

TBI-FORENSIC SERVICES DIVISION PERFORMANCE VERIFICATION FORM

Instrument/Method to Verify:

Nicolet is10 FTIR with SMART iTR attachment (S/N AKX1100576) IR#7

BT 12/14/22

S/N - AKX1300461

BT

Check the appropriate box: New Validation ☐ Modification ☐ Performance Check ☒

Laboratory: NCL ☒ KCL ☐ MCL ☐ Unit: Forensic Chemistry

Based on training and competency, the following analyst(s) are authorized by the Technical Leader to participate in this study:

Name Lela Jackson Title SA/FS Initials LJ

Completed: Signature/Date Lela Jackson
Lela Jackson (Sep 7, 2022 10:27 CDT)

Name _____ Title _____ Initials _____

Completed: Signature/Date _____

Name _____ Title _____ Initials _____

Completed: Signature/Date _____

Verification of final review:

Unit Supervisor/Date Rebecca Hernandez
Rebecca Hernandez (Sep 7, 2022 10:11 CDT)

Unit Supervisor/Date Brett Trotter
Brett Trotter (Sep 7, 2022 09:27 CDT)

Unit Supervisor/Date _____

Crime Laboratory Regional Supervisor/Date _____

Crime Laboratory Regional Supervisor/Date _____

Crime Laboratory Regional Supervisor/Date _____

Quality Assurance Manager/Date Chad Johnson
Chad Johnson (Sep 7, 2022 12:58 CDT)

By signing below, I have verified this study meets all requirements and I deem this procedure/instrument fit for the intended use:

Technical Leader/Date Brett Trotter
Brett Trotter (Sep 7, 2022 09:27 CDT)

All information must be submitted to the Quality Assurance Manager prior to the implementation of the procedure/instrument. If applicable, include training plan and competency testing schedule.

Standard Verification Performance check

**Thermo Scientific Nicolet iS10 FTIR (Serial # AKX1300461) with smart iTR attachment
TBI FCU ID – IR # 7**

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Standard Verification Performance check

Thermo Scientific Nicolet iS10 FTIR (Serial # AKX1300461) with smart iTR attachment
TBI FCU ID – IR # 7

1. Purpose:

Each Fourier-transform infrared (FTIR) spectrometer acquired by the TBI FCU must demonstrate that it will accurately reproduce spectra previously obtained within the laboratory. The TBI FCU currently uses Attenuated Total Reflectance (ATR) attachments since this technique is efficient and does not destroy the sample during analysis.

Although properly maintained instruments all adhere to the theories of FTIR, unique factors may exist within each system that can generate slightly different spectra between different instruments.

This instrument was previously in service and was taken out of service for the Omnic software to be updated from Thermo IQ for OMNIC 9 v2.2 to Thermo 9.12.1019 OMNIC series 9.12.928. The computer that the software was on was also updated. As a result, a performance verification was performed.

This performance verification will assess the spectrometer's ability to generate accurate spectra of certified reference standards compared to previously run laboratory standard spectra

Standard Verification Performance check

Thermo Scientific Nicolet iS10 FTIR (Serial # AKX1300461) with smart iTR attachment
TBI FCU ID – IR # 7

2. Components and Experiment Setup:

Instrument Components

iS10 FTIR	
Source	Single point
Beam splitter	KBr/Ge coated
Laser Type	Helium/Neon laser
Detector	DTGS KBr
Internal Verification Standard	Polystyrene/NG Glass wheel

Experiment parameters

Scans	16
Resolution	4
Spectral Range	4000 – 550
Gain	Auto
Optical Velocity	0.4747
Aperture	Medium resolution

3. Procedure:

Ten certified reference standards were tested on this instrument using the SMART iTR attachment. Several of these standards were selected because they are frequently encountered in case work. Both salt forms of cocaine were tested to determine if salt forms could be determined. Non-controlled substances were also tested to determine if the spectrometer could detect possible adulterants.

Prior to running these standards, the routine monthly maintenance as outlined in TBI SOP was performed to ensure the instrument was operating according to acceptable standards. Additionally, laser alignment is recommended every two months by the manufacturer since a slight drift in output is possible. In this performance check, the laser verification was performed each time.

All standards were run in their pure form – no extractions, washes, or other alterations were performed. If available, the same chemical lots utilized to create the FCU ATR spectral library were used. Prior to each standard run, the instrument's sampling area was cleaned, and a background spectrum was collected to ensure no cross-contamination occurred.

Standard Verification Performance check

Thermo Scientific Nicolet iS10 FTIR (Serial # AKX1300461) with smart iTR attachment
TBI FCU ID – IR # 7

4. Standards Used:

Standard	Source	Lot Number
Alprazolam	Upjohn	487RA
Caffeine	Eastman Kodak	355
Cocaine base	Merck	U7472
Cocaine HCl	Sigma	50K1124
Methamphetamine	Sigma	34H0144

SLC F 4870

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5. Results and Conclusions

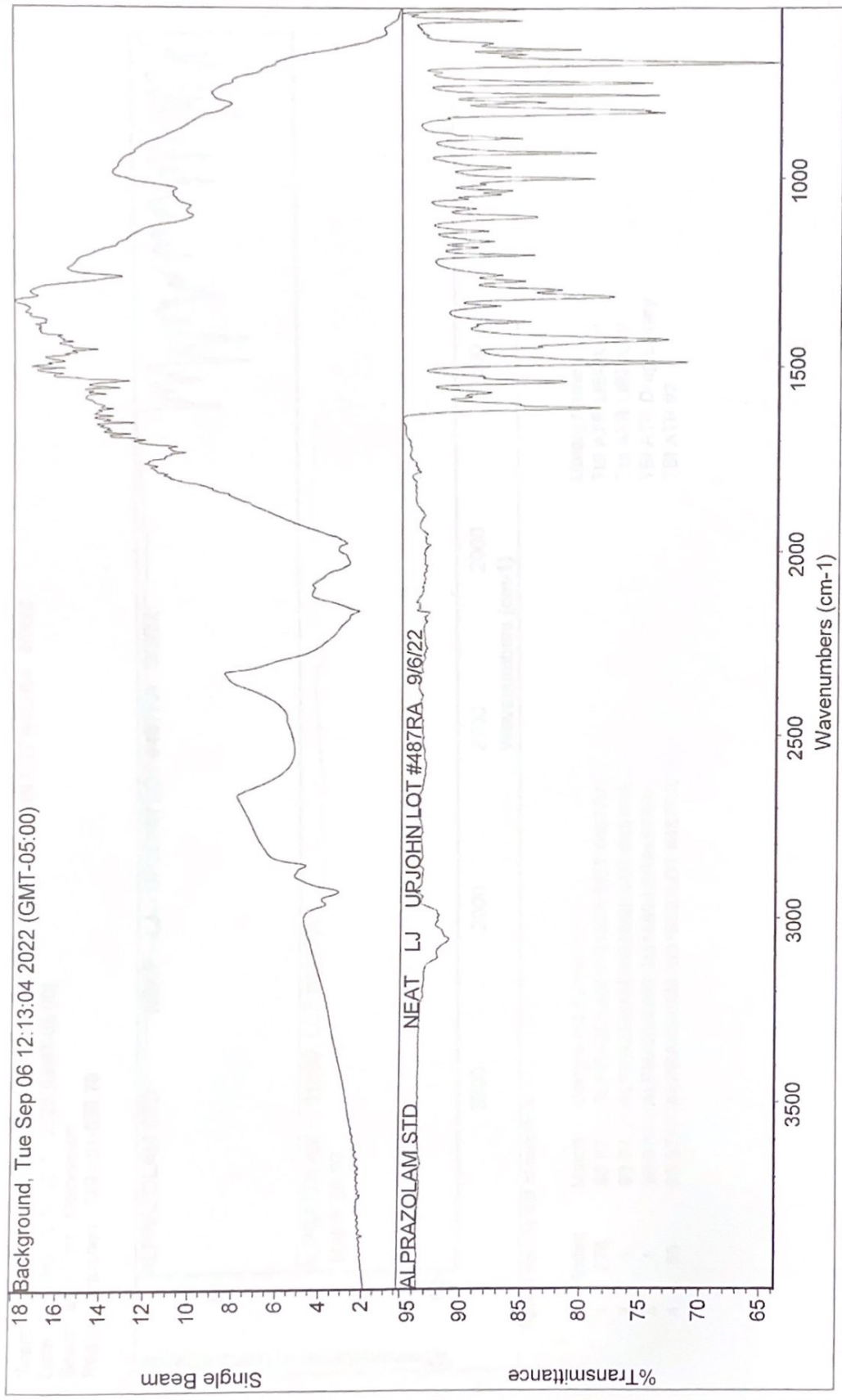
Spectra for the five standards generated by IR# 7 were compared to current library standard spectra and a high match percentage (>95%) was obtained for each standard. Results from IR #7 using the SMART iTR attachment were consistent with the library standard spectra and matched satisfactorily for identification.

