

Methamphetamine on Wipes by Liquid Chromatography-Mass Spectrometry-SIM 9111

FORMULA: C₆H₅·CH₂·CH(CH₃)·NH·CH₃

MW: 149.2

CAS: 537-46-2

RTECS: SH4910000

METHOD: 9111, Issue 1

EVALUATION: Partial

Issue 1: DRAFT

U.S. regulatory OELs

OSHA: None for surfaces

MSHA: None for surfaces

Other published OELs and guidelines

ACGIH: None for surfaces

AIHA: None for surfaces

NIOSH: None for surfaces

States: Table 1

PROPERTIES: Vapor Pressure (mm Hg) 0.163 @ 25 °C;
pK_a=9.87 @ 25 °C; Water Sol. (g/100 mL) 1.33 @ 25 °C;
Log P=2.07 (octanol-water partition coefficient).

SYNONYMS: Methedrine; Desoxyyn; chalk; crank; crystal; glass; ice; meth, speed; upper.

(S)-N,α-Dimethylbenzeneethanamine; (S)-(+)-N,α-Dimethylphenethylamine: *d*-1-Phenyl-2-methylaminopropane.

SAMPLING		MEASUREMENT	
SAMPLER:	3" x 3" 12-ply or 4" x 4" 8-ply Cotton gauze pad.	TECHNIQUE:	LIQUID CHROMATOGRAPHY-MASS SPECTROSCOPY-SIM
SAMPLE AREA:	100 cm ² or 1 ft ² (929 cm ²) as required by legal jurisdiction.	ANALYTES:	Methamphetamine
WIPE METHOD:	See sampling.	DESORPTION:	Spike 50 µL internal standard spiking solution and desorb with 30 mL 0.2 N Sulfuric acid
SHIPMENT:	Place gauze wipes into shipping container (e.g. 50-mL polypropylene centrifuge tube). Cap.	INJECTION VOLUME:	50 µL.
SAMPLE STABILITY:	At least 7 days at 22 °C At least 30 days at <6 °C	MOBILE PHASE:	A = 0.1% Acetic acid, 5% acetonitrile in water. B = 0.1% Acetic acid, 95% acetonitrile in water. Gradient: 100% A for one minute, gradient to 100% B (9 min.), hold at 100% B (5 min.), gradient to 100%A (2 min), hold at 100% A (8 min.).
FIELD BLANKS:	10% of samples, minimum of 2 blanks per set of samples.	COLUMN:	Zorbax Eclipse XDB-C18 4.6 mm x 150 mm, 5 µm packing or equivalent. Column temperature 40 °C.
MEASUREMENT ACCURACY		MASS SPECTROMETER:	In selected ion monitoring (SIM) mode. (See Table 3.)
RANGE STUDIED:	Not Determined	CALIBRATION:	Media spiked standards to cover the range.
BIAS:	Not Determined Surface recovery not performed.	RANGE:	Approximately 0.1 – 100 µg/sample.
OVERALL PRECISION (Ŝ_{rT}):	Not Determined Surface recovery not performed.	ESTIMATED LOD:	0.1 µg/sample or better.
ACCURACY:	Not Determined Surface recovery not performed.	PRECISION (Ŝ_r):	0.067 [1]

APPLICABILITY: For methamphetamine the range is approximately 0.1 to 100 µg/sample (sample = 100 cm² or 1 ft²).

INTERFERENCES: No chromatographic interferences detected.

OTHER EVALUATED WIPE METHODS: NIOSH 9106 uses liquid-liquid extraction and gas chromatography, mass spectrometry (GC/MS) to measure multiple drugs. [2] NIOSH 9109 uses solid-phase extraction and gas chromatography, mass spectrometry (GC/MS) to measure multiple drugs. [3]

REAGENTS:

1. Methamphetamine.* 1 mg/mL in methanol. (Alltech part # 010013 or equivalent).
2. Methamphetamine -D₁₄ 1 mg/mL in methanol. (Cerilliant part # M-093 or equivalent).
3. Solvents, residue free analytical grades:
 - a. Isopropanol (IPA) *
 - b. Acetic Acid *
 - c. Acetonitrile *
 - d. Methanol *
4. Concentrated sulfuric acid (AR or trace metals analysis grade).*
5. Purified gas: nitrogen for drying.
6. Deionized water (ASTM type II).

