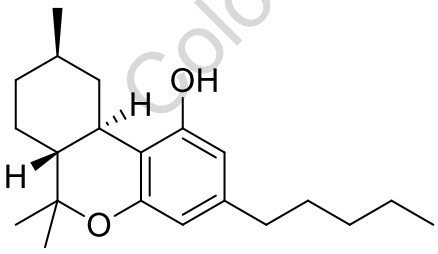
COLORADO CHROMATOGRAPHY

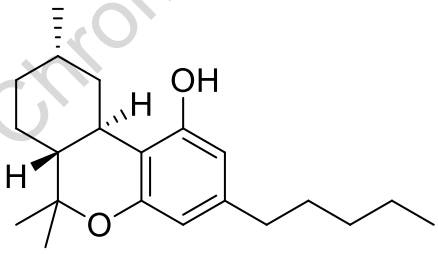
INSPIRED BY NATURE DRIVEN BY SCIENCE

(6aR,9R,10aR) Hexahydrocannabinol

(6aR,9S,10aR) Hexahydrocannabinol



(6a*R*,9*R*,10a*R*)-hexahydrocannabinol



(6a*R*,9*S*,10a*R*)-hexahydrocannabinol

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Internal (10aR,9R,6aR)-HHC Standard

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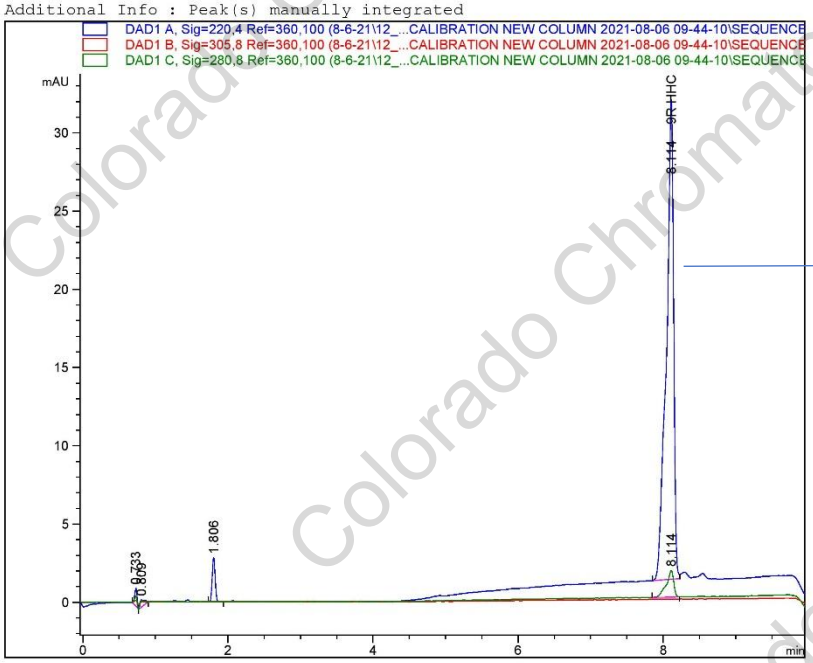
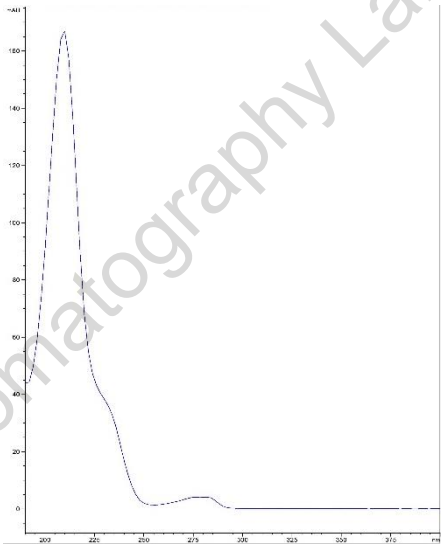


(6aR,9R,10aR)-HHC DAD Absorbance Spectra



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    Use Multiplier & Dilution Factor with ISTDs


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                              *** End of Report ***
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COLORADO CHROMATOGRAPHY

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Internal (10aR,9R,6aR)-HHC Standard

The above chromatogram represents an internal analytical reference standard for the (6aR,9R,10aS) stereoisomer of hexahydrocannabinol. It is important to note that in this current state, this is NOT a Certified Reference Material and has not been certified by an ISO 17034 accredited reference material manufacturer.

There is a contamination which is stuck to the column of our HPLC which can be seen at 1.806 min on the above chromatogram. As you will see below, this is present in every sample we test, including blank solvent injections. We believe that this is not a contaminant which is present in the actual material being tested. As evidence, please reference the chromatogram of our Acetonitrile blank. We plan on installing a new column on our HPLC in the next week.

It is important to note that the above chromatogram is a 40 ug/ml check standard for the calibration curve which was created using the above reference material. As you can see, a value of 37.706 ug/ml is well within the +/- 10% range (36-44 ug/ml) for analytical testing which is the current standard in the cannabis industry.

You can also find the DAD Absorbance Spectra from 200-400nm for our (6aR,9R,10aR)-HHC internal Standard next to the chromatogram above. This absorbance spectra appears typical of a conventional hydrocannabinol with a maximum absorbance at 220nm and 280nm. Additionally, this absorbance spectra also matches the spectra obtained from the Raw HHC Distillate. This absorbance spectra also matches with the PDA Absorbance Spectra collected by KCA Laboratories.

There is also a small contamination of the (6aR,9S,10aR)-HHC stereoisomer which can be seen as a small peak following the (6aR,9R,10aR)-HHC peak. This small contamination is taken into consideration and accounted for when normalizing our data. This standard has demonstrated a purity of >98% when measured via Ultra-High-Performance Liquid Chromatography and High-Pressure Liquid Chromatography. This purified stereoisomer of HHC has been sent off for 3rd party NMR testing and Mass Spectrometry confirmation. You can find a copy of the proton NMR and Mass Spectrometry data on the raw HHC distillate below.

This internal analytical reference standard has been submitted to an ISO 17034 accredited reference material manufacturer. We are expecting the have this purified compound certified as a reference material within the next few months. After being certified as a CRM or RM this reference standard will be available for commercial use by ISO 17025 certified testing facilities and official COA's will be issued.

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Internal (6aR,9S,10aR)-HHC Standard

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                  1100 DAD HIGH THROUGHPUT (NO CBT).M
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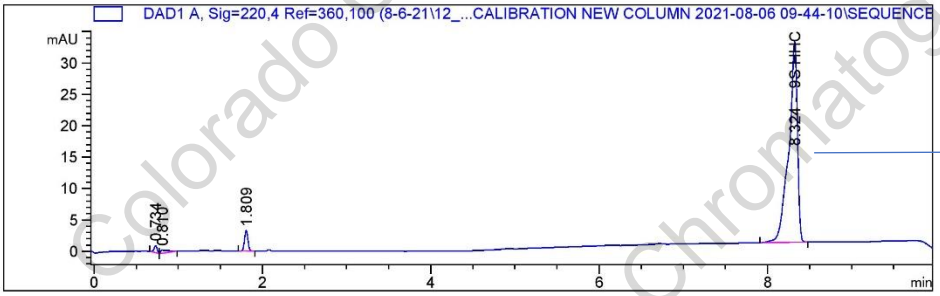
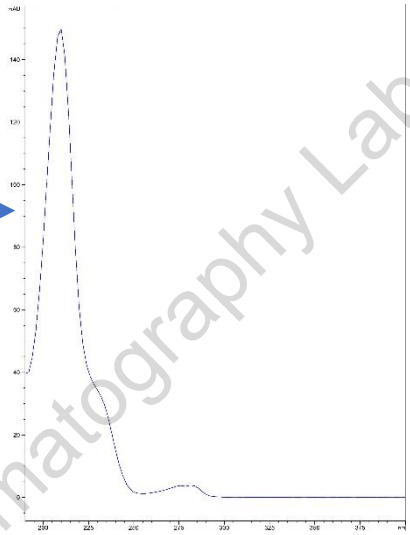


(6aR,9S,10aR)-HHC DAD Absorbance Spectra



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Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=220,4 Ref=360,100
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Totals : 42.15021

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                        *** End of Report ***
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COLORADO CHROMATOGRAPHY

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Internal (6aR,9S,10aR)-HHC Standard

The above chromatogram represents an analytical reference standard for the (6aR,9S,10aR) stereoisomer of hexahydrocannabinol. It is important to note that in this current state, this is NOT a Certified Reference Material and has not been certified by an ISO 17034 accredited reference material manufacturer.