All data generated for the iS10 using the SMART iTR attachment can be found in Appendix A.

The ValPro Qualification reports outlined in the Procedure section as well as the current maintenance log are in Appendix B. The full factory validation performed is also included in this appendix.

The laser monitoring requirement will be incorporated into the monthly maintenance to ensure the laser is verified regularly.

In summary, this instrument has demonstrated satisfactory results for use within the TBI FCU. The operation is the same as the unit's other ATRs with a few minor software differences for labeling spectra as documented in the validation for the HAL9000 is20 in service. Therefore, no additional training requirements will be needed for currently trained scientists.



Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 8.0
Optical velocity: 0.4747
Aperture: 80.00

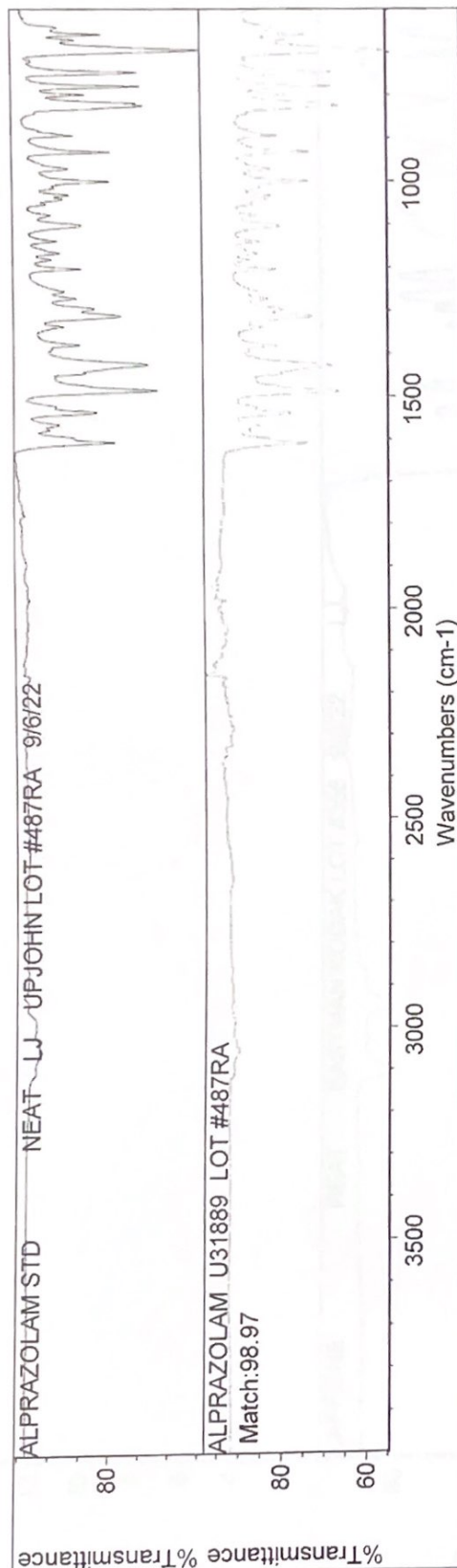
Detector: DTGS KBr
Beamsplitter: KBr
Source: IR

IR # 7

Collection time: Tue Sep 06 12:17:41 2022 (GMT-05:00)

[Handwritten signature]

Search results for: ALPRAZOLAM STD NEAT LJ UPJOHN LOT #487RA 9/6/22
Date: Tue Sep 06 12:26:13 2022 (GMT-05:00)
Search algorithm: Correlation
Regions searched: 3999.81-599.78



Search results list of matches

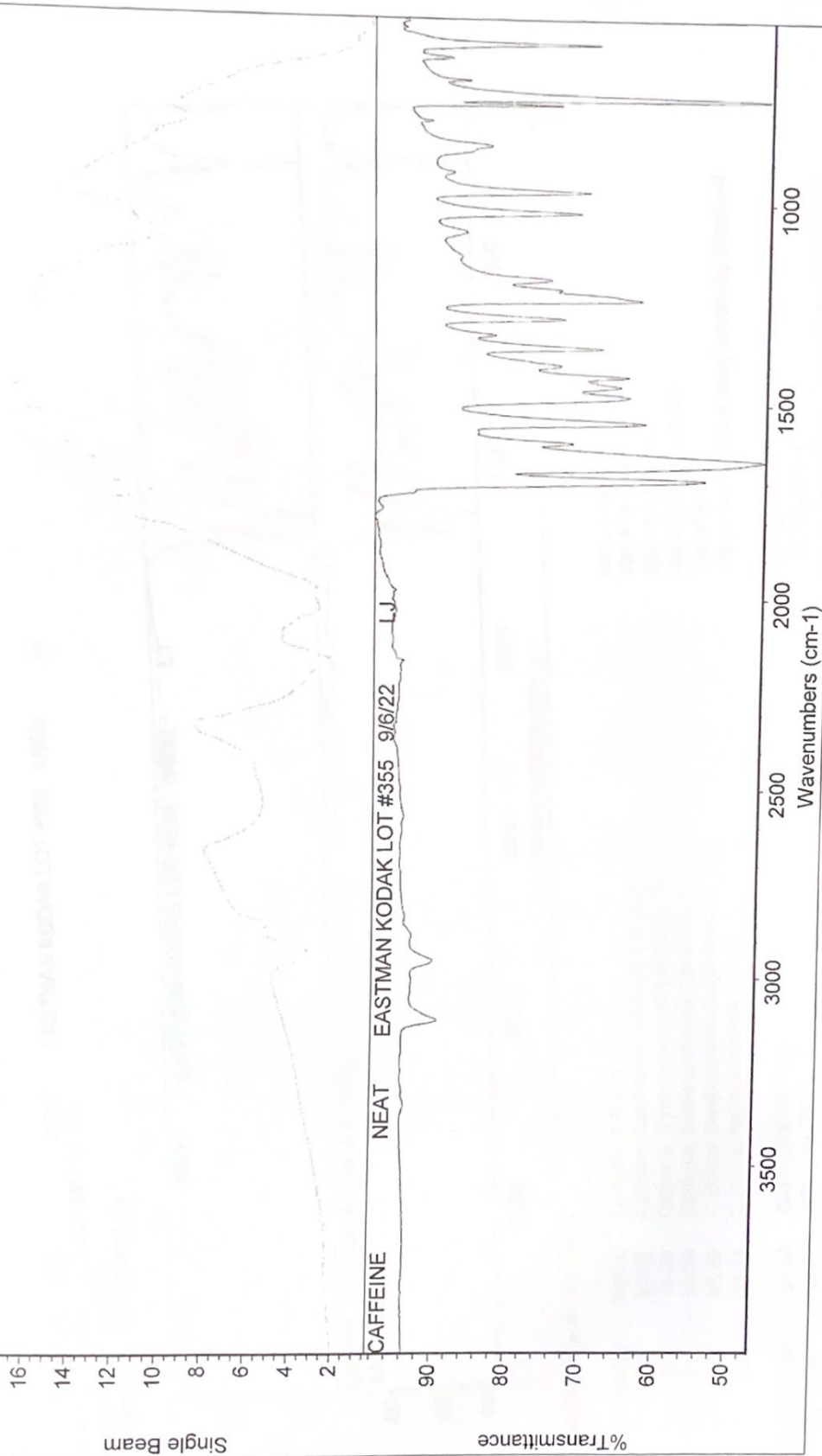
Index	Match	Compound Name
1	98.97	ALPRAZOLAM U31889 LOT #487RA
2	98.97	ALPRAZOLAM U31889 LOT #487RA
3	98.97	ALPRAZOLAM U31889 LOT#487RA
4	98.97	ALPRAZOLAM U31889 LOT #487RA