SOLUTIONS:

1. Prepare spiking solutions of target analyte and internal standard. Keep solutions refrigerated. Protect solutions from light.
 - a. Target analyte spiking solutions are prepared by diluting the 1000 µg/mL methamphetamine stock solution to 200 µg/mL and 20 µg/mL each in methanol.
 - b. Dilute 1 mL of 1000 µg/mL methamphetamine -D₁₄ stock solution to 10 mL for a 100 µg/mL (0.1 µg/µL) solution.
2. Desorption solution: 0.2N sulfuric acid. Add 22 mL conc. sulfuric acid to 4 liters deionized water.
3. Prepare Mobile Phase A: 0.1% Acetic acid, 5% Acetonitrile in water.
4. Prepare Mobile Phase B: 0.1% Acetic acid, 95% Acetonitrile in water.

* See SPECIAL PRECAUTIONS

EQUIPMENT:

1. Cotton gauze, 3" x 3" (7.6 cm x 7.6 cm) 12-ply or 4" x 4" (10.2 cm x 10.2 cm) 8-ply, in sterile packages.
2. Sample storage and shipping container: 50-mL polypropylene centrifuge tubes with caps or equivalent.
3. Liquid chromatograph/ mass spectrometer, with integrator or computerized data collection system, and Zorbax Eclipse XDB-C18; 4.6 mm x 150 mm, 5 µm packing or equivalent.
4. 2-mL LC autosampler vials and caps.
5. Volumetric flasks: various sized flasks for making standards and spiking solutions. A 4-L bottle for making the desorption solution.
6. Liquid Transfer:
 - a. Various µL Syringes for making and spiking standard solutions.
 - b. Adjustable 10-50-mL desorption solution dispenser to fit 4-L bottle.
7. Forceps for handling the gauze wipes.
8. Latex or nitrile gloves. Avoid vinyl gloves.
9. Rotating mixer capable of 10-30 rpm.
10. Pasteur transfer pipettes.
11. Template with 10 cm x 10 cm hole or 1 foot x 1 foot (30.5 cm x 30.5 cm) template made of relatively rigid disposable cardstock or sheet of Teflon®.
12. Filters: Ion Chromatography Acrodisc®, 25 mm syringe filter with 0.45 µm Supor® (PES) membrane. (Pall number 4585T or equivalent).

SPECIAL PRECAUTIONS: The solvents are flammable and have associated adverse health effects. Avoid breathing vapors. Avoid skin contact. Work should be performed in an adequate hood. Analysts must wear proper eye and hand protection (e.g. latex gloves) to prevent adsorption of even small amounts of amines through the skin as well as for protection from the solvents and other reagents. Dissolving concentrated sulfuric acid in water is highly exothermic. Goggles must be worn.

Caution must also be exercised in the handling and analysis of samples. Clandestine drug labs may produce unknown and seriously toxic by-products.

SAMPLING:

1. Follow specific requirements of surface area to be wiped (usually 100 cm² or 1 ft² (929 cm²)) and action threshold (or maximum allowable residual level) set by the agency having legal jurisdiction or specified by the client. Uptake rates depend upon the wipe sampling method used so the specific wipe technique used must be specified and any deviations from the required wipe sampling requirements noted. ⁽¹⁾ **
2. The following steps only summarize the overall sampling procedure and are not intended to be used as a shortcut or wipe sampling procedures that may be specified by the legal jurisdiction or the client.