There is a contamination which is stuck to the column of our HPLC which can be seen at 1.809 min on the above chromatogram. As you will see below, this is present in every sample we test, including blank solvent injections. We believe that this is not a contaminant which is present in the actual material being tested. As evidence, please reference the chromatogram of our Acetonitrile blank. We plan on installing a new column on our HPLC in the next week.

It is important to note that the above chromatogram is a 40 ug/ml check standard for the calibration curve which was created using the above reference material. As you can see, a value of 42.150 ug/ml is well within the +/- 10% range (36.000-44.000 ug/ml) for analytical testing which is the current standard in the cannabis industry.

You can also find the DAD Absorbance Spectra from 200-400nm for our (6aR,9S,10aR)-HHC internal Standard next to the chromatogram above. This absorbance spectra appears typical of a conventional hydrocannabinol with a maximum absorbance at 220nm and 280nm. This absorbance spectra also matches identically to the absorbance spectra for our (6aR,9R,10aR)-HHC internal standard. Additionally, this absorbance spectra also matches the spectra obtained from the Raw HHC Distillate. This absorbance spectra also matches with the PDA Absorbance Spectra collected by KCA Laboratories.

There is also a small contamination of the (6aR,9R,10aR)-HHC stereoisomer which can be seen as a small shoulder preceding the (6aR,9S,10aR)-HHC peak. This small contamination is taken into consideration and accounted for when normalizing our data. This standard has demonstrated a purity of >99% Purity when measured via Ultra-High-Performance Liquid Chromatography and High-Pressure Liquid Chromatography. This purified stereoisomer of HHC has been sent off for 3rd party NMR testing and Mass Spectrometry confirmation. You can find a copy of the proton NMR and Mass Spectrometry data on the raw HHC distillate below.

This internal analytical reference standard has been submitted to an ISO 17034 accredited reference material manufacturer. We are expecting the have this purified compound certified as a reference material within the next few months. After being certified as a CRM or RM this reference standard will be available for commercial use by ISO 17025 certified testing facilities and official COA's will be issued.

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Unidentified Stereoisomer Peak

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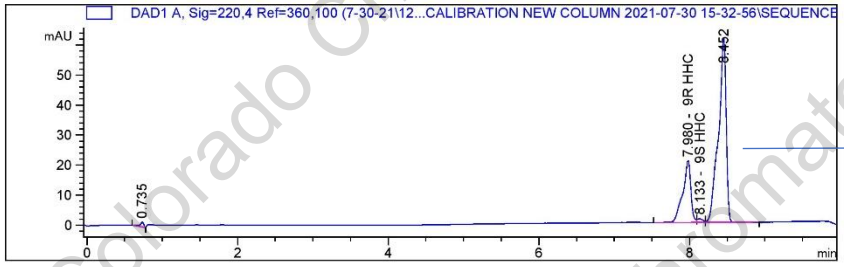
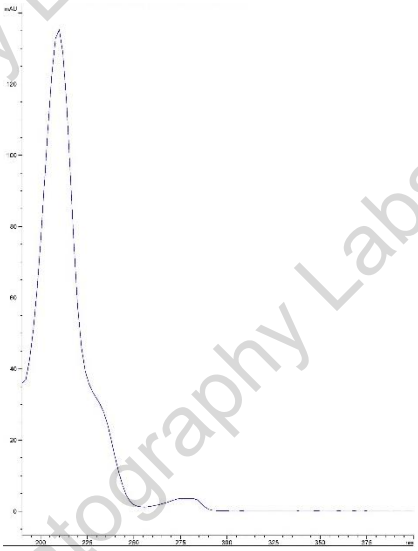


Unidentified-HHC Stereoisomer DAD Absorbance Spectra



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      7.367            -          -          -         D8 THC
      7.980 BV      152.42097 1.63140e-1   24.86590    9R HHC
      8.133 VV        5.96409 1.93587e-1    1.15457    9S HHC

    Totals :                              26.02047


    2 Warnings or Errors :

    Warning : Calibration warnings (see calibration table listing)
    Warning : Calibrated compound(s) not found

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                            *** End of Report ***
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Unidentified Stereoisomer Peak

The above chromatogram represents the current state of our purification attempts for the 3rd unidentified peak found in the Raw HHC Distillate. It is important to note that in this current state, this is NOT a Certified Reference Material and has not been certified by an ISO 17034 accredited reference material manufacturer.

There is a contamination which is stuck to the column of our HPLC which is not integrated but can be seen at 1.809 min on the above chromatogram. As you will see below, this is present in every sample we test, including blank solvent injections. We believe that this is not a contaminant which is present in the actual material being tested. As evidence, please reference the chromatogram of our Acetonitrile blank. We plan on installing a new column on our HPLC in the next week.

You can also find the DAD Absorbance Spectra from 200-400nm for this unidentified isomer next to the chromatogram above. This absorbance spectra appears typical of a conventional hydrocannabinol with a maximum absorbance at 220nm and 280nm. This absorbance spectra also matches identically to the absorbance spectra for our (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC internal standards. Additionally, this absorbance spectra also matches the spectra obtained from the Raw HHC Distillate. This absorbance spectra also matches with the PDA Absorbance Spectra collected by KCA Laboratories.

There is also a small contamination of the (6aR,9S,10aR)-HHC stereoisomer which can be seen as a small shoulder preceding the unidentified isomer peak. Additionally, there is a contamination of (6aR,9R,10aR)-HHC which can be seen as a peak at 7.980 min. This standard is a work in progress, and we hope to have it completed in the next few months. This unidentified isomer has been sent off for 3rd party NMR testing and Mass Spectrometry identity verification. You can find a copy of the proton NMR and Mass Spectrometry data on the raw HHC distillate below.

Below, you will find a visual representation of the numerous possible stereoisomers of HHC. Based on the data we have collected; we have reasonable suspicion that this 3rd peak is a different stereoisomer of HHC. We are working diligently to confirm this using 3rd party proton NMR and Mass Spectrometry. Once we have confirmed the identity of this stereoisomer, we will be creating a reference standard to be submitted to an ISO 17034 accredited reference material manufacturer.

Based on our collected data, this unidentified peak appears to have a similar polarity, absorbance spectra, mass to charge ratio and J-coupling values to our (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC internal standards. These collective data indicate that this unidentified peak is likely to be another stereoisomer of HHC.

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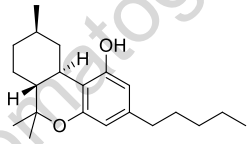
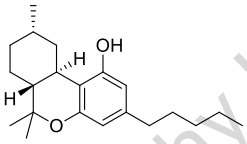
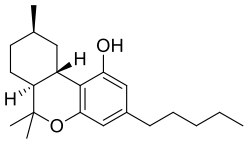
Possible Stereoisomers of Hexahydrocannabinol



(6a*R*,9*R*,10a*R*)-hexahydrocannabinol



(6a*R*,9*S*,10a*R*)-hexahydrocannabinol



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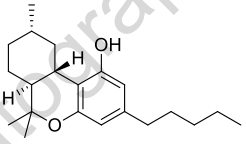

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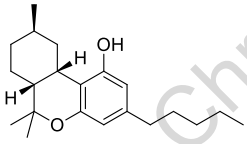
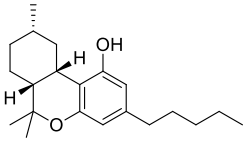
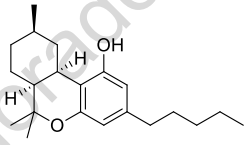