Library Name
TBI ATR LIBRARY
TBI ATR LIBRARY
TBI ATR Drug Library
TBI ATR #2

Number of sample scans: 64
Number of background scans: 16
Resolution: 4.000
Sample path: 5.0
Optical velocity: 0.4747
Aperture: 80.00

18

18 Background, Tue Sep 06 12:28:23 2022 (GMT-05:00)



Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 8.0
Optical velocity: 0.4747
Aperture: 80.00

Detector: DTGS KBr
Beamsplitter: KBr
Source: IR

Collection time: Tue Sep 06 12:30:43 2022 (GMT-05:00)

IR # 7

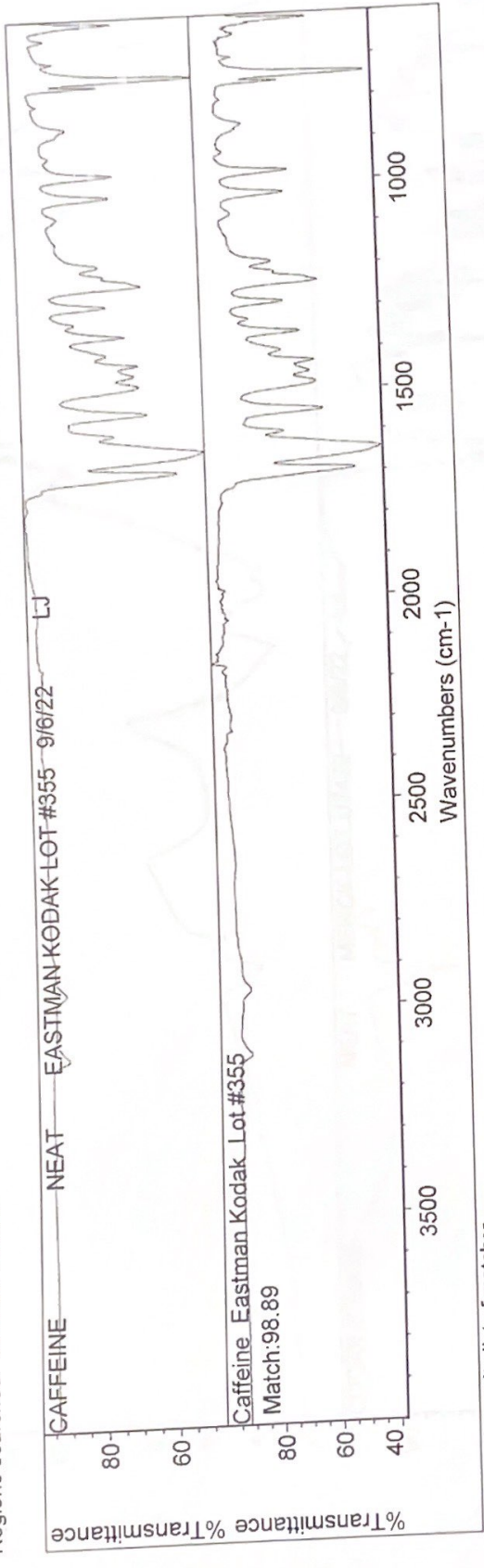
18

Search results for: CAFFEINE NEAT EASTMAN KODAK LOT #355 9/6/22 LJ

Date: Tue Sep 06 12:31:06 2022 (GMT-05:00)