2. Prepare a rigid template from disposable cardstock or a sheet of Teflon[®] having either a 10 cm x 10 cm or 1 ft x 1 ft square hole cut according to the dimensions required by the regulatory agency. The template must be able to retain its shape during wiping to ensure that the areas wiped were 100 cm² or 1 ft². Single-use disposable cardstock is preferred because it eliminates the possibility for cross-contamination and the necessity to take a blank wipe between samples in step 3.
2. Provide enough wipe media from the same lot to cover all required laboratory media blanks, field-equipment blanks, samples and sample duplicates, and quality control samples. Use gauze in sterile packaging to minimize the chance for cross-contamination which might more easily occur with open bulk packaged cotton gauze. The gauze wipes needed for the laboratory media blanks and QC samples are to be sent to the laboratory in their unopened sterile packages.
3. Secure the template(s) to the area(s) to be wiped (e.g. with tape along outside edge of template). If a single-use disposable template is not used, clean the template between samples to avoid cross-contamination and provide laboratory with a blank wipe of the cleaned template between samples to ensure that no cross-contamination has occurred.
4. With freshly gloved hand, take one gauze and wet it with isopropanol or methanol (about 3-4 mL for either the 3" x 3" 12-ply or the 4" x 4" 8-ply cotton gauze wipes). Alternatively, pre-wet and insert the gauze wipes into the sample containers off-site. This avoids any possibility of the bottle of methanol or isopropanol becoming contaminated on-site with methamphetamine. If the wipes were prepared off-site, then remove pre-wetted gauze wipe from sample container, opening only one sample container at a time. In either case, squeeze out and discard any excess solvent from the gauze wipe. Use fresh latex or nitrile gloves for each separate sample and blank. Do not use vinyl gloves due to the potential for leaching of phthalate plasticizers and contamination of the samples.
5. SURFACE SAMPLING
 - a. Concentric Squares Wiping Technique (particularly suitable for smooth and non-porous surfaces): Fold the pre-wetted gauze in half and then fold in half again. Using firm pressure wipe the area within the template. Start at one of the inside corners of the template and wipe in concentric squares, progressing toward the center. End with a scooping motion. Without allowing the gauze to touch any other surface, reverse the last fold so that the exposed side of the gauze is facing inward and using a fresh surface of the gauze, wipe the same area in the same manner as before. Roll or fold the gauze again and insert into the shipping container.
 - b. Side-to-side Wiping (or Blotting) Technique (particularly suitable for rough, porous, and/or soiled surfaces): Fold the pre-wetted gauze in half and then fold in half again. Hold the gauze with a freshly gloved hand and using firm pressure wipe or blot the area within the template with at least five overlapping side-to-side horizontal passes (see **NOTE**) beginning at the top and progressing to the bottom in a "Z" pattern. End with a scooping motion. If blotting, blot at least five times on each horizontal pass (see **NOTE**). Without allowing the gauze to touch any other surface, reverse the last fold so that the exposed side of the gauze is facing inward. Using a fresh surface of the gauze, wipe or blot the area again with at least five overlapping top-to-bottom vertical passes beginning at the left side and progressing to the right in an "N" pattern. If blotting, blot at least five times on each vertical pass. Roll or fold the gauze again and insert into the shipping container. Blotting is suggested in areas so soiled or rough that the threads of the gauze media are continually snagged.
NOTE: On areas larger than 100 cm², more than five passes and blots will be needed.

- c. Repeat or Serial Wiping: If isopropanol is used for wiping, a serial or repeat wipe sample of the same area with a fresh gauze wipe will improve sampling efficiency. For serial wiping, repeat the wiping procedure described above (steps 5a or 5b) with a fresh gauze wipe. Place the second gauze wipe into the same shipping container as the first gauze. The 50-mL polypropylene centrifuge tubes are large enough to contain up to two gauze wipes of either the 3" x 3" 12-ply or 4" x 4" 8-ply sizes.

NOTE: If the area to be wiped remains substantially wet from the first gauze, the second gauze wipe might be used in the dry state to soak up the residual solvent from the first gauze wipe.

6. Cap shipping containers securely and keep refrigerated (<6 °C). Make sure caps are not cross-threaded. Containers must have no chips, fractures, or other irregularities on the sealing edge. Do not use polyethylene plastic bags. While methamphetamine and several related amines are stable on the recommended wipe media for at least 7 days at room temperature, refrigeration is recommended as soon as possible.
7. Label each sample clearly with a unique sample identification number or name, and the date, time, location, and initials or identification number of the individual taking the sample. The above information and a description of the sample and the area wiped should also be recorded in a logbook for later correlation with the analytical results.
8. Prepare a minimum of one field-equipment blank for every ten samples (originating from the same clandestine laboratory or location), and at least one for every clandestine laboratory or location being evaluated. Using a freshly gloved hand, remove one gauze from its package and wet it with methanol or isopropanol (as described in step 4 above), squeeze out the excess solvent, wipe an area on the surface of the glove and the edge of a blank template, and insert the wipe into the shipping container. If two wipes are used per sample (as in step 5c), then repeat the process with the second gauze and add it to the same tube. Prepare field-equipment blanks off-site to avoid contamination from dust or vapors on-site. Cap, label, and include with the samples for shipment.
9. A laboratory media blank (QB) is prepared at the rate of one for every 10 samples. Cotton gauze from the same lot used for taking samples in the field should be provided to the analytical laboratory for preparing these laboratory blanks.
10. Laboratory duplicates may be prepared in the analytical laboratory by taking two separate but equal aliquots of the initial acid desorbate from a selected sample and processing these in parallel. Such duplicates should be prepared at the rate of one duplicate for every ten samples