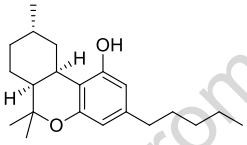
(6a*R*,9*R*,10a*S*)-hexahydrocannabinol



(6a*R*,9*S*,10a*S*)-hexahydrocannabinol



(6a*S*,9*R*,10a*R*)-hexahydrocannabinol



(6a*S*,9*S*,10a*R*)-hexahydrocannabinol

***We thought it was important to note that many naturally occurring phytocannabinoids demonstrate chirality and have multiple stereoisomers. For example, both Delta-8 THC and Delta-9 THC have 4 stereoisomers each.**

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(6aR,9R,10aR)-HHC + (6aR,9S,10aR)-HHC Internal Standard Mixture

Data File C:\CHEM32\..._16_20 CALIBRATION NEW COLUMN 2021-08-06 09-44-10\SEQUENCE0000030.D
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                      1100 DAD HIGH THROUGHPUT (NO CBT).M
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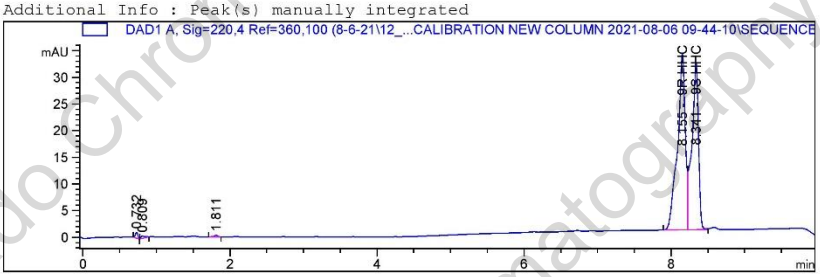


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    Dilution:                     :      1.0000
    Use Multiplier & Dilution Factor with ISTDs

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    RetTime  Type     Area     Amt/Area    Amount   Grp   Name
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      8.341 VV      198.40628 2.06546e-1   40.98012    9S HHC

    Totals :                               80.96570

    ======================================================================
                              *** End of Report ***
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COLORADO CHROMATOGRAPHY

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(6aR,9R,10aR)-HHC + (6aR,9S,10aR)-HHC Internal Standard Mixture

The above chromatogram represents an analytical reference standard for a mix of the >98% (6aR,9R,10aR)-HHC and >99% (6aR,9S,10aR)-HHC discussed above. It is important to note that in this current state, this is NOT a Certified Reference Material and has not been certified by an ISO 17034 accredited reference material manufacturer.

There is a contamination which is stuck to the column of our HPLC which can be seen at 1.811 min on the above chromatogram. As you will see below, this is present in every sample we test, including blank solvent injections. We believe that this is not a contaminant which is present in the actual material being tested. As evidence, please reference the chromatogram of our Acetonitrile blank. We plan on installing a new column on our HPLC in the next week.

It is important to note that the above chromatogram is a 40 ug/ml check standard for the calibration curve which was created using the above standard mix as reference material. As you can see, a value of 39.986 ug/ml for (6aR,9R,10aR)-HHC and 40.980 ug/ml for (6aR,9S,10aR)-HHC is well within the +/- 10% range (36.000-44.000 ug/ml) for analytical testing which is the current standard in the cannabis industry.

You can also find the DAD Absorbance Spectra from 200-400nm for our (6aR,9S,10aR)-HHC internal Standard next to the chromatogram above. This absorbance spectra appears typical of a conventional hydrocannabinol with a maximum absorbance at 220nm and 280nm. This absorbance spectra also matches identically to the absorbance spectra for both of our (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC internal standards. Additionally, this absorbance spectra also matches the spectra obtained from the Raw HHC Distillate. This absorbance spectra also matches with the PDA Absorbance Spectra collected by KCA Laboratories.

The small contaminations of the other stereoisomer found in the individual (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC peaks works to our advantage when mixed as they contaminants from the individual standards create a higher purity standard when mixed. The small contaminations are still taken into consideration and accounted for when normalizing our data. This standard has demonstrated a purity of >99% Purity when measured via Ultra-High-Performance Liquid Chromatography and High-Pressure Liquid Chromatography.

This internal analytical reference standard has been submitted to an ISO 17034 accredited reference material manufacturer. We are expecting the have this purified compound certified as a reference material within the next few months. After being certified as a CRM or RM this reference standard will be available for commercial use by ISO 17025 certified testing facilities and official COA's will be issued.

COLORADO CHROMATOGRAPHY
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Acetonitrile Blank

Data File C:\CHEM32\..._16_20 CALIBRATION NEW COLUMN 2021-08-06 09-44-10\SEQUENCE0000011.D
Sample Name: ACN Blank

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Last changed    : 8/5/2021 3:14:47 PM
Analysis Method : C:\CHEM32\1\METHODS\8-6-21 9R HHC CALIBRATION.M
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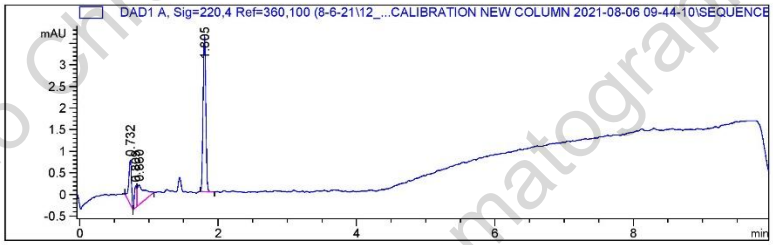


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Sorted By             :      Signal
Calib. Data Modified  :      8/11/2021 11:36:19 AM
Multiplier:                  :      1.0000
Dilution:                    :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=220,4 Ref=360,100

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [mAU*s]                [ug/ml]
-------|-----|----------|----------|----------|--|------------------
  8.100           -          -          -         9R HHC

Totals :                                0.00000


1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==================================================================
```

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Acetonitrile Blank

The above chromatogram represents a solvent blank which is performed to equilibrate a column at the beginning of a new sequence and between sample injections to clear the column and try to avoid contamination.

Acetonitrile, also known as methyl cyanide, is an organic solvent which we use as both our sample matrix and as part of our mobile phase when performing HPLC testing. Acetonitrile is the ideal solvent to use as our sample matrix as it is readily present in the mobile phase and cannabinoids are highly soluble in it.

A clean acetonitrile blank should result in a clean baseline free of contamination. The shape of our baseline is correct and is a result of our gradient based HPLC method. As you can see in the above chromatograph, there is a contamination found in our acetonitrile blank at 1.805 min and another smaller contamination found before it around 1.5 min. The presence of contamination when doing a solvent blank is an indicator that either your column has contaminants stuck to it, or the acetonitrile itself is contaminated. After thorough investigation, we have reason to believe these are contaminants stuck to our column.

In addition, you will find integrated positive and negative peaks between 0.7-1.0 min on this chromatograph and on all data presented here. This area is known as an injection peak which is also referred to as a void volume. This is caused by the actual injection of the sample into the system and is perfectly normal when collecting data using HPLC.

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11-Cannabinoid Mixture Certified Reference Material

Data File C:\CHEM32\..._16_20 CALIBRATION NEW COLUMN 2021-08-05 15-14-52\SEQUENCE0000011.D
Sample Name: 40 PPM CHECK STD MIX

```
==========================================================================
Acq. Operator   :                              Seq. Line :  11
Acq. Instrument : Instrument 1                  Location : Vial 8
Injection Date  : 8/5/2021 5:30:59 PM                Inj :   1
                                               Inj Volume : 5.0 µl
Acq. Method     : C:\CHEM32\1\DATA\8-5-21\12_16_20 CALIBRATION NEW COLUMN 2021-08-05 15-14-52\
                  1100 DAD HIGH THROUGHPUT (NO CBT).M
Last changed    : 8/5/2021 3:14:47 PM
Analysis Method : C:\CHEM32\1\METHODS\8-5-21 CALLIBRATION STD MIX.M
Last changed    : 8/11/2021 11:58:32 AM
                  (modified after loading)
Method Info     : First Runs Shutdown
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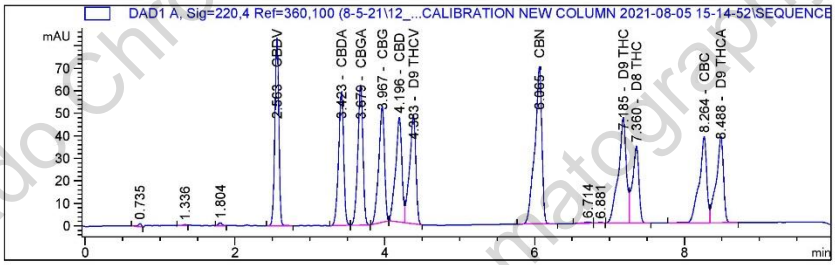


```
==========================================================================
                      External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      8/11/2021 11:58:25 AM
Multiplier:                  :      1.0000
Dilution:                    :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=220,4 Ref=360,100
```