Search algorithm: Correlation

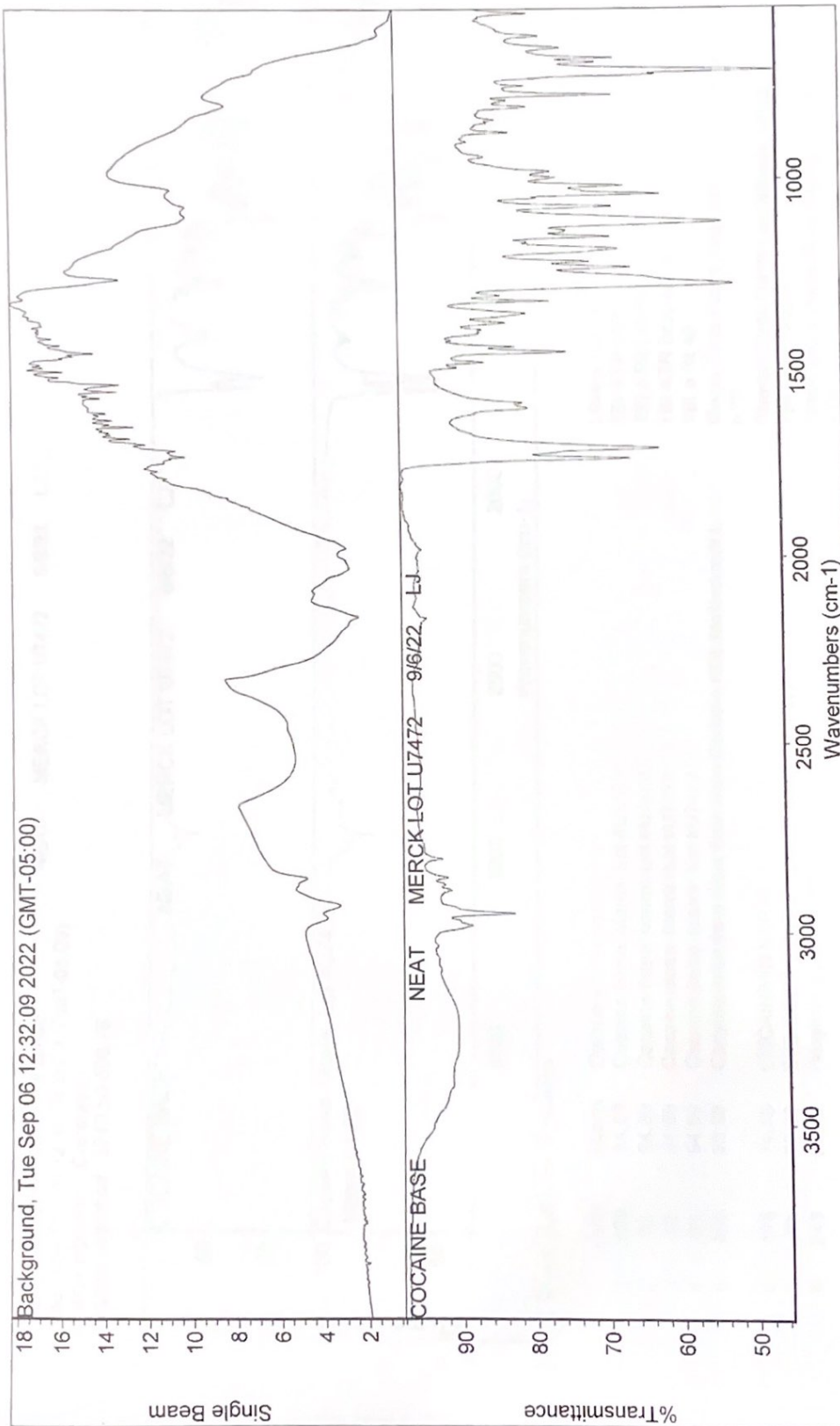
Regions searched: 3949.50-599.78



Search results list of matches

Index	Compound Name	Match	Library Name
1	Caffeine Eastman Kodak Lot #355	98.89	TBI ATR LIBRARY
2	Caffeine Eastman Kodak Lot #355	98.89	TBI ATR LIBRARY
3	Caffeine Eastman Kodak Lot #355	98.89	TBI ATR Drug Library
4	Caffeine Eastman Kodak Lot #355	98.89	TBI ATR #2
5	Caffeine Applied Science 204	94.04	Illinois State Police Drug Library by Diamond ATR
6	CAFFEINE IN KBR	81.53	Georgia State Crime Lab Sample Library
7	STD CAFFIENE	65.18	TBI Drug Library
8	Theophylline K&K Labs	51.94	Illinois State Police Drug Library by Diamond ATR
9	Dyphylline Applied Science 04771	45.37	Illinois State Police Drug Library by Diamond ATR
10	Brorphine HCl Cayman Lot 0567046-8 NEAT LMN	40.27	TBI ATR Drug Library

18



Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 8.0
Optical velocity: 0.4747
Aperture: 80.00

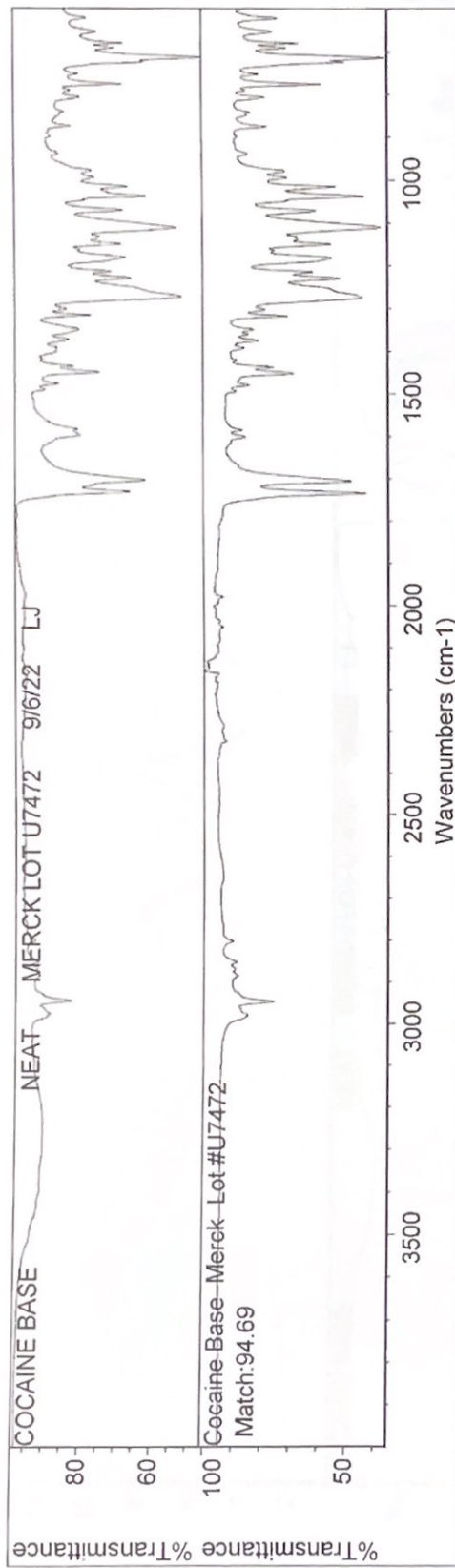
Detector: DTGS KBr
Beamsplitter: KBr
Source: IR

IR # 7

Collection time: Tue Sep 06 12:34:36 2022 (GMT-05:00)

Search results for: COCAINE BASE
 Date: Tue Sep 06 12:35:04 2022 (GMT-05:00)
 Search algorithm: Correlation
 Regions searched: 3949.50-599.78