SAMPLE PREPARATION:

11. DESORPTION FROM MEDIA:

- a. Remove cap from shipping container. Sample media should fit loosely in the container. If not, rearrange media carefully with rinsed forceps or transfer them to a larger container. If the sample media are transferred to a larger container, do not discard the original container. Samples may consist of more than one wipe. If this is the case, internal standard and desorption solution volumes may be adjusted accordingly.
- b. Spike exactly 50 µL of internal standard spiking solution onto each wipe sample.
- c. Add 30 mL desorption solution (0.2N sulfuric acid). If the samples were transferred to a larger container, the original shipping container must be rinsed with the desorption solution first, shaken, and the rinsate decanted into the larger container.

- d. Cap securely and mix contents by inverting the tubes end over end on a rotary mixer at 10-30 rpm for at least one hour.

NOTE 1: The desorption solution must percolate freely through the gauze wipes.

NOTE 2: If there is reason to believe that the samples may be alkaline enough to overcome the acidity of the desorption solution (e.g. wipes of unpainted concrete or stucco surfaces), then the pH must be adjusted to about ≤ 4 with diluted (5 to 6N) sulfuric acid drop-wise. The pH may be checked with pH paper or monitored with the addition of about 2 drops of the mixed pH Indicator solution of bromothymol blue and phenolphthalein. (The color should be yellow and not green or blue.) If the pH needs to be adjusted, then mix the contents by shaking or inversion a few times by hand after each addition of acid before checking the pH.

- e. Filter an aliquot of the sample through a Pall 0.45 μm pore size Ion Chromatography Acrodisc[®] for analysis.
12. Analyze samples, standards, blanks, and QCs by LC-MS. (See MEASUREMENT, steps 16-18.)

CALIBRATION AND QUALITY CONTROL:

13. Determine retention time using the column and chromatographic conditions specified on page 1.
14. Calibrate daily with at least six media spiked calibration standards and a blank.
 - a. Prepare the target analyte spiking solutions as follows: Add known amounts of 1000 $\mu\text{g}/\text{mL}$ methamphetamine stock solution to a volumetric flask and dilute to volume with methanol. A recommended final concentration for this solution is approximately 200 μg per mL. A second solution at 20 μg per mL is prepared for the lower concentration standards.
 - b. Prepare calibration standards and media blanks in clean shipping containers (e.g. 50-mL polypropylene centrifuge tubes)
 - c. Spike a known volume of target analyte spiking solution into each calibration standard by spiking directly onto the media. Use the spiking volumes suggested in Table 2 to cover the desired range.
 - f. Analyze these along with the field samples. (See MEASUREMENT, steps 16-18.)
15. Prepare matrix-spiked and matrix-spiked duplicate quality control samples (QC and QD) .
 - a. Cotton gauze from the same lot used for taking samples in the field should be provided to the analytical laboratory to prepare these matrix-spiked QC samples.
 - b. The quality control samples (QC and QD) must be prepared independently at concentrations within the analytical range. (See Table 2 for applicable concentration ranges).
 - c. One quality control media blank (QB) must be included with each QC and QD pair.
 - d. The quality control samples must be prepared at the rate of one set (QB, QC, and QD) per 20 samples or less.
 - e. Transfer clean gauze wipes to new shipping containers.

NOTE: If two gauze wipes were used for the majority of samples in an analytical set, use two clean gauze wipes for each QB, QC, and QD.
 - g. Spike QC and QD with a known amount of target analyte as suggested in Table 2.
 - h. Process quality control samples along with the calibration standards, blanks, and field samples.
 - i. Analyze these along with the calibration standards, blanks, and field samples.

MEASUREMENT:

16. Analyze the calibration standards, quality control samples, blanks, and samples by LC-MS.
 - a. Use the following suggested analytical sequence.
 - (1) Calibration standards.
 - (2) Matrix spiked quality control samples (QC and QD), one set for every 20 samples or less.
 - (3) A media blank (QB), one for every 20 samples or less.
 - (4) Samples (up to 10) including one sample duplicate.
 - (5) A continuing calibration verification (CCV) standard consisting of one of the initial calibration standards.
 - (6) A media blank.
 - b. Set liquid chromatograph according to manufacturer's recommendations and to conditions listed in Table 3.
 - c. Set mass spectrometer conditions to those given in Table 3 for the SIM mode.
 - d. Inject sample aliquot into liquid chromatograph.
 - e. After analysis, the vials should be promptly recapped and refrigerated if further analysis is anticipated. Samples are stable refrigerated for at least seven days.
17. Using extracted ion current profiles for the primary (quantification) ions specific to methamphetamine and the internal standard, measure LC peak area of each respective peak and compute relative peak areas by dividing the peak area of the analyte by the area of the internal standard. Recommended primary (quantification) ions and internal standard ions are given in Table 3. Prepare a calibration graph (relative peak area vs. μg analyte per sample).
18. Samples from initial investigations of clandestine laboratories are likely to include highly contaminated samples. If sample results exceed the upper range of the calibration curve, the sample in the LC vial may be diluted with the sulfuric acid desorption solution and reanalyzed.