RetTime [min]	Type	Area [mAU*s]	Amt/Area	Amount [ug/ml]	Grp	Name
2.563	BB	307.13788	1.26455e-1	38.83922		CBDV
3.423	BV	281.34451	1.36754e-1	38.47505		CBDA
3.679	VB	298.06519	1.28862e-1	38.40925		CBGA
3.967	BB	275.24692	1.40996e-1	38.80859		CBG
4.196	BV	271.50290	1.43096e-1	38.85106		CBD
4.383	VB	283.68152	1.37174e-1	38.91364		D9 THCV
6.065	BB	459.86356	8.42503e-2	38.74364		CBN
7.185	BV	345.22052	1.12958e-1	38.99530		D9 THC
7.360	VB	204.33949	1.89684e-1	38.76003		D8 THC
8.264	BV	267.30136	1.44676e-1	38.67219		CBC
8.488	VB	257.63623	1.49102e-1	38.41405		D9 THCA

Totals : 425.88203

```
==========================================================================
                          *** End of Report ***
```

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11-Cannabinoid Mixture Certified Reference Material

The above chromatograph represents a Certified Reference Material for an 11-cannabinoid standard mixture which was purchased from a 3rd party vendor that is ISO 17034 accredited. This chromatograph does meet the requirements for testing by an ISO 17025 certified testing laboratory, however, Colorado Chromatography is NOT an ISO 17025 certified testing laboratory. These data are collected for internal use only and do not meet the requirements put forth by ISO 17025.

It is important to note that the above chromatogram is a 40 ug/ml check standard for the calibration curve which was created using the above standard mix as a Certified Reference Material. As you can see, values between 38.000 ug/ml and 39.000 ug/ml for all 11 cannabinoids is well within the +/- 10% range (36.000-44.000 ug/ml) for analytical testing which is the current standard in the cannabis industry.

There is a contamination which is stuck to the column of our HPLC which can be seen at 1.804 min on the above chromatogram. As you have already seen, this is present in every sample we test, including blank solvent injections. We believe that this is not a contaminant which is present in the actual material being tested. As evidence, please reference the chromatogram of our Acetonitrile blank. We plan on installing a new column on our HPLC in the next week.

In addition, we thought it was important to note that this Certified Reference Material appears to have other contaminants located near the THC peaks. As you can see, even Certified Reference Materials do contain small amounts of impurities.

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Raw HHC Distillate

Data File C:\CHEM32\..._16_20 CALIBRATION NEW COLUMN 2021-08-11 16-33-52\SEQUENCE0000007.D
Sample Name: HHC Distillate

```
==========================================================================
Acq. Operator   :                                Seq. Line :   7
Acq. Instrument : Instrument 1                    Location : Vial 5
Injection Date  : 8/11/2021 5:57:07 PM                 Inj :   1
                                                 Inj Volume : 5.0 µl
Acq. Method     : C:\CHEM32\1\DATA\8-9-21\12_16_20 CALIBRATION NEW COLUMN 2021-08-11 16-33-52\
                  1100 DAD HIGH THROUGHPUT (NO CBT).M
Last changed    : 8/5/2021 3:14:47 PM
Analysis Method : C:\CHEM32\1\METHODS\8-6-21 (9R,9S) HHC CALIBRATION.M
Last changed    : 8/11/2021 6:59:25 PM
                  (modified after loading)
Method Info     : First Runs Shutdown
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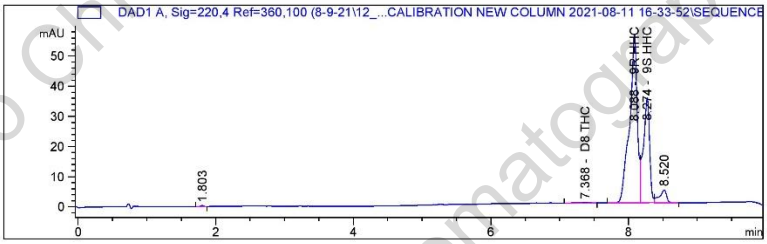


```
==========================================================================
                      External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      8/11/2021 6:18:48 PM
Multiplier:                  :      1.0000
Dilution:                    :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=220,4 Ref=360,100

RetTime  Type      Area      Amt/Area    Amount   Grp   Name
 [min]           [mAU*s]                [ug/ml]
-------|------|----------|----------|----------|--|------------------
  5.959          -           -          -        CBN
  7.368 BB        2.76658     0.00000    0.00000    D8 THC
  8.088 BV      439.85248 1.63549e-1   71.93728    9R HHC
  8.274 VV      216.11104 2.06579e-1   44.64408    9S HHC

Totals :                               116.58136


3 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found
Warning : Invalid calibration curve, (D8 THC)