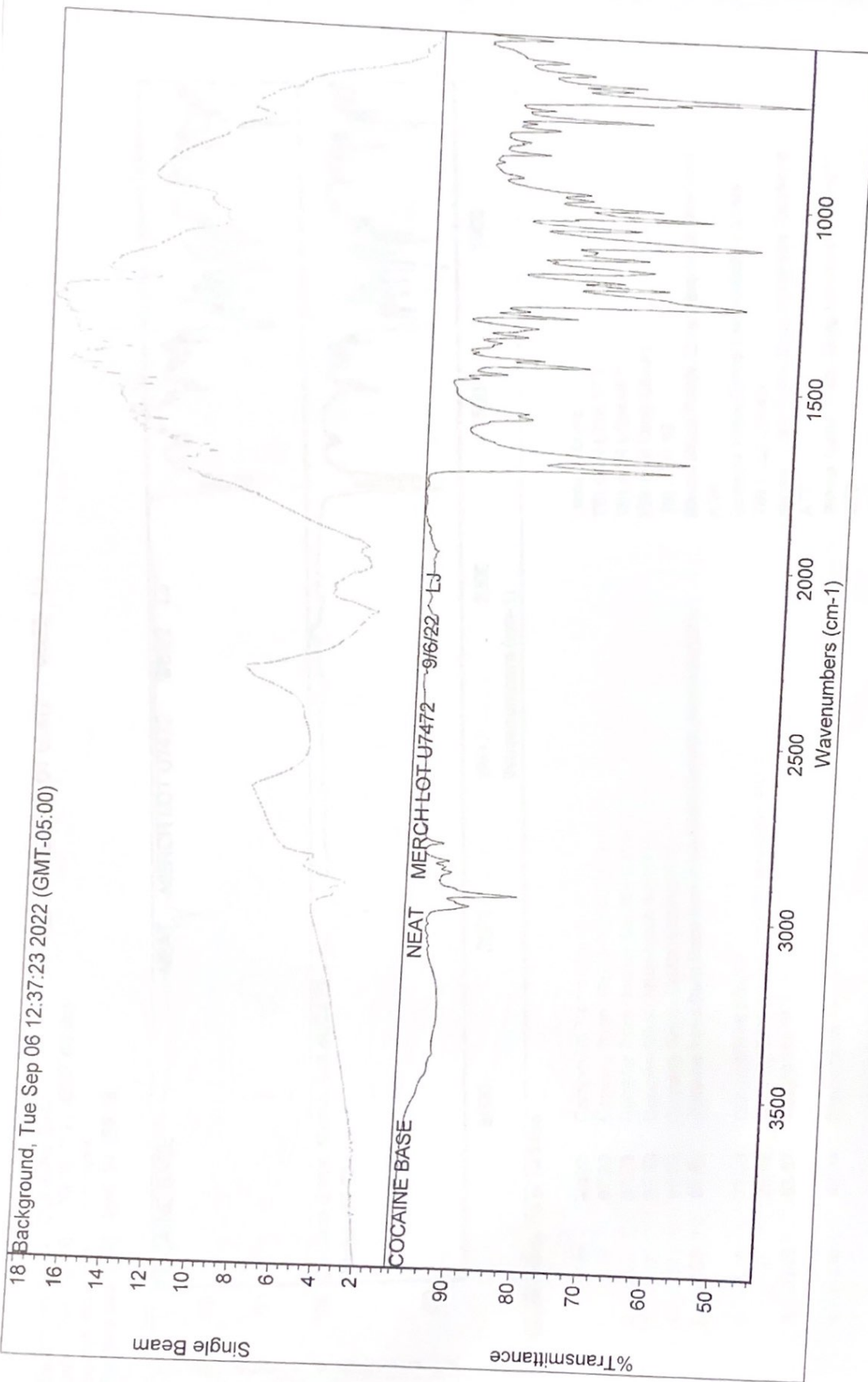
NEAT MERCK LOT U7472 9/6/22 LJ



Search results list of matches

Index	Match	Compound Name	Library Name
1	309	Cocaine Base Merck Lot #U7472	TBI ATR LIBRARY
2	32	Cocaine Base Merck Lot #U7472	TBI ATR LIBRARY
3	32	Cocaine Base Merck Lot #U7472	TBI ATR Drug Library
4	81	Cocaine Base Merck Lot #U7472	TBI ATR #2
5	406	Cocaine base from Base Extr. from Cocaine HCL Mallinckrodt L	Illinois State Police Drug Library by Diamond ATR
6	178	COCAINE IN KBR	Georgia State Crime Lab Sample Library
7	32	STD COCAINE FREE BASE (MERCK) PWF	TBI Drug Library
8	243	Hexylcaine HCl NF 6244	Illinois State Police Drug Library by Diamond ATR
9	188	Piperocaine HCl Lilly 6NY30	Illinois State Police Drug Library by Diamond ATR
10	1	COCAINE HCL IN KBR	Georgia State Crime Lab Sample Library

18



Detector: DTGS KBr
Beamsplitter: KBr
Source: IR

Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 8.0
Optical velocity: 0.4747
Aperture: 80.00

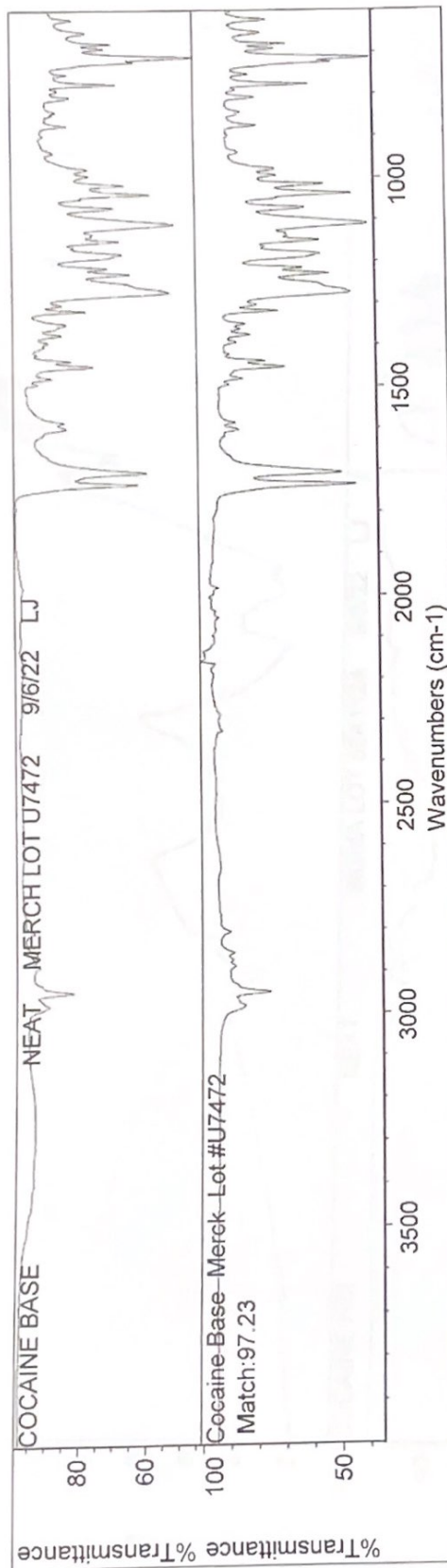
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IR # 7

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Search results for: COCAINE BASE
 Date: Tue Sep 06 12:39:45 2022 (GMT-05:00)
 Search algorithm: Correlation
 Regions searched: 3949.50-599.78

