SFL4

Method: GS1aH

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GS1aH method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Flame Ionization Detector
Column Type and Dimensions: 100% dimethylpolysiloxane; 30 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Hydrogen at 1.5 mL/minute
Make-up Gas: Nitrogen
Control Mode: Constant flow
Oven Program Set Points: 100 ºC initial, ramp at 30 ºC/minute to 310 ºC, hold for minimum of 3 minutes
Minimum Run Time: 10 minutes
Detector Temperature: 280 ºC

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: GS1H

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GS1H method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Flame Ionization Detector
Column Type and Dimensions: 100% dimethylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Hydrogen at 1.5 mL/minute
Make-up Gas: Nitrogen
Control Mode: Constant flow
Oven Program Set Points: 100 ºC initial, ramp at 30 ºC/minute to 310 ºC, hold for minimum of 0.5 minutes
Minimum Run Time: 7.5 minutes
Detector Temperature: 280 ºC

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: GS5H

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GS5H method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Flame Ionization Detector
Column Type and Dimensions: 5% phenyl, 95% methylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Hydrogen at 1.5 mL/minute
Make-up Gas: Nitrogen
Control Mode: Constant flow
Oven Program Set Points: 100 ºC initial, ramp at 30 ºC/minute to 310 ºC, hold for minimum of 1 minute
Minimum Run Time: 8 minutes
Detector Temperature: 280 ºC

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: GS50H

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GS50H method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Flame Ionization Detector
Column Type and Dimensions: 50% phenyl, 50% methylpolysiloxane; 30 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Hydrogen at 1.5 mL/minute
Make-up Gas: Nitrogen
Control Mode: Constant flow
Oven Program Set Points: 100 ºC initial, ramp at 30 ºC/minute to 300 ºC, hold for minimum of 15 minutes
Minimum Run Time: 21.667 minutes
Detector Temperature: 280 ºC

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: LGS5H

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solutions should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the LGS5H method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, with Low Thermal Mass (LTM) module equipped with Flame Ionization Detector

Column Type and Dimensions: 5% phenyl, 95% methylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness

Inlet Temperature: 270 ºC

Minimum Injection Volume: 1 µL

Injection Mode: Split

Maximum Split Ratio: 100:1

Carrier Gas and Flow: Hydrogen at 2 mL/minute

Make-up Gas: Nitrogen

Control Mode: Constant flow

Oven Program Set Points: 280 ºC initial for 5.33 minutes, ramp at 30 ºC/minute to 310 ºC

LTM Program Set Points: 95 ºC initial hold for 0.25 minutes, ramp at 60 ºC/minute to 280 ºC, hold for 2 minutes, ramp at 30 ºC/minute to 310 ºC

Minimum Run Time: 6.2 minutes

Detector Temperature: 280 ºC

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: MTPA50

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: Limited purpose (optical isomers of amphetamine, methamphetamine, ephedrine and pseudoephedrine)

Sample Preparation:

In a large test tube, add the sample, one aliquot of hexane and one of at least 1N sodium hydroxide. Vortex to perform basic extraction. To the same test tube, add several drops of 4.0 mg/mL (R)-(-)-α-methoxy-α-(trifluoromethyl)phenylacetyl chloride (MTPA) reagent to the hexane (top) layer and let stand for a few minutes. Add a couple of drops of pyridine and let stand. Vortex thoroughly to deactivate excess MTPA. Draw off hexane layer for injection.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Flame Ionization Detector
Column Type and Dimensions: 50% phenyl 50% methylpolysiloxane; 30 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 °C
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Hydrogen at 1.8 mL/minute
Make-up Gas: Nitrogen
Control Mode: Constant flow
Oven Program Set Points: 230 °C isothermal
Minimum Run Time: 6 minutes
Detector Temperature: 280 °C

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: IGS5A

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solutions should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the IGS5A method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with ASAP IRD3, or equivalent, Solid Phase Infrared Detector

Column Type and Dimensions: 5% phenyl, 95% methylpolysiloxane; 30 m x 0.32 mm I.D. x 0.25 µm film thickness

Inlet Temperature: 270 ºC

Minimum Injection Volume: 2 µL

Injection Mode: Splitless

Maximum Split Ratio: N/A

Carrier Gas and Flow: Helium at 3.0 mL/minute

Control Mode: Constant flow

Oven Program Set Points: 55 ºC initial, ramp at 30 ºC/minute to 295 ºC, hold for minimum 5.5 minutes

Minimum Run Time: 13.5 minutes

Detector: See IRD1 Vapor Phase Infrared Spectroscopy Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 4 weeks are within 0.1 minutes of the values measured on week 1.