==========================================================================
                          *** End of Report ***
```

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Raw HHC Distillate

The above chromatograph represents our raw HHC distillate. As you can see, the primary constituents found in this material appear to be (6aR,9R,10aS)-HHC and (6aR,9S,10aR)-HHC, with trace amounts of Delta-8 THC also detected.

There is a contamination which is stuck to the column of our HPLC which can be seen at 1.803 min on the above chromatogram. As you have already seen, this is present in every sample we test, including blank solvent injections. We believe that this is not a contaminant which is present in the actual material being tested. As evidence, please reference the chromatogram of our Acetonitrile blank. We plan on installing a new column on our HPLC in the next week.

It is important to note that the output values found for (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC of 71.937 ug/ml and 44.644 ug/ml respectively are within our calibration curve which runs from 1 ug/ml to 250 ug/ml. It is also important to note that the above chromatograph was analyzed using two separate analytical methods, one which was calibrated using the mixture of the (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC standards discussed above to identify and quantify the HHC peaks and another which was calibrated to the 11-cannabinoid standard mixture which was used to quantify the Delta-8 THC. The method pictured above is for the HHC standard mixture. The above value of 0.000 ug/ml for Delta-8 THC is incorrect and was only included on this chromatograph to identify the peak. In order to quantify the Delta-8 THC we had to use an additional method for data analysis which is not pictured here.

In addition, there is an unidentified peak found at 8.520 min. We believe that this peak represents an additional stereoisomer of HHC. Above, we have shown the numerous possible stereoisomers of HHC. The H-NMR data and Mass Spectrometry data found below do not indicate that this unidentified peak is anything abnormal, however, more data collection is needed to confirm our hypothesis. We are currently working to isolate this 3rd peak and have it identified using NMR and Mass Spectrometry. Once this peak has been purified, we plan to have this compound certified as a reference material by an ISO 17034 accredited reference material manufacturer.

The absorbance spectra for the different HHC peaks in the above chromatogram appears typical of a conventional hydrocannabinol with a maximum absorbance at 220nm and 280nm. The absorbance spectra for the primary constituents also matches identically to the absorbance spectra for both of our (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC internal standards. The absorbance spectra for the unidentified peak at 8.520 min also matches identically to both of our (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC internal standards as well as the absorbance spectra for the isolated unidentified peak. This absorbance spectra also matches with the PDA Absorbance Spectra collected by KCA Laboratories.

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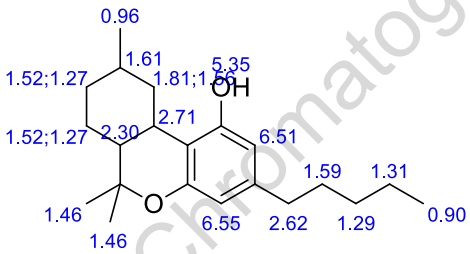
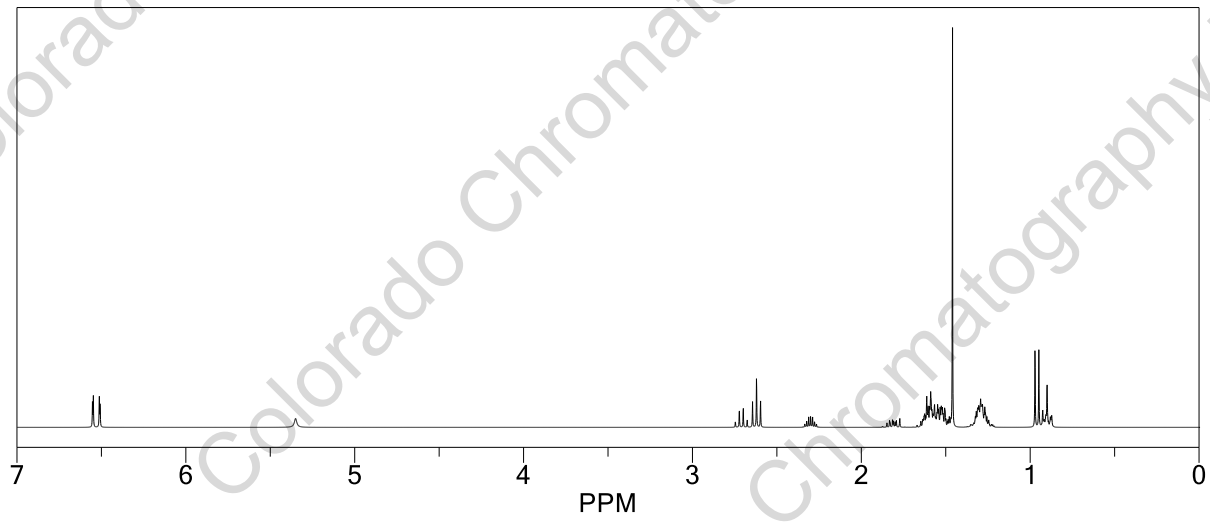
Predicted HHC Proton NMR Spectra

ChemNMR ^{1}H Estimation



Estimation quality is indicated by color: good, medium, rough



This is a predicted NMR spectrum generated from ChemDraw. This program allows us to predict what the NMR of a compound will be even if the compound has not been reported in the academic literature. This is a powerful tool for synthetic organic chemists since many of them will be making new scaffolds that have not been reported yet.

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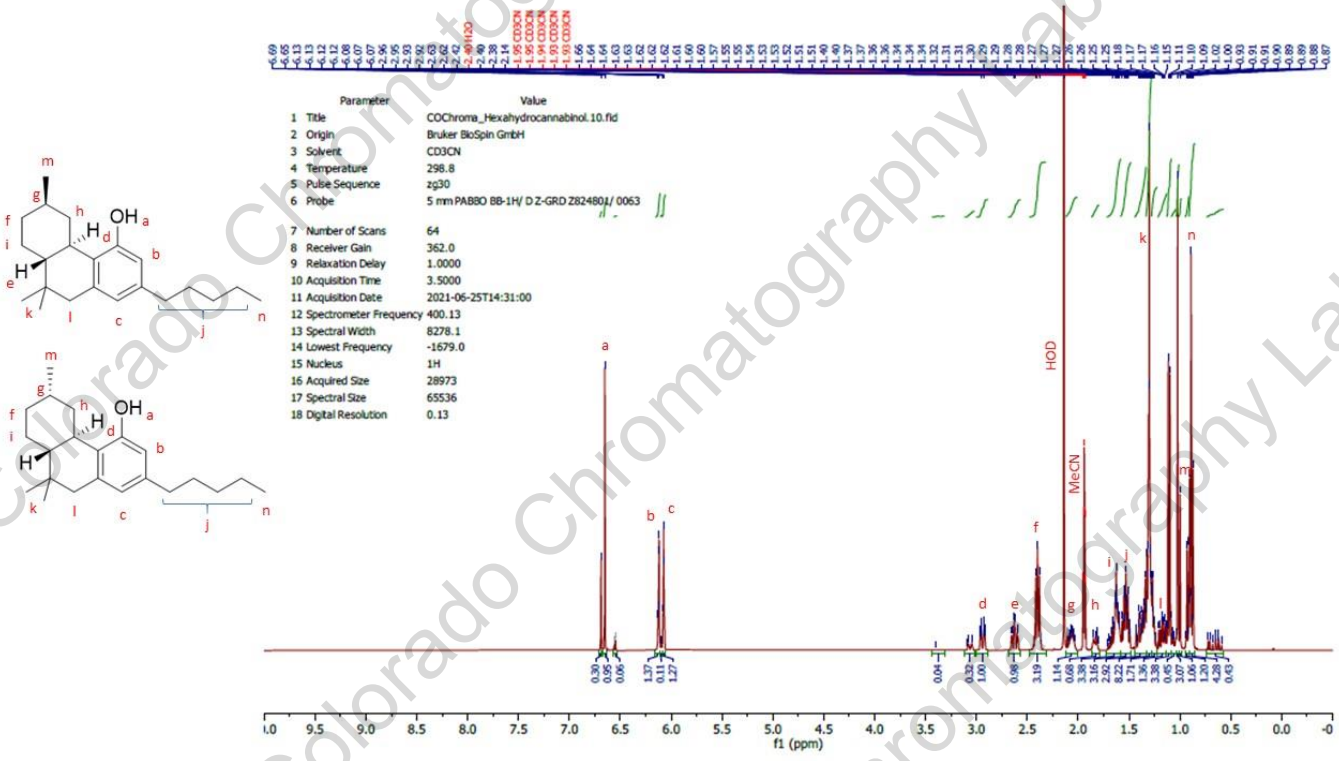
Raw HHC Distillate Proton NMR Spectra