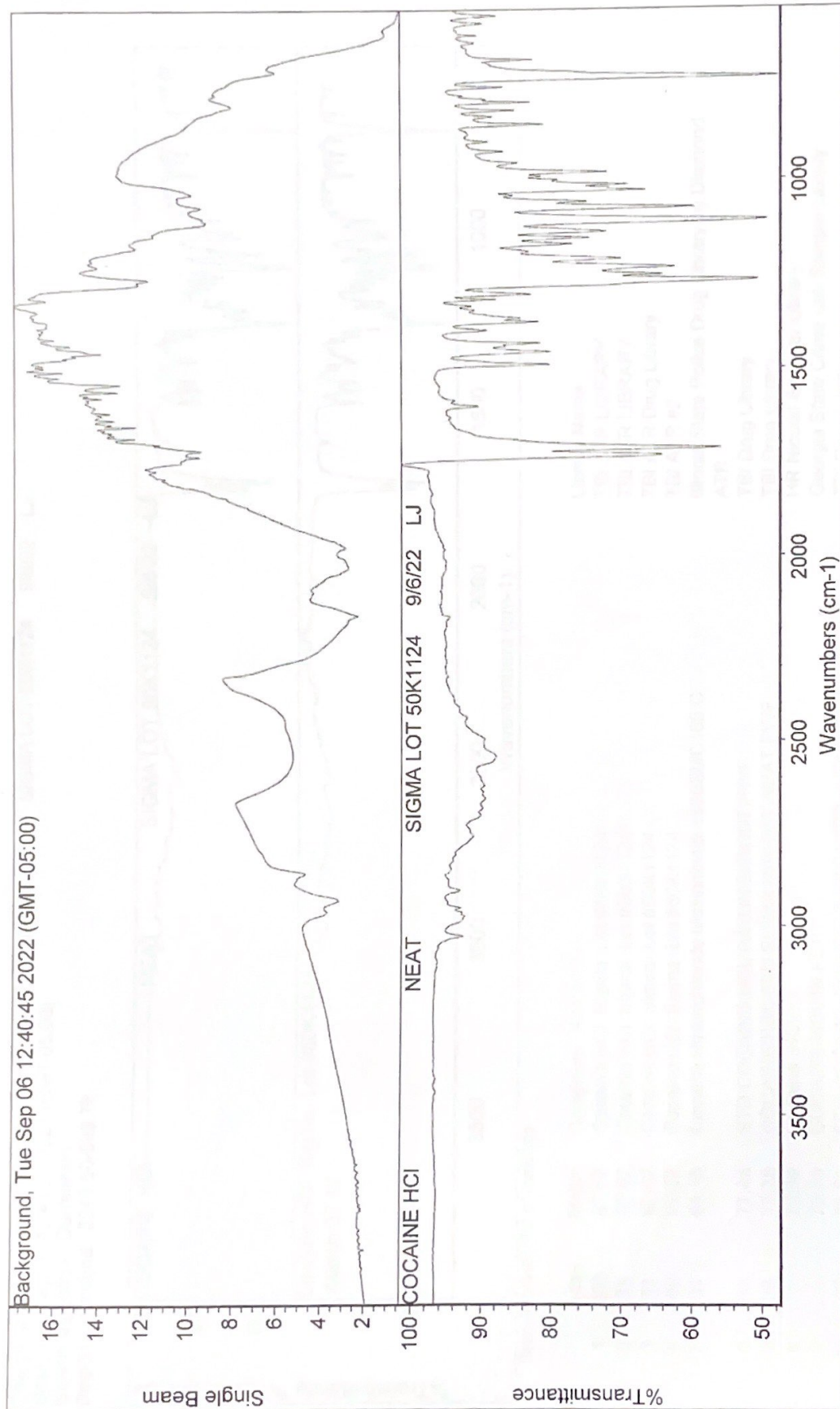
NEAT MERCH LOT U7472 9/6/22 LJ



Search results list of matches

Index	Match	Compound Name	Library Name
1	97.23	Cocaine Base Merck Lot #U7472	TBI ATR LIBRARY
2	97.23	Cocaine Base Merck Lot #U7472	TBI ATR LIBRARY
3	97.23	Cocaine Base Merck Lot #U7472	TBI ATR Drug Library
4	97.23	Cocaine Base Merck Lot #U7472	TBI ATR #2
5	91.85	Cocaine base from Base Extr. from Cocaine HCL Mallinckrodt L	Illinois State Police Drug Library by Diamond ATR
6	77.63	COCAINE IN KBR	Georgia State Crime Lab Sample Library
7	75.65	STD COCAINE FREE BASE (MERCK) PWF	TBI Drug Library
8	53.57	Hexylcaine HCl NF 6244	Illinois State Police Drug Library by Diamond ATR
9	47.34	Piperocaine HCl Lilly 6NY30	Illinois State Police Drug Library by Diamond ATR
10	43.76	COCAINE HCL IN KBR	Georgia State Crime Lab Sample Library

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Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 8.0
Optical velocity: 0.4747
Aperture: 80.00

Detector: DTGS KBr
Beamsplitter: KBr
Source: IR

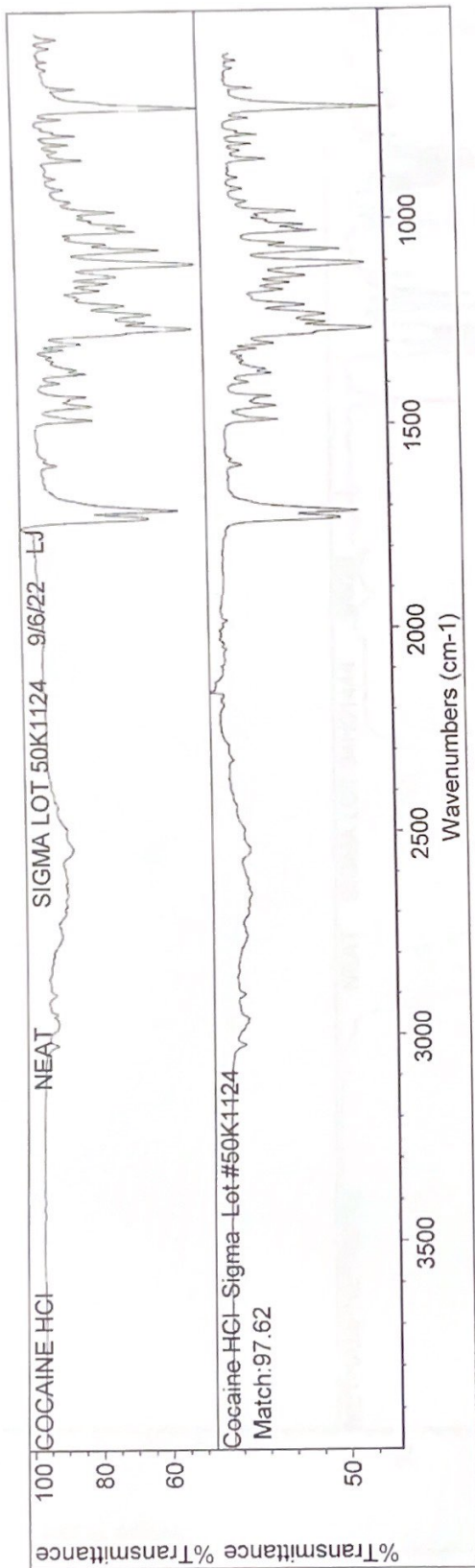
IR # 7

Collection time: Tue Sep 06 12:42:56 2022 (GMT-05:00)

[Signature]

Search results for: COCAINE HCl
 Date: Tue Sep 06 12:43:20 2022 (GMT-05:00)
 Search algorithm: Correlation
 Regions searched: 3949.50-599.78