SFL4

Method: IRD1

Identification of Controlled and Non-controlled Substances by Vapor Phase Infrared Spectroscopy

Scope: General purpose

Sample Preparation:

GC effluent

Method Parameters:

Instrument: Analytical Solutions and Providers IRD3, or equivalent, Vapor Phase Infrared Spectrometer
Scan Range: 550 cm^{-1} to 4000 cm^{-1}
Transfer Line Temperature: 295 °C
Resolution: 4 cm^{-1}
Light Pipe Temperature: 295 °C

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Accuracy: Analyte spectra are compared to a verified reference database, commercial library, published spectra or spectra from another ISO/IEC 17025 accredited laboratory. The overall sample spectral pattern corresponds to that of the reference spectrum and the prominent, well-defined, measured signals in the sample spectra were all within 4 cm^{-1} of those in the reference spectrum. No prominent extraneous signals are observed in the sample spectrum.

Repeatability and Reproducibility: The repeatability and reproducibility of confirmatory methods is established via evaluation of system-wide historical spectral data.

SFL4

Method: GS1

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GS1 method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Agilent 5975 and 5977 Mass Selective Detector, or equivalent
Column Type and Dimensions: 100% dimethylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Helium at 1.5 mL/minute
Control Mode: Constant flow
Oven Program Set Points: 100 ºC initial, ramp at 30 ºC/minute to 310 ºC, hold for minimum of 0.5 minutes
Minimum Run Time: 7.5 minutes
Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: GS1a

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GS1a method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Agilent 5975 and 5977 Mass Selective Detector, or equivalent
Column Type and Dimensions: 100% dimethylpolysiloxane; 30 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Helium at 1.5 mL/minute
Control Mode: constant flow
Oven Program Set Points: 100 ºC initial, ramp at 30 ºC/minute to 310 ºC, hold for minimum of 3 minutes
Minimum Run Time: 10 minutes
Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: GS5

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GS5 method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Agilent 5975 and 5977 Mass Selective Detector, or equivalent
Column Type and Dimensions: 5% phenyl, 95% methylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Helium at 1.5 mL/minute
Control Mode: Constant flow
Oven Program Set Points: 100 ºC initial, ramp at 30 ºC/minute to 310 ºC
Minimum Run Time: 8 minutes
Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: GS50

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GS50 method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Agilent 5975 and 5977 Mass Selective Detector, or equivalent

Column Type and Dimensions: 50% phenyl, 50% methylpolysiloxane; 30 m x 0.25 mm I.D. x 0.25 µm film thickness

Inlet Temperature: 270 ºC

Minimum Injection Volume: 1 µL

Injection Mode: Split

Maximum Split Ratio: 100:1

Carrier Gas and Flow: Helium at 1.5 mL/minute

Control Mode: Constant flow

Oven Program Set Points: 100 ºC initial, ramp at 30 ºC/minute to 300 ºC, hold for minimum of 15 minutes

Minimum Run Time: 24.667 minutes

Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: GSRXI1a

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the GSRXI1a method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph (220V fast heating oven), or equivalent, equipped with 5975 and 5977 Mass Selective Detector, or equivalent
Column Type and Dimensions: 100% dimethylpolysiloxane; 30 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 265 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Helium at 2 mL/minute
Control Mode: Constant flow
Oven Program Set Points: 180 ºC initial, hold for 2 minutes, ramp at 50 ºC/minute to 310 ºC, hold for minimum of 4 minutes
Minimum Run Time: 8.6 minutes
Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: HI1

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: Limited purpose (alprazolam, cocaine, heroin, hydrocodone, morphine and oxycodone)

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the HI1 method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Agilent 5975 and 5977 Mass Selective Detector, or equivalent
Column Type and Dimensions: 100% dimethylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Helium at 1.8 mL/minute
Control Mode: Constant flow
Oven Program Set Points: 275 ºC initial hold 2 minutes, ramp at 30 ºC/minute to 295 ºC, hold for 1 minute
Minimum Run Time: 3.66 minutes
Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: HI5

