤0.5% (Naphthalene/ Methanol standards)
Wavelength Range	180 – 680nm
Spectrum Bandwidth	8nm
Wavelength Accuracy	±1nm
Wavelength Precision	Below 0.1nm
Noise	≤0.25X10 ⁻⁵ AU

HPLC Column Specifications

Column Type	C18, SS body
Dimensions	150x4.6mm
Packing	5µm particles
Guard Column	C18



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Biomass Sample

Sample Type	Industrial Hemp Flower
Strain	NBS Auto Flower
Condition	Dry



PROCESS

1. Extraction

Extraction of cannabinoids from dried industrial hemp is the initial step in the analysis.

Extraction Parameters

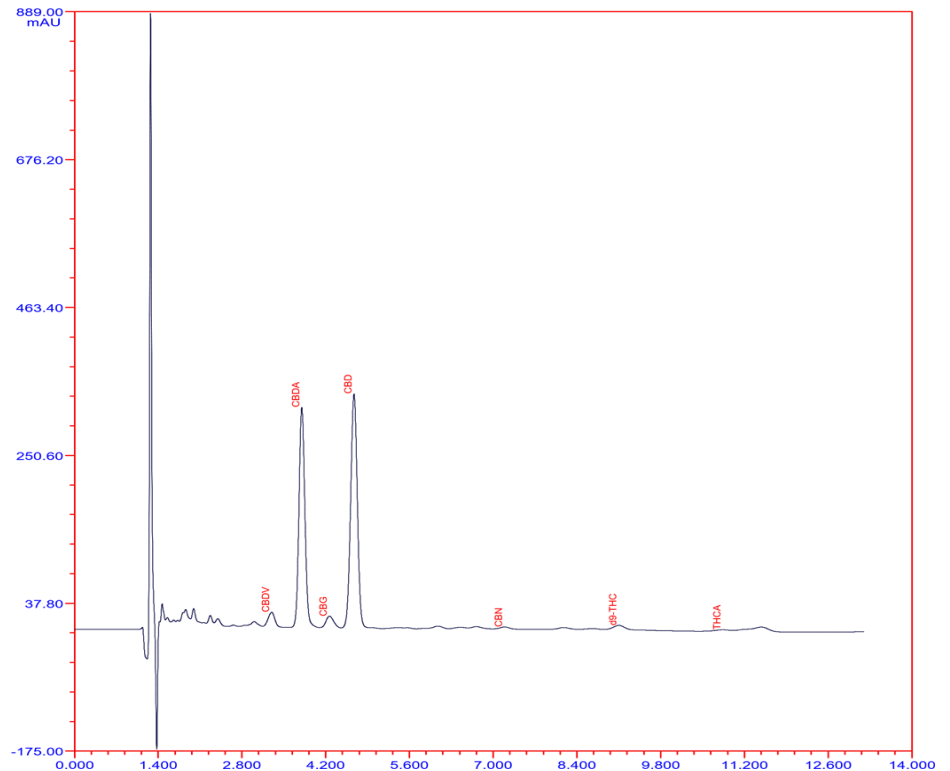
Sample Weight	500mg
Sample Preparation	Grinding/Homogenization
Extraction Solvent	Methanol
Extraction Conditions	15 minutes at room temperature
Dilution	In acetonitrile

2. Injection and HPLC Analysis

After the extraction is completed, diluted extract is injected into HPLC for analysis.

Chromatographic Conditions

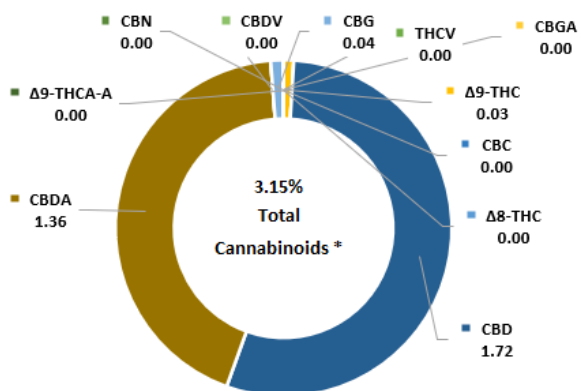
Mode	Isocratic
Temperature	30°C
Detection	UV at 220nm
Mobile Phase	Buffer:Acetonitrile
Flow Rate	1.2mL/min



3. Report Generation

After the analysis is completed, CTI HPLC software auto-processes the chromatogram, followed by export to custom lab report generation program in MS Excel (highly customizable and automated report generation for ease of use).

CANNABINOID PROFILE



Compound		Result (% w/w)	mg/gram of sample
THCV	Tetrahydrocannabivarin	NR	NR
Δ8-THC	(-)-Δ8-THC	NR	NR
Δ9-THC	(-)-Δ9-THC	0.03	0.31
Δ9-THCA-A	(-)-trans-Δ9-THC acid A	NR	NR
CBD	Cannabidiol	1.72	17.19
CBDA	Cannabidiolic acid	1.36	13.64
CBDV	Cannabidivarin	<0.01	<0.04
CBG	Cannabigerol	0.04	0.39
CBGA	Cannabigerolic acid	NR	NR
CBN	Cannabinol	<0.01	<0.04
CBC	(+/-) Cannabichromene	NR	NR



Compound	Result (% w/w)	mg/gram of sample
Total Cannabinoids *	3.15	31.53
Total Potential THC	0.03	0.31
Total Potential CBD	2.92	29.16
Total Potential CBG	0.04	0.39

NOTES

Lower Limit of Quantification (LLOQ)

The lower limit of quantification (LLOQ) is the lowest amount of a cannabinoid in a sample that can be quantitatively determined with suitable precision and accuracy using the corresponding method and dilution rates. All values below this threshold are reported as NR - None Reported.

Compound		LLOQ (% w/w)
THCV	Tetrahydrocannabivarin	0.01
Δ8-THC	(-)-Δ8-THC	0.01
Δ9-THC	(-)-Δ9-THC	0.01
Δ9-THCA-A	(-)-trans-Δ9-THC acid A	0.01
CBD	Cannabidiol	0.01
CBDA	Cannabidiolic acid	0.01
CBDV	Cannabidivarin	0.01
CBG	Cannabigerol	0.01
CBGA	Cannabigerolic acid	0.01
CBN	Cannabinol	0.01
CBC	(+/-) Cannabichromene	0.01

Instrument Calibration & Quality Control

Date of Quality Control	Standard	Standard Concentration (ug/mL)	Measured Concentration (ug/mL)	Delta (%)	PASS/FAIL	Notes
27-Mar-21	Benzoic acid	1002.9	1004.0	0.1%	PASS	
27-Mar-21	CBD	100.5	99.7	-0.8%	PASS	