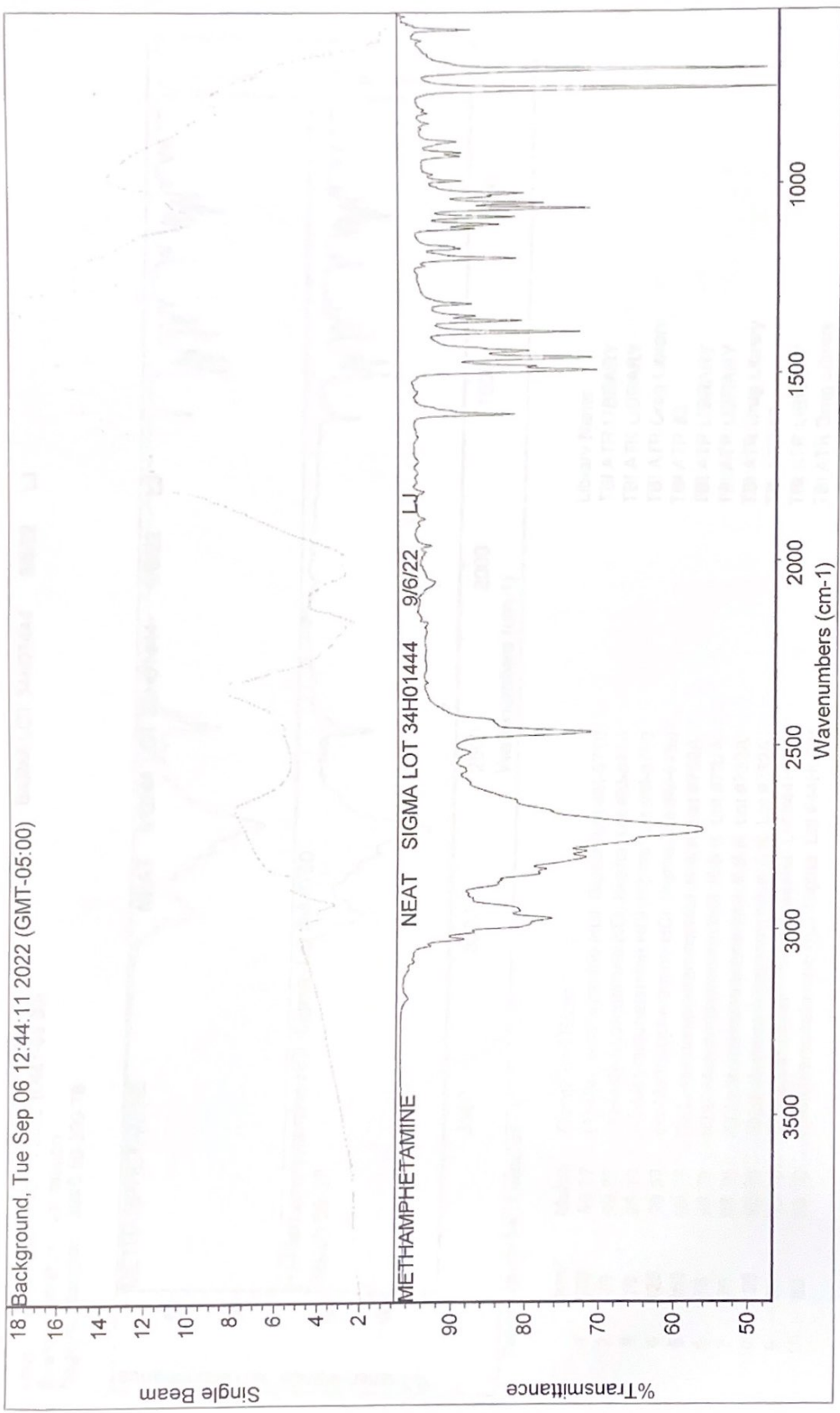
NEAT SIGMA LOT 50K1124 9/6/22 LJ



Search results list of matches

Index	Match	Compound Name	Library Name
1	308	Cocaine HCl Sigma Lot #50K1124	TBI ATR LIBRARY
2	31	Cocaine HCl Sigma Lot #50K1124	TBI ATR LIBRARY
3	31	Cocaine HCl Sigma Lot #50K1124	TBI ATR Drug Library
4	80	Cocaine HCl Sigma Lot #50K1124	TBI ATR #2
5	31	Cocaine Hydrochloride Mallinckrodt 1520SMC165 C	Illinois State Police Drug Library by Diamond ATR
6	33	STD COCAINE HCL (MALINCKRODT)PWF	TBI Drug Library
7	36	COCAINE HCL STD SIGMA 48F0208 NEAT PWF	TBI Drug Library
8	1	Cocaine .HCl	HR Nicolet Sampler Library
9	1	COCAINE HCL IN KBR	Georgia State Crime Lab Sample Library
10	38	STD COCAINE HCL NEAT WITH KBR 3MM (MALINCKRODT)	TBI Drug Library

LJ



Number of sample scans: 16
Number of background scans: 16
Resolution: 4.000
Sample gain: 8.0
Optical velocity: 0.4747
Aperture: 80.00

Detector: DTGS KBr
Beamsplitter: KBr
Source: IR

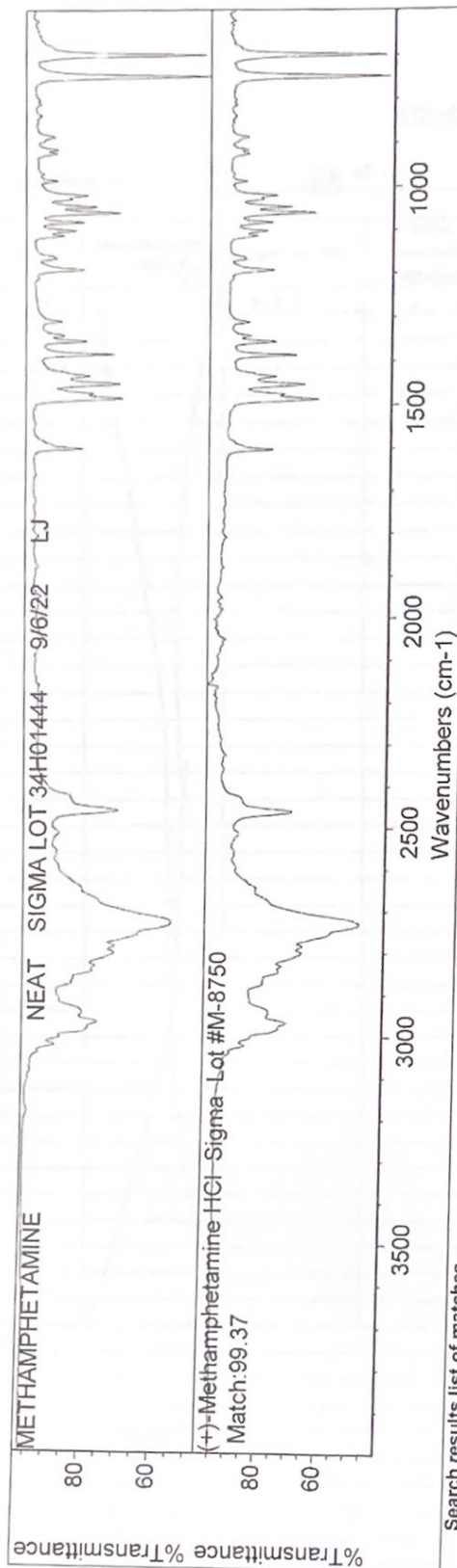
IR # 7

Collection time: Tue Sep 06 12:46:24 2022 (GMT-05:00)

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Search results for: METHAMPHETAMINE
 Date: Tue Sep 06 12:46:36 2022 (GMT-05:00)
 Search algorithm: Correlation
 Regions searched: 3949.50-599.78

NEAT SIGMA LOT 34H01444 9/6/22 LJ



Search results list of matches

Index	Match	Compound Name
1	99.37	(+)-Methamphetamine HCl Sigma Lot #M-8750
2	99.37	(+)-Methamphetamine HCl Sigma Lot #M-8750
3	99.37	(+)-Methamphetamine HCl Sigma Lot #M-8750
4	99.37	(+)-Methamphetamine HCl Sigma Lot #M-8750
5	98.76	(D,L)-Methamphetamine HCl K & K Lot #732A
6	98.76	(D,L)-Methamphetamine HCl K & K Lot #732A
7	98.76	(D,L)-Methamphetamine HCl K & K Lot #732A
8	98.76	(D,L)-Methamphetamine HCl K & K Lot #732A
9	98.70	(-)-Methamphetamine HCl Sigma Lot #44H0081
10	98.70	(-)-Methamphetamine HCl Sigma Lot #44H0081

Library Name
 TBI ATR LIBRARY
 TBI ATR LIBRARY
 TBI ATR Drug Library
 TBI ATR #2
 TBI ATR LIBRARY
 TBI ATR LIBRARY
 TBI ATR Drug Library
 TBI ATR #2
 TBI ATR LIBRARY
 TBI ATR Drug Library

IR # 7

Other Maintenance

Version #: 1.0

ValPro Qualification Report

Qualification test: Nicolet iS10 system KBr-EP

Operator: DrugLab

Date: Monday, September 5, 2022 7:45:11 AM (GMT-05:00)

Instrument: Nicolet iS10 Serial number: AKX1300461

Filename: Nicolet iS10 system KBr-EP_20220905_074511.spg

Test description	High limit	Low limit	Measured	Result
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Energy ratio

Energy ratio 4000 / 2000	1.00	0.20	0.30	Pass
Energy ratio 2000 / 1000	4.00	0.80	1.50	Pass

Noise level

P-P noise 4050 - 3950 (%T)	0.25	0.00	0.01	Pass
P-P noise 2050 - 1950 (%T)	0.221	0.00	0.005	Pass
P-P noise 1050 - 950 (%T)	0.10	0.00	0.02	Pass
P-P noise 550 - 450 (%T)	1.50	0.00	0.24	Pass
RMS noise 4050 - 3950	0.05	0.00	0.00	Pass
RMS noise 2050 - 1950	0.039	0.00	0.001	Pass
RMS noise 1050 - 950	0.014	0.00	0.004	Pass
RMS noise 550 - 450	0.30	0.00	0.04	Pass