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: Limited purpose (alprazolam, cocaine, heroin, hydrocodone, morphine and oxycodone)

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the HI5 method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Agilent 5975 and 5977 Mass Selective Detector, or equivalent
Column Type and Dimensions: 5% phenyl, 95% methylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Helium at 1.8 mL/minute
Control Mode: Constant flow
Oven Program Set Points: 275 ºC initial hold 2 minutes, ramp at 30 ºC/minute to 295 ºC, hold for 1 minute
Minimum Run Time: 3.66 minutes
Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: LO1

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: Limited purpose (amphetamine, N-benzylpiperazine, phentermine, methamphetamine and 3,4-MDMA)

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the LO1 method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Agilent 5975 and 5977 Mass Selective Detector, or equivalent
Column Type and Dimensions: 100% dimethylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Helium at 1.8 mL/minute
Control Mode: Constant flow
Oven Program Set Points: 170 ºC initial hold 2 minutes, ramp at 30 ºC/minute to 190 ºC, hold for 1 minute
Minimum Run Time: 3.66 minutes
Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: LO5

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: Limited purpose (amphetamine, N-benzylpiperazine, phentermine, methamphetamine and 3,4-MDMA)

Sample Preparation:

Sample solution should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the LO5 method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, equipped with Agilent 5975 and 5977 Mass Selective Detector, or equivalent
Column Type and Dimensions: 5% phenyl, 95% methylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness
Inlet Temperature: 270 ºC
Minimum Injection Volume: 1 µL
Injection Mode: Split
Maximum Split Ratio: 100:1
Carrier Gas and Flow: Helium at 1.8 mL/minute
Control Mode: constant flow
Oven Program Set Points: 170 ºC initial hold 2 minutes, ramp at 30 ºC/minute to 190 ºC, hold for 1 minute
Minimum Run Time: 3.66 minutes
Detector: See MS1 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 6 weeks are within 0.1 minutes of the values measured on week 1, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: MS1

Identification of Controlled and Non-controlled Substances by Mass Spectrometry (EI)

Scope: General purpose

Sample Preparation:

GC effluent

Method Parameters:

Instrument: Agilent 5975 and 5977 Mass Selective Detector, or equivalent
Mass Analyzer: Quadrupole
Ionization Mode: Positive Electron Ionization
Scan Range: m/z 34-550
Scan Rate: N=2
Source Temperature: 280 °C
MS Temperature: 150 °C
Transfer Line Temperature: 280 °C
Tune Type: Standard

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Accuracy: Analyte spectra are compared to a verified reference database, commercial library, published literature spectra or spectra from another ISO/IEC 17025 accredited laboratory. The overall sample spectral pattern corresponds to that of the reference spectrum. The measured m/z values for prominent ions in the sample spectrum are of the same nominal mass as those in the reference spectrum. The molecular ion is present in the sample spectrum if it is present in the reference spectrum. No prominent unexplainable extraneous ions are observed in the sample spectrum.

Repeatability and Reproducibility: The repeatability and reproducibility of confirmatory methods is established via evaluation of system-wide historical spectral data.

SFL4

Method: LGS5

Separation of Controlled and Non-controlled Substances by Gas Chromatography

Scope: General purpose

Sample Preparation:

Sample solutions should routinely be prepared at active drug ingredient concentrations of up to approximately 10 mg/mL in an appropriate organic solvent. Basic extraction into organic solvent, filtration and/or derivatization procedures may also be performed prior to using the LGS5 method.

Method Parameters:

Instrument: Agilent 7890 Gas Chromatograph, or equivalent, with Low Thermal Mass (LTM) module equipped with Agilent 5977 Mass Selective Detector, or equivalent

Column Type and Dimensions: 5% phenyl, 95% methylpolysiloxane; 15 m x 0.25 mm I.D. x 0.25 µm film thickness

Inlet Temperature: 270 ºC

Minimum Injection Volume: 1 µL

Injection Mode: Split

Maximum Split Ratio: 100:1

Carrier Gas and Flow: Helium at 2 mL/minute

Control Mode: constant flow

Oven Program Set Points: 280 ºC initial for 5.33 minutes, ramp at 30 ºC/minute to 310 ºC

LTM Program Set Points: 95 ºC initial hold for 0.25 minutes, ramp at 60 ºC/minute to 280 ºC, hold for 2 minutes, ramp at 30 ºC/minute to 310 ºC

Minimum Run Time: 6.2 minutes

Detector: See MS2 Mass Spectrometry Method Parameters

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed, including a low level (0.5%) marker compound. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured for representative compounds are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured for representative compounds during 4 weeks are within 0.1 minutes of the values measured on week 6, and/or the individual relative retention times during 6 weeks are within 1% of the values measured on week 1.

