



SOP-CH-002
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Drug Enforcement Administration

Office of Forensic Sciences

SOP-CH-002

STANDARD OPERATING PROCEDURE

for the

ANALYSIS OF SUSPECTED CANNABIS LIQUIDS AND EXTRACTS



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1.0 Introduction

SOP-CH-002 supplements the Analysis of Drugs Manual (ADM) and outlines procedures for analyzing suspected cannabis liquids and extracts, and reporting Δ^9 -tetrahydrocannabinol (THC), cannabidiol (CBD), and cannabichromene (CBC), if identified. Reference the ADM for evidence analysis policy.

The analytical scheme requires use of system-wide validated methods, if available, and laboratory-validated methods. A Decision Limit (DL) value for total THC present at 1% is established for field laboratory reporting purposes. (NOTE: Total THC = Δ^9 -tetrahydrocannabinolic acid (THCA) + Δ^9 -THC).

2.0 Scope

This procedure:

- A. Identifies THC above or below the DL.
- B. Identifies additional cannabinoids.
- C. Applies to liquid samples.
- D. Applies to suspected cannabis extracts.
- E. Does not apply to creams, edibles, and powders.
 1. For analysis of these matrices, follow the Analysis of Drugs Manual (ADM) 2-5 using system-wide or laboratory methods validated for the analysis of THC and other cannabinoids. See Section 4.3 for reporting.

3.0 Analytical Scheme

- A. If a negative result is obtained during qualitative testing, the SOP no longer applies and analysis should proceed via the ADM or other SOP if applicable.

3.1 Qualitative Analysis

- A. Macroscopic examination: Conduct macroscopic examination on each unit for the presence or absence of plant material.
- B. Microscopic examination: Conduct microscopic examination on each unit when plant material is present.

NOTE: Effervescence of the calcium carbonate crystal (i.e., cystolith at the base of the hair) in dilute acid may be performed.

1. Acceptance criteria: Microscopic observation of cystolithic hairs.
 2. If no microscopic examination was conducted, enter "N/A" in the *Microscopic Observation* finding in the *Macro/Microscopic Examination of Plant Material* test in LIMS.
- C. Gas chromatography-mass spectrometry (GC-MS):



1. Analyze one working THC positive control solution ([Appendix A](#)) prior to each sample sequence using THCSCRN_MS01.

NOTE: The data from the positive control may be used for all exhibits run during a sequence.

- a. Acceptance criteria for THC:IS ratio: THC:IS ratio > 1
 - b. Use the macro associated with THCSCRN_MS01 to ensure the peak heights of THC, CBD, and IS as well as the THC:IS ratio are recorded on the data.
2. Analyze each selected unit using THCSCRN_MS01.
 - a. Weigh 10-20 mg (or use 1-3 drops for liquids) from each selected unit using an appropriate weighing method.
 - b. Add 5 mL of internal standard solution (ISS) to test tube; vortex/mix for 10-15 seconds.
 - c. Dilute sample solution 1:10 with ISS.
 - d. Filter each sample solution through a cotton plugged pipette or syringe filter into new auto sampler vial.
 3. Acceptance criteria for THC:IS ratio: THC:IS ratio > *0.1*
 4. Use the macro associated with THCSCRN_MS01 to ensure the peak heights of THC, CBD, and IS as well as the THC:IS ratio are recorded on the data.
 5. Document ratio results in the *Remarks* finding of the *GC-MS Analysis* test in LIMS (e.g., "THC ≥1%").
 6. Evaluate data for the presence of CBD, CBN, and CBC.
- D. Gas chromatography-flame ionization detection (GC): Analyze each selected unit using a validated method.
- E. Perform additional qualitative testing as needed.

4.0 Reporting

4.1 Positive Results for THC in All Units Tested

- A. Report "Δ9-Tetrahydrocannabinol (THC)" on the DEA-113 when:
1. GC: All units are positive for THC
- AND
2. GC-MS: All units are positive for THC
- B. Add statement (as applicable) in the Remarks section of the DEA-113:
1. "Total delta 9-THC estimated >1%." when all units have a THC:IS ratio > 0.1



OR

2. "Total delta 9-THC not determined; pending further analysis upon request." when all units have a THC:IS ratio < 0.1

OR

3. "Total delta 9-THC estimated >1% in X of X units tested." when some units have a THC:IS ratio > 0.1 and others have a THC:IS ratio < 0.1.

4.2 Additional Cannabinoids

- A. Report CBN, CBD, and/or CBC if data is acceptable for identification.

NOTE 1: Additional testing is not required.

NOTE 2: The presence of additional cannabinoids may also be reported if data is acceptable for identification.

4.3 Creams, Edibles and Powders

- A. Report delta 9-THC and other cannabinoids if identified in accordance with ADM 2-5.

- B. Add Remark on the DEA-113:

1. "Total delta 9-THC not determined."



Appendix A – THC Positive Control Preparation

- A. Prepare a 0.1 mg/mL working positive control solution of THC.
1. Using Class-A volumetric glassware, prepare a 1-1.5 mg/mL THC Stock A solution by transferring 1 mL from the THC reference material (~10 mg/mL) into a tared flask or beaker.
 2. Evaporate to dryness and weigh the amount of residue remaining.
 3. Dilute using the appropriate volume of ISS. For example, if 9.6 mg of residue remain, dilute using 9 mL of ISS.
 4. Prepare the working THC positive control solution by performing a 1:10 dilution of the THC Stock A solution using ISS.
- NOTE:** Class-A glassware may be used for the preparation of the working THC solution, but it is not required.
5. Both stock and working solutions of the positive control can be used until they no longer meet the acceptance criteria.
 6. Store all solutions in the refrigerator.

**Effective Date/Revision History**

Revision No.	Effective Date	Summary of Changes
1	10/1/2019	Original document issued.
2	03/29/2021	<ul style="list-style-type: none">• Requirement of macro/microscopic examination added• Requirement of identification of additional cannabinoids added• Reporting for creams, edibles, and powders added• Document reformatted and reorganized• ADM references updated
3	08/01/2022	Re-issued to replace SOP-CH-002 Revision 2. Major changes include: <ul style="list-style-type: none">• Reorganization to include only information pertaining to the analytical scheme• Removal of statements when no THC is present
4	08/15/2022	<ul style="list-style-type: none">• Correction of the acceptance criteria in Section 3.1.C.3 from 1 to 0.1



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