Wavenumber accuracy

Peak at 3060.0 (cm-1)	3061.0	3059.0	3059.7	Pass
Peak at 2849.5 (cm-1)	2850.5	2848.5	2849.3	Pass
Peak at 1942.9 (cm-1)	1943.9	1941.9	1942.6	Pass
Peak at 1601.2 (cm-1)	1602.2	1600.2	1601.1	Pass
Peak at 1583.0 (cm-1)	1584.0	1582.0	1583.0	Pass
Peak at 1154.5 (cm-1)	1155.5	1153.5	1154.5	Pass
Peak at 1028.3 (cm-1)	1029.3	1027.3	1028.4	Pass

Optical resolution

Resolution 2870 - 2849.5 (Abs)	10.00	0.33	0.42	Pass
Resolution 1589 - 1583 (Abs)	10.00	0.08	0.12	Pass

Repeatability

Peak at 3027.1 (cm-1)	5.00	-5.00	0.00	Pass
Peak at 1028.3 (cm-1)	1.00	-1.00	0.00	Pass
Intensity at 2849.5 (%T)	0.50	-0.50	0.01	Pass
Intensity at 1028.3 (%T)	0.50	-0.50	0.02	Pass

Detector linearity

Slope	1.10	0.90	0.99	Pass
Intercept (%T)	1.00	-1.00	0.59	Pass

Performed by: *AK* Title: _____ Date: 9/5/22

Approved by: _____ Title: _____ Date: _____

Comments: _____

Digital comment(s):
No digital comments found.

ValPro Qualification Report

Qualification test: Smart iTR accessory-EP

Operator: DrugLab

Date: Monday, September 5, 2022 8:20:23 AM (GMT-05:00)

Instrument: Nicolet iS10 Serial number: AKX1300461

Accessory serial number: 13051770101025166

Filename: Smart iTR accessory-EP_20220905_082023.spg

Test description	High limit	Low limit	Measured	Result
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Wavenumber accuracy

Peak at 2849.5 (cm-1)	2850.5	2848.5	2848.8	Pass
Peak at 1601.2 (cm-1)	1602.2	1600.2	1601.1	Pass
Peak at 1583.0 (cm-1)	1584.0	1582.0	1582.9	Pass
Peak at 1154.5 (cm-1)	1155.5	1153.5	1154.4	Pass
Peak at 1028.3 (cm-1)	1029.3	1027.3	1028.1	Pass

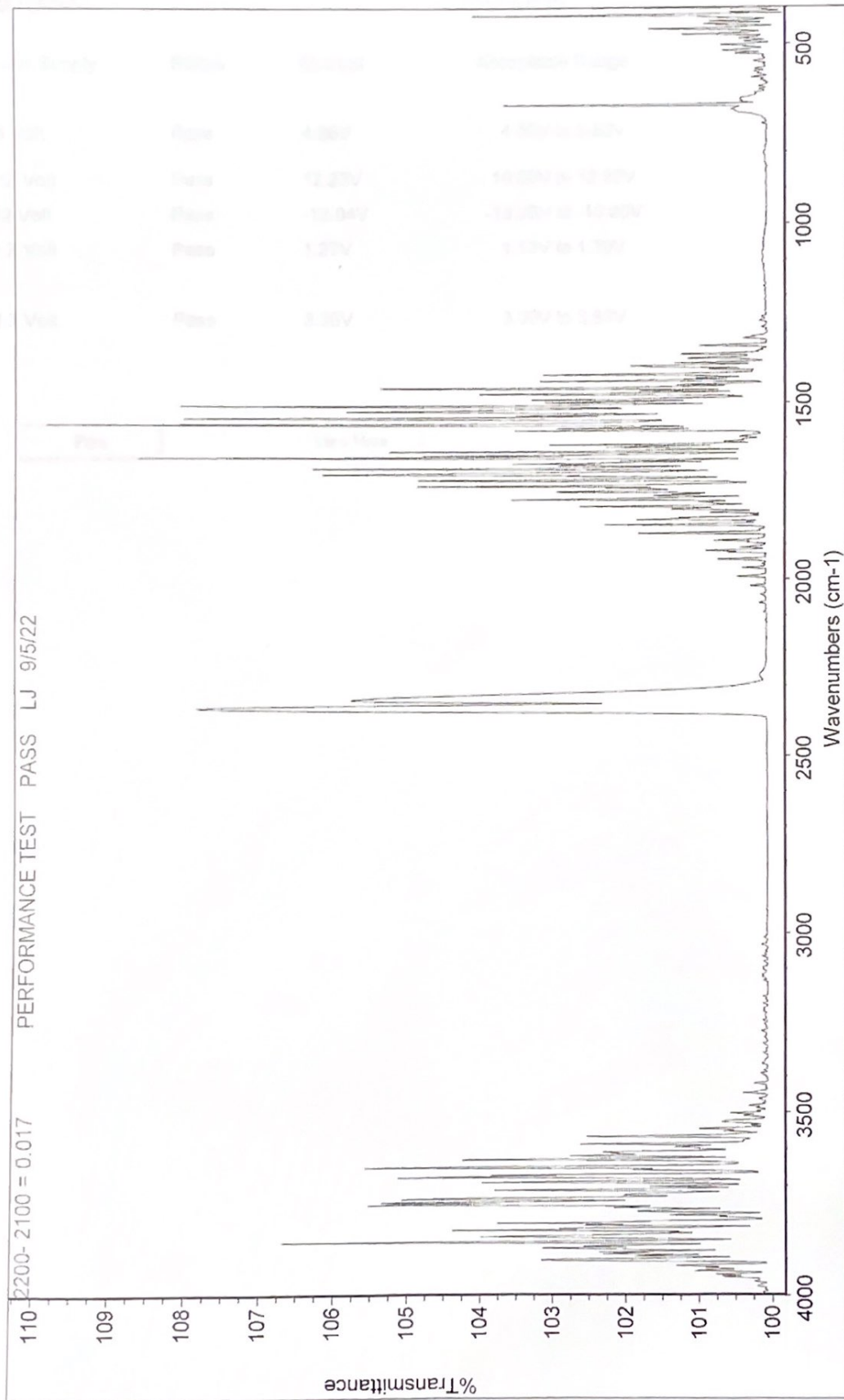
Optical Resolution

FWHH at 1154 (cm-1)	10.00	5.00	8.38	Pass
FWHH at 907 (cm-1)	14.00	5.00	13.01	Pass

Performed by: <u> <i>lg</i> </u>	Title: _____	Date: <u> 9/5/22 </u>
Approved by: _____	Title: _____	Date: _____
Comments: _____		

Digital comment(s):

No digital comments found.



Number of sample scans: 36
Number of background scans: 36
Resolution: 4.000
Sample gain: 1.0
Optical velocity: 0.6329
Aperture: 80.00

Detector: DTGS KBr
Beamsplitter: KBr
Source: IR

IR # 7

Collection time: Mon Sep 05 08:43:58 2022 (GMT-05:00)

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Tennessee Bureau of Investigation
AKX1300461

9/5/2022 9:02:36 AM
Nicolet iS10

12

Power Supply	Status	Current	Acceptable Range
+ 5 Volt	Pass	4.96V	4.50V to 5.50V
+ 12 Volt	Pass	12.23V	10.80V to 13.20V
- 12 Volt	Pass	-12.04V	-13.20V to -10.80V
+1.2 Volt	Pass	1.27V	1.13V to 1.39V
+3.3 Volt	Pass	3.36V	3.00V to 3.60V

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Return

Tennessee Bureau of Investigation
AKX1300461

9/5/2022 9:02:36 AM
Nicolet iS10

Item	Status	Current	Acceptable Range
Laser Current	Pass	0.76A	0.20A to 1.30A
Source Voltage	Pass	10.77V	4.00V to 13.00V
Source Current	Pass	1.24A	0.10A to 10.00A
Source Power		13.38W	
Temperature	Pass	51.55C	0.50C to 70.00C

Print

Return