SFL4

Method: MS2

Identification of Controlled and Non-controlled Substances by Mass Spectrometry (EI)

Scope: General purpose

Sample Preparation:

GC effluent

Method Parameters:

Instrument: Agilent 5977 Mass Selective Detector, or equivalent
Mass Analyzer: Quadrupole
Ionization Mode: Positive Electron Ionization
Scan Range: m/z 34-550
Scan Rate: N=1
Source Temperature: 280 °C
MS Temperature: 150 °C
Transfer Line Temperature: 280 °C
Tune Type: Standard

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Accuracy: Analyte spectra are compared to a verified reference database, commercial library, published literature spectra or spectra from another ISO/IEC 17025 accredited laboratory. The overall sample spectral pattern corresponds to that of the reference spectrum. The measured m/z values for prominent ions in the sample spectrum are of the same nominal mass as those in the reference spectrum. The molecular ion is present in the sample spectrum if it is present in the reference spectrum. No prominent unexplainable extraneous ions are observed in the sample spectrum.

Repeatability and Reproducibility: The repeatability and reproducibility of confirmatory methods is established via evaluation of system-wide historical spectral data.

SFL4

Method: IR1

Identification of Controlled and Non-controlled Substances by Solid-Phase Infrared Spectroscopy

Scope: General purpose

Sample Preparation:

Sample will be analyzed either by direct analysis, sublimation, or extraction with any appropriate solvent, including but not limited to methanol, chloroform, acetone, petroleum ether, ethyl ether, methylene chloride, water, ethyl acetate, xylenes and hexane, or any combination of these.

Method Parameters:

Instrument: Thermo Scientific Nicolet iS10 Infrared Spectrometer, or equivalent
Number of Background Scans: 8 Scans
Minimum Number of Sample Scans: 8 Scans
Scan Range: 4000 cm^{-1} to 525 cm^{-1}
Sample Gain: Autogain
Resolution: 4 cm^{-1}
Optical Velocity: 0.4747 cm/s
Aperture: 80.0
Accessory: Smart iTX and iTR ATR, or equivalent

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Accuracy: Analyte spectra are compared to a verified reference database, commercial library, published spectra or spectra from another ISO/IEC 17025 accredited laboratory. The overall sample spectral pattern corresponds to that of the reference spectrum and the prominent, well-defined, measured signals in the sample spectrum were all within 4 cm^{-1} of those in the reference spectrum. No prominent extraneous signals are observed in the sample spectrum.

Repeatability and Reproducibility: The repeatability and reproducibility of confirmatory methods is established via evaluation of system-wide historical spectral data.

SFL4

Method: IR2

Identification of Controlled and Non-controlled Substances by Solid-Phase Infrared Spectroscopy

Scope: General purpose

Sample Preparation:

Sample will be analyzed either by direct analysis, sublimation, or extraction with any appropriate solvent, including but not limited to methanol, chloroform, acetone, petroleum ether, ethyl ether, methylene chloride, water, ethyl acetate, xylenes and hexane, or any combination of these.

Method Parameters:

Instrument: Thermo Scientific Nicolet iS10 Infrared Spectrometer, or equivalent
Number of Background Scans: 8 Scans
Minimum Number of Sample Scans: 8 Scans
Scan Range: 4000 cm^{-1} to 400 cm^{-1}
Sample Gain: Autogain
Resolution: 4 cm^{-1}
Optical Velocity: 0.4747 cm/s
Aperture: 80.0
Accessory: Smart Golden Gate ATR, or equivalent

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Accuracy: Analyte spectra are compared to a verified reference database, commercial library, published spectra or spectra from another ISO/IEC 17025 accredited laboratory. The overall sample spectral pattern corresponds to that of the reference spectrum and the prominent, well-defined, measured signals in the sample spectrum were all within 4 cm^{-1} of those in the reference spectrum. No prominent extraneous signals are observed in the sample spectrum.

