Drug Enforcement Administration
Office of Forensic Sciences

SOP-OPI-001

STANDARD OPERATING PROCEDURE

for the

ANALYSIS OF SUSPECTED NATURAL AND SYNTHETIC OPIOIDS

Date Posted: 08/30/2024

Table of Contents

1.0 Introduction

SOP-OPI-001 outlines the analytical scheme for analyzing suspected natural and synthetic opioid samples. Reference Laboratory Operations Manual (LOM) 7500 for evidence sampling, qualitative analysis, and quantitative analysis policy. Reference the appropriate method validation packet for preparations and procedures.

2.0 Scope

This analytical scheme:

A. Identifies natural and synthetic opioids.

1. Natural opioids include substances such as morphine, codeine, etc.

a. When a natural opioid(s) is present as the result of naturally occurring alkaloids, the substance(s) is not identified or reported unless it is the only identifiable controlled substance in the exhibit.

2. Synthetic opioids include substances such as heroin, fentanyl, fentanyl-related substances, benzimidazoles (e.g. nitazenes), tramadol, etc.

NOTE: This includes opiates, opium derivatives, and opioids listed as narcotic drugs as listed in 21 CFR §1308.11-1308.15.

B. Identifies additional controlled substances, new psychoactive substances (NPS), and non-controlled substances.

C. Determines the purity of opioid exhibits that meet the requirements for quantitation.

D. Applies to all gross forms.

1. For opium exhibits, see section 3.1.1.

E. May apply to individual sub-exhibits.

1. Follow SOP-OPI-001 for sub-exhibits that are within the scope; refer to LOM 7500 or other SOPs for sub-exhibits that are not within the scope.

F. Does not apply to residues.

G. Does not apply to special program exemplars analyzed at SFL1.

3.0 Analytical Scheme

3.1 Qualitative Analysis

A. If a negative result is obtained, the SOP no longer applies and analysis should proceed via LOM 7500 or other SOP, if applicable.

B. Analyze each selected unit (single-unit non-composite, multi-unit non-composite, or single-unit composite, as applicable) using one of the following general-purpose methods to obtain confirmatory data:

1. Direct Analysis in Real Time – Mass Spectrometry (DART-MS) using DART-MS and DART-MSMS.

2. Gas Chromatography-Mass Spectrometry (GC-MS) using GCGEN_MS01 or GCLOWX_MS01.

    a. Dissolve each sample in an appropriate solvent(s) at a concentration of 5 – 10 mg/mL when sample size permits.

    NOTE: It is not necessary to weigh the samples or measure the volume delivered; the amount of sample and volume may be approximated. Standard sampling tools may be used.

    b. If GCGEN_MS01 or GCLOWX_MS01 is unavailable, analyze using a laboratory-validated general-purpose GC-MS method.

C. Analyze each selected unit (single-unit non-composite, multi-unit non-composite, or single-unit composite, as applicable) using an orthogonal technique and a standardized method.

1. When a standardized method is unavailable, use a laboratory-validated method.

2. Orthogonal techniques and associated methods include:

    a. DART-MS or ESI-MS

        i. DART-MS and DART-MSMS

        NOTE: MSMS fragmentation is not required when confirmatory data has already been obtained.

    b. Gas Chromatography – Flame Ionization Detection (GC-FID)

        i. ISOM02

        ii. GCLOWX

    c. Gas Chromatography – Infrared Spectroscopy (GC-IR)

    d. GC-MS

        i. GCGEN_MS01

        ii. GCLOWX_MS01

    e. Immunoassay

        i. For the fentanyl immunoassay test, dissolve each sample in an appropriate solvent at a concentration of approximately 0.2 – 0.5 mg/mL.

        NOTE: It is not necessary to weigh the samples or measure the volume delivered; the amount of sample and volume may be approximated. Standard sampling tools may be used.

    f. Infrared Spectroscopy (IR)

i. IR01

g. Liquid Chromatography (LC)

h. Marquis Color Test

i. Nuclear Magnetic Resonance Spectroscopy (NMR)

D. Perform additional qualitative testing as needed.

3.1.1 Opium Analysis

A. Ensure the gross form of the substance is a gum-like or resinous, brown material.

B. Analyze each selected unit using one of the following to obtain confirmatory data:

1. Direct Analysis in Real Time – Mass Spectrometry (DART-MS) using DART-MS and DART-MSMS.

2. Gas Chromatography-Mass Spectrometry (GC-MS) using GCGEN_MS01 orGCLOWX_MS01.

a. Dissolve each sample in an appropriate solvent(s) at a concentration of 5 – 10 mg/mL.

NOTE: It is not necessary to weigh the samples or measure the volume delivered; the amount of sample and volume may be approximated. Standard sampling tools may be used.

b. If GCGEN_MS01 or GCLOWX_MS01 is unavailable, analyze each unit using a laboratory-validated general-purpose GC-MS method.

C. Analyze each selected unit using a standardized separatory method.

1. When a standardized method is unavailable, use a laboratory-validated method.

D. When at least four of the following are identified in the absence of heroin, report “Opium” on the DEA-113: codeine, morphine, thebaine, papaverine, or noscapine.

E. Perform additional qualitative testing as needed.

3.2 Quantitative Analysis

A. When required, perform quantitation on the composite using a standardized method.

1. Heroin

a. GC Method: DEA 127

i. If DEA 127 is unavailable or is inappropriate for the sample type: DEA 102L (LTM) or DEA 102

b. LC Method: DEA 202

c. NMR Method: DEA 440H/450H/460H

2. Fentanyl
    a. GC Method: DEA 127
        i. If DEA 127 is unavailable or is inappropriate for the sample type: DEA 107L (LTM)
    b. NMR Method: DEA 440H/450H/460H
3. Oxycodone
    a. GC Method: DEA 105
    b. LC Method: DEA 275
    c. NMR Method: DEA 440H/450H/460H
4. Hydrocodone
    a. GC Method: DEA 108
    b. NMR Method: DEA 440H/450H/460H

Effective Date/Revision History

Revision No.	Effective Date	Summary of Changes
0	2/1/2023	Original document issued.
1	03/20/2024	• Updated reference to ADM to LOM 7500 • Added DART-MS and DART-MSMS as standardized methods • Added GCGEN_MS01 as a standardized method
2	05/20/2024	• Editorial updates for clarity and to align with other SOPs

End of Document