CALCULATIONS:

19. Determine the mass in $\mu\text{g}/\text{sample}$ of methamphetamine found in the wipe samples, and in the media blank from the calibration graph.
20. Calculate final concentration, C , of methamphetamine in $\mu\text{g}/\text{sample}$:

$$C = c \cdot (V_1 / V_2) - b.$$

where

c = concentration in sample (in $\mu\text{g}/\text{sample}$ determined from the calibration curve).

(V_1 / V_2) = dilution factor, if applicable.

b = concentration in media blank (in $\mu\text{g}/\text{sample}$ determined from the calibration curve).

21. Report concentration, C' , in μg per total area wiped (in cm^2) as follows:

$$C' = (C/A)$$

C = $\mu\text{g}/\text{sample}$ (step 20).

A = Total area wiped in cm^2 per sample.

NOTE: For example, if the sample was a composite sample and the area was 400 cm², report results as µg/400 cm². In general, if the area wiped was greater than or less than 100 cm², do not convert value to µg/100 cm². To avoid confusion, report separately both µg/sample (C) and the total area wiped in cm² per sample (A) for both discrete and composite samples.

EVALUATION OF METHOD:

This method was evaluated for methamphetamine over a range of approximately 0.4 µg/sample to 17.8 µg/sample on cotton gauze. These concentration levels represent approximately the 3x LOQ through 100x LOQ level. Results are reported in the Backup Data Report [1].

The limits of detection (LOD) and limits of quantitation (LOQ) were determined by preparing a series of media spiked standards, desorbing in the sulfuric acid desorption solution and analyzing in the SIM mode. The LODs were estimated using the procedure of Burkart [4]. An LOD of less than 0.02 µg/sample for methamphetamine on wipes was achieved in the SIM mode. The LOD was set at 0.05 µg/sample and the LOQ at 0.15 µg/sample for method development purposes. Lower LODs can be achieved in practice by including calibration standards at lower concentration levels and with proper instrument maintenance. The cleanliness and performance of the mass spectrometer must be maintained such that at a minimum of 0.1 µg/sample a signal of at least 5 to 10 times the baseline noise is achievable.

Precision and accuracy were determined by analyzing 6 replicates at each of 4 concentration levels (nominally 0.44, 1.8, 4.4, and 18 µg/sample). Using all data, method precision (S_r) was 0.06663. Accuracy was 20.7% and mean bias was -0.09753.

Long term sample storage stability was determined for periods up to 30 days under refrigeration (4 °C±2 °C) and for up to 7 days at room temperature (22-24 °C). Since long term storage measures only the viability of analytes on a particular media over time, this determination was not repeated for this particular method; the reader is directed to the NIOSH 9106 Backup Data Report [2] for more detail. All recoveries were found to be 93.5% or better.

Recovery of amphetamines from six different types of surfaces using cotton gauze was evaluated. The study and results are reported in the Backup Data Report for NIOSH 9109 [3]. The practice of serial wiping (wiping the same surface area a second time with a second gauze wipe and combining both wipes as a single sample) was evaluated. Four solvents for wetting the gauze were tested (distilled water, 5% distilled white vinegar, isopropanol, and methanol). Six replicate samples were taken on a latex painted wall. Recovery and precision results are presented in the previously mentioned Backup Data Report. In summary, the effectiveness of the various solvents using a single wipe on a latex painted wall were as follows: water, 46% recovery; 5% distilled white vinegar, 55% recovery; isopropanol, 64% recovery and methanol, 87% recovery. Average recoveries with isopropanol from all the surfaces tested were greatly improved with a repeat (serial) wipe (11% improvement compared to only about 6% improvement with methanol). The serial wipe is added to the first wipe and constitutes a single sample.