Repeatability and Reproducibility: The repeatability and reproducibility of confirmatory methods is established via evaluation of system-wide historical spectral data.

SFL4

Method: IR3

Identification of Controlled and Non-controlled Substances by Solid-Phase Infrared Spectroscopy

Scope: General purpose

Sample will be analyzed either by direct analysis, sublimation, or extraction with any appropriate solvent, including but not limited to methanol, chloroform, acetone, petroleum ether, ethyl ether, methylene chloride, water, ethyl acetate, xylenes and hexane, or any combination of these.

Method Parameters:

Instrument: Thermo Scientific Nicolet iS50 Infrared Spectrometer, or equivalent
Number of Background Scans: 8 Scans
Minimum Number of Sample Scans: 8 Scans
Scan Range: 4000 cm^{-1} to 400 cm^{-1}
Sample Gain: Autogain
Resolution: 4 cm^{-1}
Optical Velocity: 0.4747 cm/s
Aperture: 100.0
Accessory: ATRiS50, or equivalent

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Accuracy: Analyte spectra are compared to a verified reference database, commercial library, published spectra or spectra from another ISO/IEC 17025 accredited laboratory. The overall sample spectral pattern corresponds to that of the reference spectrum and the prominent, well-defined, measured signals in the sample spectrum were all within 4 cm^{-1} of those in the reference spectrum. No prominent extraneous signals are observed in the sample spectrum.

Repeatability and Reproducibility: The repeatability and reproducibility of confirmatory methods is established via evaluation of system-wide historical spectral data.

SFL4

Method: METH-CH-210

Separation of Controlled and Non-controlled Substances by Liquid Chromatography

Scope: Limited purpose (Optical Isomers of Methamphetamine)

Sample Preparation:

Dilute sample with methanol up to an approximate concentration of 0.5 mg/mL in methanol. Filter through a minimum 0.45 µm filter.

Method Parameters:

Instrument: Agilent Technologies 1260 Infinity HPLC, or equivalent
Column: Shiseido Chiral CD-Ph 4.6 mm x 250 mm, 5 µm (or equivalent)
Column Temperature: 30 ºC
Buffer/Mobile Phase: (A) 0.5 M Sodium Perchlorate, no pH adjustment necessary; (B) Acetonitrile
Minimum Injection Volume: 3.0 µL
Gradient Set Points: Isocratic (40% 0.5 M Sodium Perchlorate: 60% Acetonitrile)
Flow Rate: 0.75 mL/minute (Constant flow)
Detection Wavelength: 210 nm (4 nm bandwidth); 360 nm reference (100 nm bandwidth)
Minimum Run Time: 10.0 minutes

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Selectivity: Target compounds are visually separated and observed as a single peak with a clear, non-splitting apex. Peak fronting/tailing, if observed, does not preclude the detection of closely eluting peaks. A minimum S/N =3 is observed. Earliest eluting compound met minimum retention factor criteria and/or fulfilled the repeatability and reproducibility acceptance criteria.

Repeatability: Individual retention times measured are within 0.1 minutes of the average of 30 injections, and/or the individual relative retention times are within 1% of the average of 30 injections.

Reproducibility: Individual retention times measured during 2 weeks are within 0.1 minutes of the values measured on week 1.

SFL4

Method: DEA440H

Identification of Controlled and Non-controlled Substances by Nuclear Resonance Spectroscopy

Scope: Proton

Note: "Internal Standard-Solvent" naming of the method is substituted with the actual internal standard/solvent combination depending on preparation of the sample.

Procedure:

Dilute sample in the appropriate solvent preparation, containing a 0 ppm reference and internal standard (if applicable). Concentrations in the range of 30-50 mg/mL are suggested. Vortex or sonicate for several seconds. Filter and pipet the solution into an NMR sample tube. Common internal standard choices include maleic acid, dimethyl sulfone, dimethyl fumarate and 1,4-dioxane, among others. Solvent choices include deuterated forms of water, methanol and chloroform.