This is a 1H NMR collected using a 500 MHz Bruker Biospin GmbH from Massachusetts. The HHC sample is dissolved in deuterated MeCN (CD3OD). The CD3OD peak appears at 1.95 ppm and any HOD (water) is found at 2.54 ppm. Those well versed in NMR analysis can see that there is the presence of diastereomers at phenol peak (6.65 ppm and 6.69 ppm). The benzylic proton (2.92 ppm and 2.95 ppm) also shows diastereomers in the spectra.

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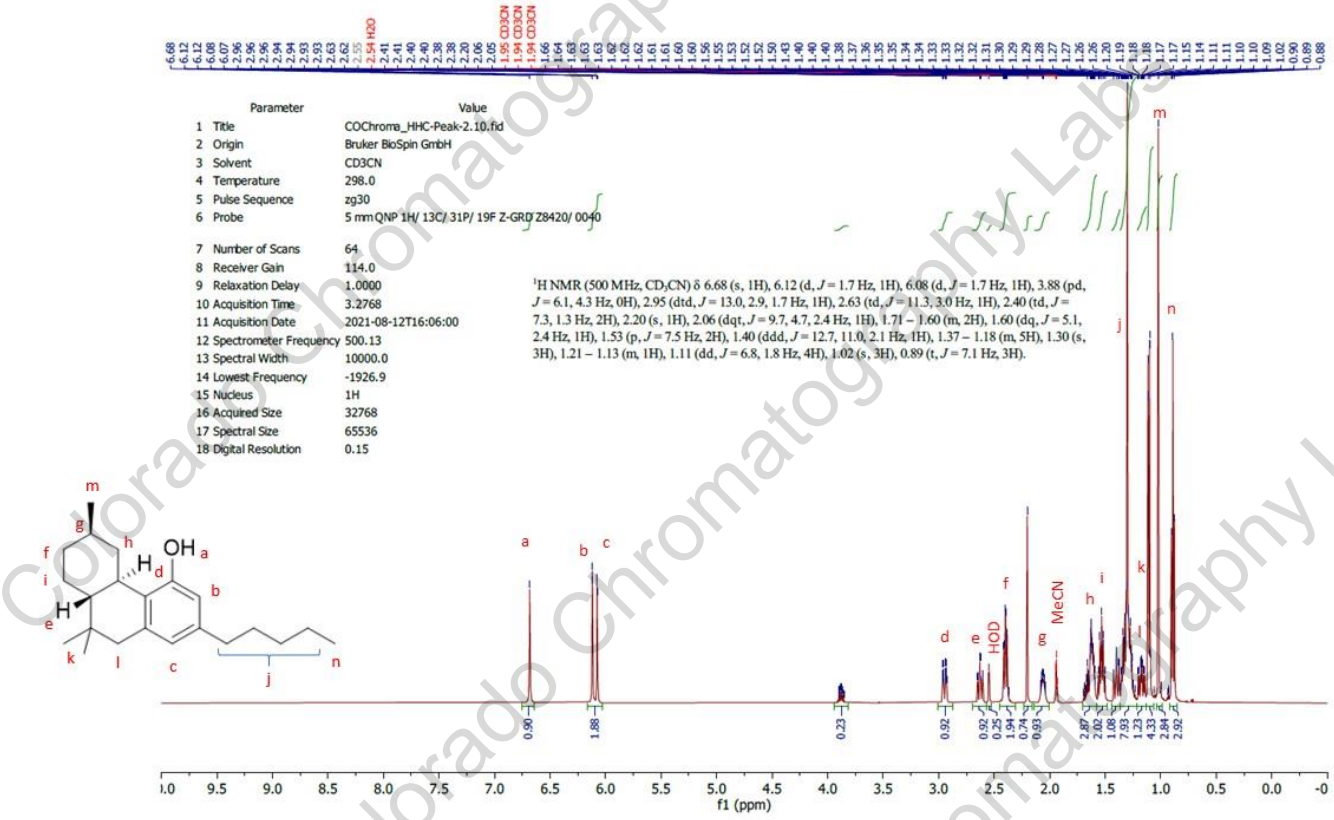
(6aR,9R,10aR)-HHC Proton NMR Spectra



This is a 1H NMR collected using a 500 MHz Bruker Biospin GmbH from Massachusetts. The (6aR,9R,10aR)-HHC sample is dissolved in deuterated MeCN (CD3OD). The CD3OD peak appears at 1.95 ppm and any HOD (water) is found at 2.54 ppm. This spectrum also has J-coupling values for those versed in NMR spectroscopy analysis.

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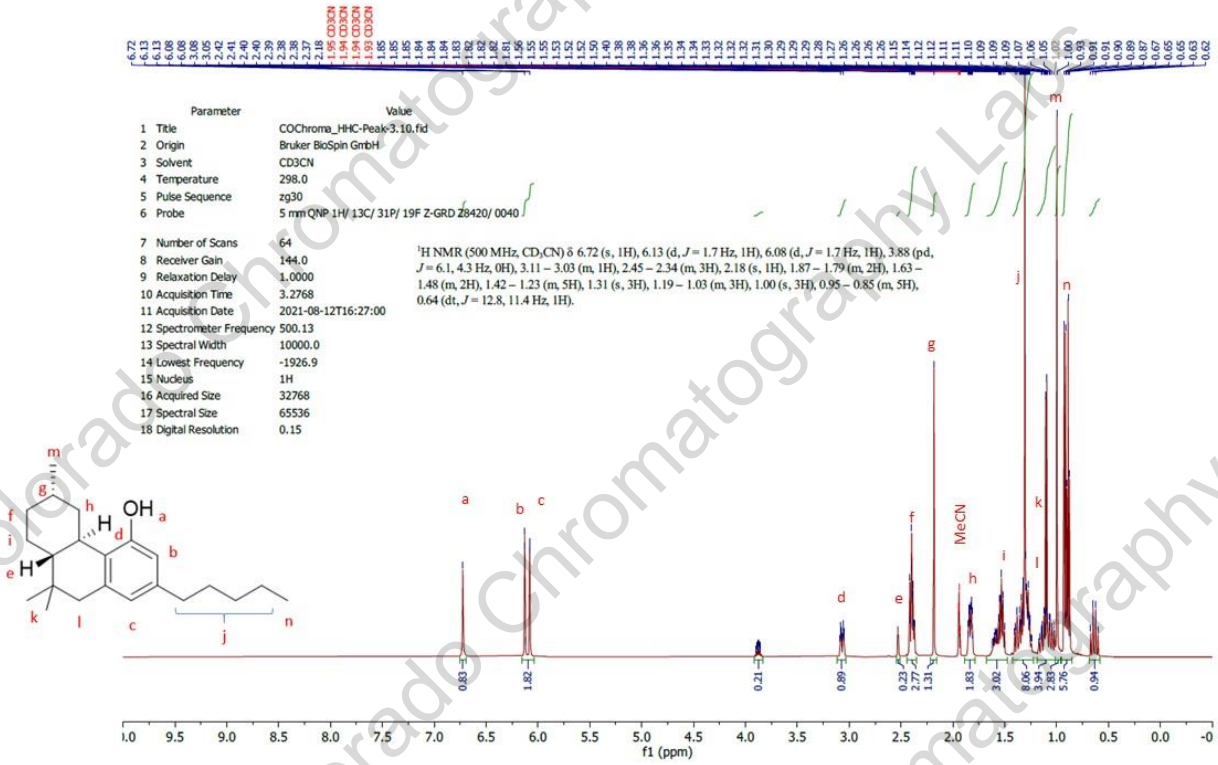
(6aR,9S,10aR)-HHC Proton NMR Spectra



This is a 1H NMR collected using a 500 MHz Bruker Biospin GmbH from Massachusetts. The (6aR,9S,10aR)-HHC sample is dissolved in deuterated MeCN (CD_3OD). The CD_3OD peak appears at 1.95 ppm and any HOD (water) is found at 2.54 ppm. This spectrum also has J-coupling values for those versed in NMR spectroscopy analysis.

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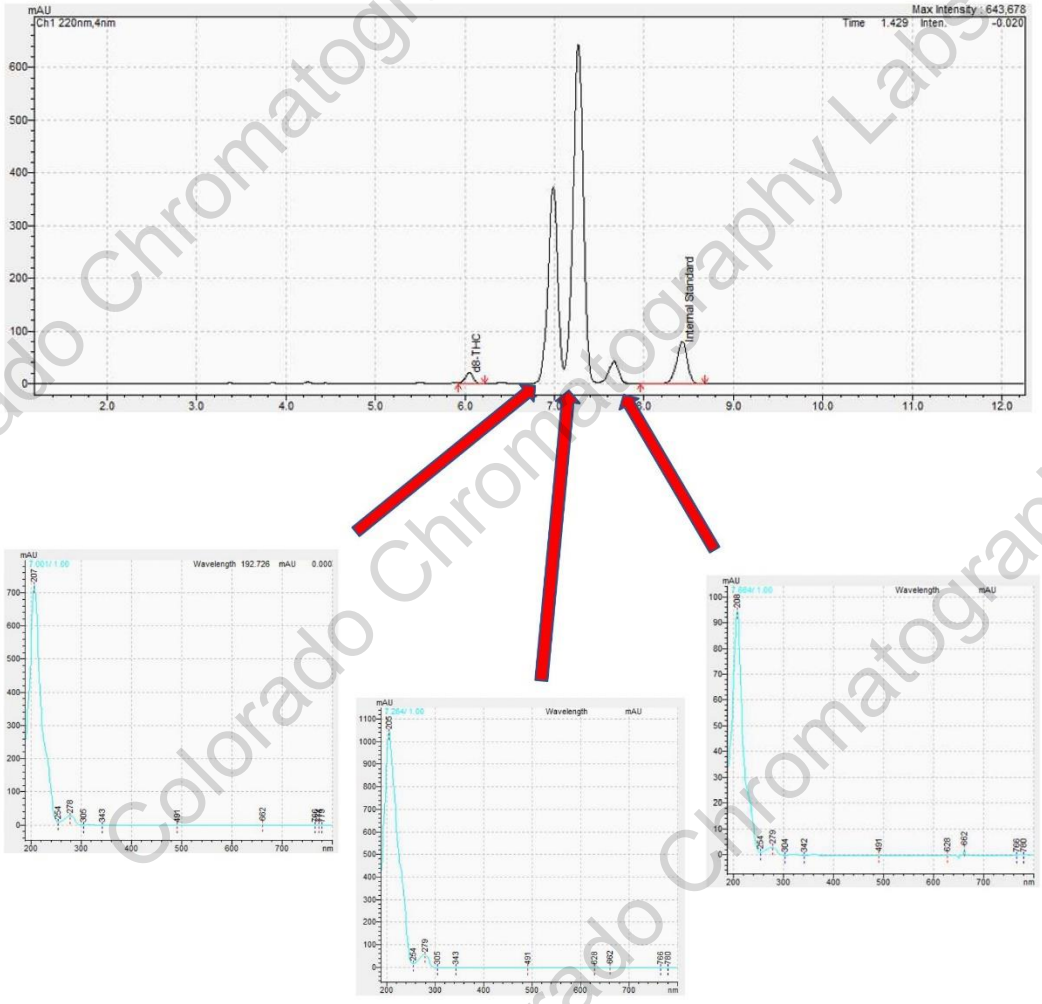
Δ^8-THC was the only cannabinoid identified from the reference standards analyzed by this method. The spectra of unknown peaks are displayed below. At least three unidentified substances eluted after Δ^8-THC indicating that they are more lipophilic than Δ^8-THC. If the molar absorptivities of these substances are similar to that of Δ^8-THC, then at least two of them are much more abundant than that of Δ^8-THC and the third at a retention time of about 7.7 min is about twice the abundance of Δ^8-THC.

Origins of PDA Spectral Data



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https://kcalabs.com

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KDA License Number P_0058

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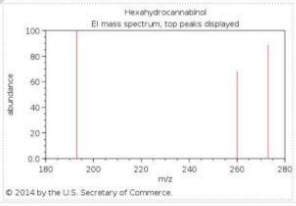
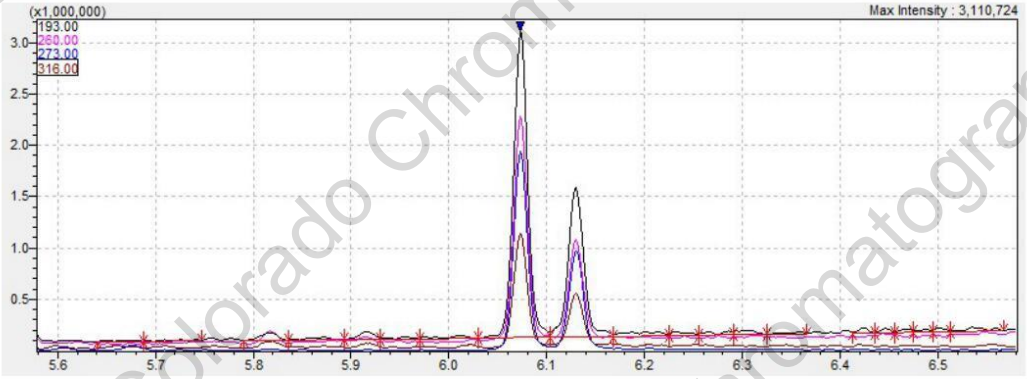
GC-MS/MS Analysis of Sample #2132

The sample was subjected to GC-MS/MS analysis to obtain evidence for the presence of hexahydrocannabinol diastereomers and confirm the identity of the Δ^8-THC.

The GC/MS spectrum of hexahydrocannabinol was obtained from the NIST library and is shown below. Prominent ions are reported at *m/z* 193 (base peak), *m/z* 273, and *m/z* 260.

NIST Number	298729
Library	Replicate library
Total Peaks	155
m/z Top Peak	193
m/z 2nd Highest	273
m/z 3rd Highest	260
Thumbnail	

Those ions characteristic of hexahydrocannabinol were monitored during the GC/MS analysis of Sample 2123. The selected ion chromatogram is shown below and the relative abundances of the ions characteristic of hexahydrocannabinol from the 1st prominent peak at about 6.08 min are shown in the table below.



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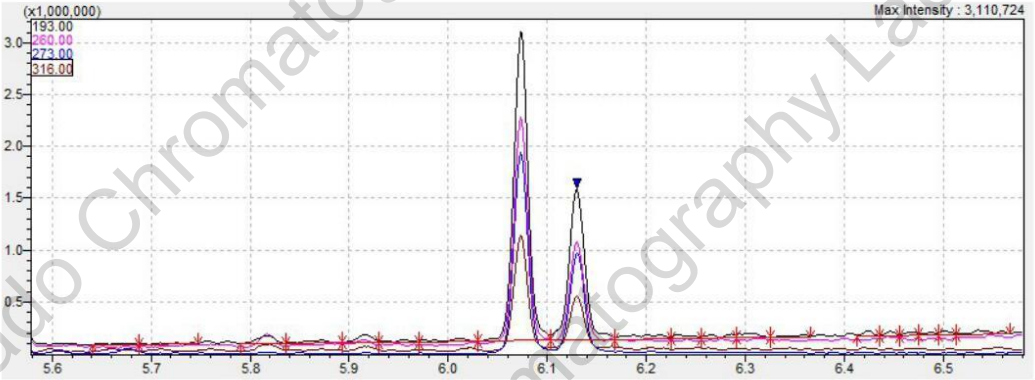
Type	m/z	Intensity	Set %	Act. %	Ref. Band
Target	193.00	3107990	100.00	100.00	---
Ref.Ion1	260.00	2249844	0.00	72.39	30
Ref.Ion2	273.00	2044301	0.00	65.78	30
Ref.Ion3	316.00	846728	0.00	27.24	30
Ref.Ion4					
Ref.Ion5					

The selected ion chromatogram is shown below and the relative abundances of the ions characteristic of hexahydrocannabinol from the 2nd prominent peak at about 6.13 min are shown in the table below.



Type	m/z	Intensity	Set %	Act. %	Ref. Band
Target	193.00	1472511	100.00	100.00	---
Ref.Ion1	260.00	994232	0.00	67.52	30
Ref.Ion2	273.00	955394	0.00	64.88	30
Ref.Ion3	316.00	518360	0.00	35.20	30
Ref.Ion4					
Ref.Ion5					

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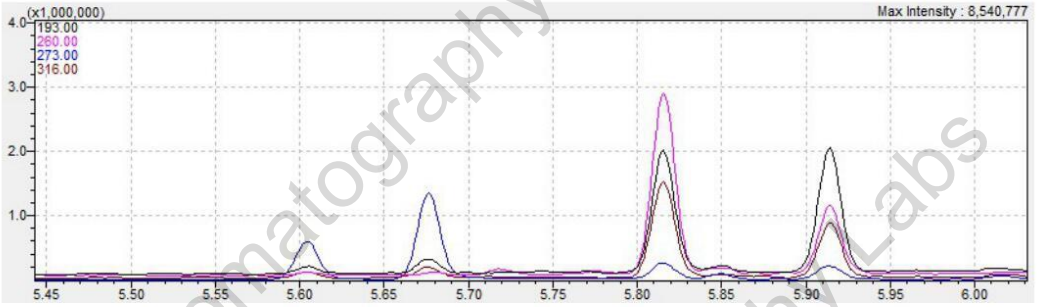
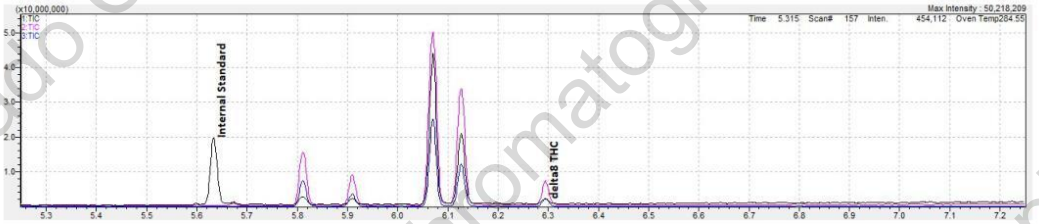