REFERENCES:

- [1] Maria Carolina Siso, Thomas T. McKay, John M. Reynolds, Don C. Wickman, "Backup Data Report for NIOSH 9111, Methamphetamine on Wipes by Liquid Chromatography-Mass Spectrometry," prepared under NIOSH Contract 200-2001-0800, (Unpublished, 2005).
- [2] John M. Reynolds, Maria Carolina Siso, James B. Perkins, "Backup Data Report for NMAM 9106, Methamphetamine and Illicit Drugs, Precursors, and Adulterants on Wipes by Liquid-Liquid Extraction," prepared under NIOSH Contract 200-2001-0800, (Unpublished, 2004).

- [3] John M. Reynolds, Maria Carolina Siso, James B. Perkins, "Backup Data Report for NIOSH 9109, Methamphetamine and Illicit Drugs, Precursors, and Adulterants on Wipes by Solid Phase Extraction," prepared under NIOSH Contract 200-2001-0800, (Unpublished, 2004).
- [4] John A. Burkart, "General Procedures for Limit of Detection Calculations in the Industrial Hygiene Chemistry Laboratory," *Applied Industrial Hygiene* 1(3):153-155, (1986).
- [5] NAMSLD 2007. State Controlled Substance(s) Environmental Issues Bill – Status Update, (<http://www.natlalliance.org/>) The National Alliance for Model State Drug Laws, Alexandria, Va. Access via the web on March 11, 2008.

METHOD DEVELOPMENT BY:

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TABLE 1. MAXIMUM METHAMPHETAMINE SURFACE CONTAMINATION LIMITS

There are no national health-based or feasibility-based surface contamination standards, criteria or guidelines for clandestine drug laboratory decontamination. However, several states have feasibility-based surface contamination limits for methamphetamine.

State Surface Contamination Limit[5]*		State
0.5 μ /100 cm ²		Colorado
1.0 μ /ft ²	(Equivalent to 0.11 μ /100 cm ²)	Minnesota
0.1 μ /100 cm ²		Alaska, Arizona, Arkansas, California, Idaho, Montana, North Carolina, Tennessee, Utah, Washington
0.5 μ /ft ²	(Equivalent to 0.05 μ /100 cm ²)	Oregon

* NIOSH has not established health-based or feasibility-based airborne Recommended Exposure Limits (RELs) or surface contamination guidelines for methamphetamine. State surface contamination limits are provided as an aid to those seeking additional information and does not constitute endorsement by NIOSH. The National Alliance for Model State Drug Laws (NAMSDL) (<http://www.natlalliance.org/>) periodically summarizes state feasibility-based decontamination limits and proposed state legislative requirements and guidelines for clandestine drug laboratories. NAMSDL is a useful source to obtain a summary of state requirements and guidelines. However, state information is subject to change, and specific state's surface contamination limits, and other state decontamination requirements and guidelines should be obtained directly from each state.

TABLE 2. SUGGESTED SPIKING SCHEDULE FOR CALIBRATION STANDARDS.

Standard	Volume (μ L) of Methamphetamine Spiking Solution Spiked on Media		Internal Standard Spike (μ L)	Desorption Solution Volume (mL)	Final Concentration (μ g/sample)
	200 μ g/mL solution	20 μ g/mL solution			
1	500		50	30	100
2	100		50	30	20
3	25		50	30	5
4	5		50	30	1
5		25	50	30	0.5
6		5	50	30	0.1
7		2.5	50	30	0.05
8		1.2	50	30	0.024

TABLE 3. SUGGESTED MASS SPECTROMETER CONDITIONS:

Ionization Mode:	API-ES (Atmospheric Pressure Ionization-Electro Spray)
Polarity:	Positive
SIM Parameters:	
Fragmentator:	100
Gain:	3.0 EMV
Actual Dwell:	294
SIM ions:	119 Methamphetamine confirmation ion 150 Quantitation ion for Methamphetamine 164 Ion for Methamphetamine -D ₁₄
Spray Chamber:	(Optimize for the particular instrument in use.)
Gas Temperature:	200 °C.
Drying Gas:	12.0 L/min.
Nebulizer Pressure:	50 psig

Note: Methamphetamine and the Internal Standard essentially co-elute. Monitor m/z ions 119 and 150 for Methamphetamine quantitation and 164 for Methamphetamine -D₁₄.

**FIGURE 1. LC-MS TOTAL ION CHROMATOGRAM
OF METHAMPHETAMINE (m/z 119, 150, 164).**