Method Parameters:

Instrument: Agilent 400-MR NMR, or equivalent, with proton detection probe
MHz: 400
Minimum Spectral Range (ppm): -1 to 11 ppm
Minimum Delay between Pulses (seconds): 45
Minimum Pulse Angle (degrees): <90
Minimum Acquisition Time: 5.0 seconds
Minimum Number of Scans: 8

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Accuracy: Analyte spectra are compared to a verified reference database, commercial library, published literature spectra, or spectra from another ISO/IEC 17025. Overall sample spectral pattern corresponds to that of the reference spectrum acquired using the same solvent. All signals in the sample spectra were within 0.2 ppm of those in the reference spectrum. No unexplainable extraneous signals are observed in the sample spectrum.

Repeatability and Reproducibility: The repeatability and reproducibility of confirmatory methods is established via evaluation of system-wide historical spectral data.

SFL4

Method: RAM1

Identification of Controlled and Non-controlled Substances by Raman Spectroscopy

Scope: General purpose

Sample Preparation:

Sample will be analyzed by direct analysis from suitable medium (slide, test tube, etc.). Techniques such as sublimation or extraction may be applied prior to analysis. Extraction solvents may include, but are not limited to, methanol, chloroform, acetone, petroleum ether, ethyl ether, methylene chloride, water, ethyl acetate, xylenes, hexane, or any in combination.

Method Parameters:

Instrument: Thermo Electron Nicolet iS50, or equivalent
Minimum Number of Sample Scans: 32
Scan Range: 3697 – 550 cm^{-1}
Sample Gain: 1
Resolution: 4 cm^{-1}
Optical Velocity: 0.3165
Aperture: 75
Accessory: Raman iS50, or equivalent

Limitations: See individual instrument validation reports.

Acceptance Criteria (unless otherwise noted in individual validation report):

Accuracy: Analyte spectra are compared to a verified reference database, commercial library, published spectra or spectra from another ISO/IEC 17025 accredited laboratory. The overall sample spectral pattern corresponds to that of the reference spectrum and the prominent, well-defined, measured signals in the sample spectrum were all within 4 cm^{-1} of those in the reference spectrum. No prominent extraneous signals are observed in the sample spectrum.

Repeatability and Reproducibility: The repeatability and reproducibility of confirmatory methods is established via evaluation of system-wide historical spectral data.

4MDMA3 – Quantitation of 3,4-MDMA by Gas Chromatography

Scope

Samples containing 3,4-Methylenedioxymethamphetamine (3,4-MDMA)

Procedure:

Accurately weigh the sample into a volumetric flask and dilute to volume with deionized water. The sample solution should be prepared such that the 3,4-MDMA concentration is within the established working range and between the high- and low-concentration QC solutions. A 2 mL aliquot of the sample solution is then extracted with 2 mL of 1 N NaOH into 2 mL of the internal standard solution.

Internal Standard Solution:

0.4 mg/mL n-tetracosane in chloroform/methanol (9:1).

Standard Solution:

Accurately weigh the 3,4-MDMA reference material in Internal Standard Solution so that the concentration of the 3,4-MDMA is within the working range.

Quality Control Solutions:

Prepare two QC solutions for use as positive controls during quantitative analysis. These two solutions are prepared such that their target analyte concentrations represent the low and high ends of the method's working range.

Chromatographic System:

Instrument: Gas Chromatograph HP/Agilent 6890 equipped with an FID detector (or equivalent)
Column: 100% Dimethylpolysiloxane, 30m x 0.25mm i.d. x 0.25µm film thickness
Inlet (Injector) Temperature: 270 °C
Mode: Split
Split Ratio: 100:1
Carrier Gas: Hydrogen
Carrier Gas Flow Rate: 59 cm/second
Oven Program: Isothermal at 160 °C
Total Run Time: 4 min
Detector Temperature: 250 °C
Signal Data (Sampling) Rate: 50 Hz
Injection Volume: 1 µL
Injection Solvent: methylene chloride

Limitations:

N/A

Acceptance Criteria:

Selectivity: 3,4-MDMA and n-tetradecane resolved (R ≥1.5) from each compound tested.
Linearity: At least seven concentrations were within 95-105% overall average sensitivity (response/concentration) limits.
Repeatability: Relative Standard Deviation (RSD) for each concentration tested was less than 2%.
Accuracy: Experimentally measured purity (expressed in % w/w) within ± 5% relative to the known prepared purity.

Working Range:

0.2075 – 2.3733 mg/mL 3,4-MDMA