The selected ion chromatograms of the ions characteristic of hexahydrocannabinol from the less abundant peaks before 6.0 min are shown below.



These results indicate with reasonable assurance that at least two and possibly more isomers of hexahydrocannabinol are present in the sample submitted for analysis. Proof of identity would require a reference standard.



The peak at 6.3 minutes was identified as Δ^8-THC. See the following page for confirmation of the identity of Δ^8-THC.

The following is a SIM analysis of a Standards Mix showing ions and retention times for Δ^8-THC and Δ^9-THC. The table below the ion chromatogram reports the relative abundances of the most abundant ion for Δ^8-THC at *m/z* 231, the molecular ion at *m/z* 314, and a fragment ion at *m/z* 299.

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Conclusions

- Sample #2132 contains a small amount of D^8-THC based on HPLC-PDA, LC-MS, and GC-MS data.
- Sample #2132 contains components characterized by greater lipophilicity than D^8-THC based on longer HPLC and LC retention times. The components eluting after D^8-THC are characterized by a pseudomolecular ion at *m/z* 317 based on positive ionization electrospray LC-MS analysis indicating an apparent molecular weight of 316, consistent with that of the hexahydrocannabinol isomers. Analysis of sample #2132 by GC/MS analysis indicated the presence of at least two substances with an apparent molecular mass of 316 and characterized by fragment ions at *m/z* 193, *m/z* 260, and *m/z* 273. These fragment ions are consistent with reported fragment ions of hexahydrocannabinol.
- Confirmation of the presence of hexahydrocannabinol in sample #2132 requires availability of a reference standard.
- Sample #2132 contains no other detectable cannabinoids from our collection of more than forty reference standards.

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*Please note this is an abbreviated analysis from KCA Laboratories. To read the full analysis please go to the following link:

https://drive.google.com/file/d/1itmdXrAwEGyP9FZg8KEdDT_PhrvrJQaT/view?usp=sharing

Internal Certificate of Analysis

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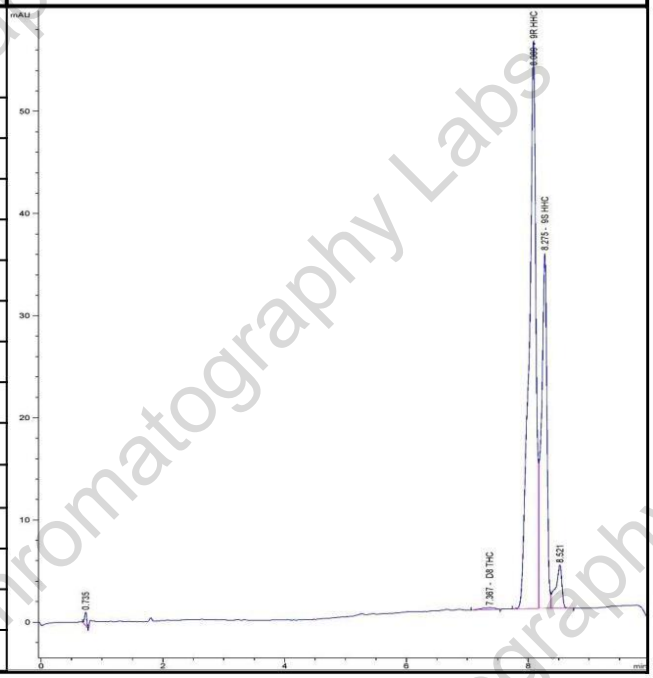
Company Name: Colorado Chromatography Labs
Address: 10505 South Progress Way, Unit 105
Address Cont: Parker, CO 80145
Website: ColoradoChromatography.com
Email: Info@ColoradoChromatography.com
Phone: 303-856-3244

Sample ID: 08062021S1L3
Matrix: Acetonitrile
Sample Type: Distillate/Concentrate
Sample Size: 1000mg

Batch Number: 1.8.2021-HHC
Test Type: Internal HPLC Analysis
Method Name: DAD High Throughput
Date Tested: 8/6/2021

Analyte Name	LOD %	Result %	Result mg/g
CBDV	0.009%	ND	0.00
CBDA	0.012%	ND	0.00
CBGA	0.015%	ND	0.00
CBG	0.008%	ND	0.00
CBD	0.006%	ND	0.00
D9-THCV	0.021%	ND	0.00
D8-THCV	0.014%	ND	0.00
CBN	0.061%	ND	0.00
D9-THC	0.052%	ND	0.00
D8-THC	0.019%	0.21%	2.10
CBC	0.062%	ND	0.00
D9-THCA	0.022%	ND	0.00
9R-HHC	0.031%	52.68%	526.80
9S-HHC	0.033%	44.70%	447.00



Total CBD	Total THC	Total HHC	Total Cannabinoids
0.00%	0.21%	97.38%	97.59%

*This test does NOT comply with ISO 17025 Testing Facility Requirements

*This test does NOT comply with ISO 17034 Requirements for Testing Standards

Total CBD = CBDA * 0.877 + CBD

Total THC = D9-THCA * 0.877 + D9-THC + D8-THC

Total HHC = 9R-HHC + 9S-HHC

LOD = Limit of Detection

ND = Non-Detectable (Below Limit of Detection)

COLORADO CHROMATOGRAPHY

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Internal Certificate of Analysis

The above Certificate of Analysis was generated for internal use only. Colorado Chromatography is not an ISO 17025 accredited testing laboratory and does not offer analytical testing as a paid service. The analytical reference standards used to create this COA are NOT a Certified Reference Materials and have not been certified by an ISO 17034 accredited reference material manufacturer. We are here to share our data publicly to allow our customers and consumers to further their knowledge regarding hexahydrocannabinol.

It is important to note that the chromatogram used to generate the above COA was analyzed using four different analytical methods. The first method was calibrated using just the (6aR,9R,10aR)-HHC internal standard. The second method was calibrated using just the (6aR,9S,10aR)-HHC internal Standard. The third method was calibrated using a mixture of the (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC internal standards. The final method was calibrated using the 11-Cannabinoid Standard Mixture CRM. Using these four separate methods, we attempted to identify and quantify the components of our Raw HHC distillate. The (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC peaks were quantified using the first three analytical methods described above; all HHC values were within a 2% margin of error from method to method. The Delta-8 THC was identified and quantified using the fourth method described above All data has been normalized for trace contamination and human error.

In the above Certificate of Analysis, (6aR,9R,10aR)-HHC has been abbreviated as 9R-HHC and (6aR,9S,10aR)-HHC has been abbreviated as 9S-HHC. Based on our current data, we suspect that the majority of the remaining percentage of unknown material is an unidentified stereoisomer of HHC. Confirmation of this suspicion will require additional purification and analytical testing.

There is a contamination which is stuck to the column of our HPLC which can be seen at 1.803 min on the above chromatogram. As you have already seen, this is present in every sample we test, including blank solvent injections. This integration for this peak has been manually removed in order to avoid confusion. We believe that this is not a contaminant which is present in the actual material being tested. As evidence, please reference the chromatogram of our Acetonitrile blank. We plan on installing a new column on our HPLC in the next week.

COLORADO CHROMATOGRAPHY

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Summary and Key Points

- Hexahydrocannabinol (HHC) is a naturally occurring phytocannabinoid which has multiple stereoisomers
- Colorado Chromatography has purified and isolated two of these diastereomers, (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC
- These purified HHC diastereomers have been submitted to an ISO 17034 accredited Reference material manufacturer to be turned into certified reference material
- Once these purified HHC Diastereomers has been certified as reference materials by an ISO 17034 accredited reference material manufacturer, it will be commercially available to ISO 17025 certified 3rd party testing facilities
- Once these standards distributed to ISO 17025 certified 3rd party testing facilities, official COA's will become available
- It appears that the primary constituents of our Raw HHC Distillate are (6aR,9R,10aR)-HHC and (6aR,9S,10aR)-HHC
- There is a third unidentified peak which elutes just after the (6aR,9S,10aR)-HHC
- Colorado Chromatography suspects that this unidentified peak is another stereoisomer of HHC but more data collection is required to confirm our suspicions
- The NMR and Mass Spectrometry data support the hypothesis that these are in fact stereoisomers of HHC
- Using the internal reference standards which have been submitted to an ISO 17034 accredited reference material manufacturer, Colorado Chromatography has created an Internal COA to provide insight for our customers and consumers
- Colorado Chromatography is NOT an ISO 17034 Accredited Reference material manufacturer and the analytical reference material used to generate this internal COA do NOT meet the criteria set forth by ISO 17034
- Colorado Chromatography is NOT an ISO 17025 certified 3rd Party testing facility and our internal COA does not meet the requirements set forth by the ISO 17025 standard.