# GC/MS Volatiles

## Case Narrative

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## COGCC

### Complaint 200444807

Work Order Number: 1803374

1. This report consists of 1 water sample. The sample was received cool and intact by ALS on 03/19/18.

   The vial for the sample contained headspace prior to analysis.

   The samples had a pH < 2 at the time of analysis.

2. The sample was prepared according to SW-846, 3rd Edition procedures. Specifically, the water sample was prepared using purge and trap procedures based on Method 5030C.

3. The sample was analyzed using GC/MS with an RTX-624, RTX-VMS, or equivalent capillary column according to the current revision of SOP 525 based on SW-846 Method 8260. All positive results were quantitated against the initial calibration standards using the internal standard technique. The identification of positive results was achieved by a comparison of the retention time and mass spectrum of the sample versus the daily calibration standard.

4. All initial calibration criteria were met.

5. All initial calibrations are verified by comparing a second source standard calibration verification (ICV) against the calibration curve. All criteria for initial calibration verification were met.

6. All compounds in the daily (continuing) calibration verifications were within 20%D with the exception of n-butanol which was low. This compound was not detected in the associated sample.

7. Methylene chloride, acetone and 2-butanone are common laboratory contaminants. In order to minimize the levels of these compounds detected in the gc/ms analysis, ALS has designated its volatile laboratory as a restricted access area. In addition, the laboratory has been equipped with a dedicated, air intake and exhaust system that operates under positive pressure in order to minimize cross contamination of these compounds. Due to fluctuations in ambient laboratory

conditions, reported sample values for common laboratory contaminants may be due to lab contamination even if the compound in question is not detected in the associated method blank.

All method blank criteria were met.

8. All laboratory control sample and laboratory control sample duplicate recoveries and RPDs were within the acceptance criteria with the following exceptions:

| Spiked Compound | QC Sample | Direction |
|---|---|---|
| 1,1,1,2-tetrachloroethane | LCS | High |
| Isopropylbenzene | LCS | High |

Because of the large number of target analytes reported by this method, the lab allows for sporadic marginal exceedances. No further action was taken.

9. A matrix spike and matrix spike duplicate were not performed because of insufficient sample. A laboratory control sample and laboratory control sample duplicate were performed instead.

10. The sample was analyzed within the established holding time.

11. All surrogate recoveries were within acceptance criteria.

12. All internal standard recoveries were within acceptance criteria.

13. Manual integrations are performed when needed to provide consistent and defensible data following the guidelines in the current revision of SOP 939.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

mindy norton

Mindy Norton
Organics Primary Data Reviewer

3/27/18
Date

Kathleen M. Ward

Organics Final Data Reviewer

3/28/18
Date

***ALS***
***Data Qualifier Flags***
***Organics***

| | |
|---|---|
| **U or ND:** | **This flag indicates that the compound was analyzed for but not detected.** |
| **J:** | **This flag indicates an estimated value. This flag is used as follows : (1) when estimating a concentration for tentatively identified compounds (TICs) where a 1:1 response is assumed; (2) when the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the reporting limit (RL) but greater than the method detection limit (MDL); (3) when the retention time data indicate the presence of a compound that meets the GC identification criteria, and the result is less than the RL but greater than the MDL; and (4) the reported value is estimated.** |
| **B:** | **This flag is used when the analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user. This flag shall be used for a tentatively identified compound (TIC) as well as for a positively identified target compound.** |
| **E:** | **This flag identifies compounds whose concentration exceeds the upper level of the calibration range.** |
| **A:** | **This flag indicates that a tentatively identified compound is a suspected aldol-condensation product.** |
| **X:** | **This flag indicates that the analyte was diluted below an accurate quantitation level.** |
| ***:** | **This flag indicates that a spike recovery is equal to or outside the control criteria used.** |
| **+:** | **This flag indicates that the relative percent difference (RPD) equals or exceeds the control criteria.** |

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

**OrderNum:** 1803374
**Client Name:** COGCC
**Client Project Name:** Complaint 200444807
**Client Project Number:**
**Client PO Number:** GAE 2018-0302

| Client Sample Number | Lab Sample Number | COC Number | Matrix | Date Collected | Time Collected |
|---|---|---|---|---|---|
| 757228 Ditlev-Simonsen flowline | 1803374-1 | | WATER | 19-Mar-18 | 11:32 |

# ALS Environmental

225 Commerce Drive, Fort Collins, Colorado 80524
TF: (800) 443-1511 PH: (970) 490-1511 FX: (970) 490-1522

# Chain-of-Custody

Turnaround time for samples received after 2 p.m. will be calculated beginning from the next business day.
Turnaround time for samples received Saturday will be calculated beginning from the next business day.

| ALS WORKORDER # | |
|---|---|
| 1803374 | |

| | | | | | |
|---|---|---|---|---|---|
| TURNAROUND TIME | day prelims & 14 day fin | SAMPLER | PAG | PAGE | 1 of 1 |
| SITE ID | | | | DISPOSAL | BY LAB or |
| EDD FORMAT | COGCC | | | PARAMETER/METHOD REQUEST FOR ANALYSIS | |
| PURCHASE ORDER | GAE-2018-0302 | | | A | 8260 extended list with oxygenates (plus TICs) |
| BILL TO COMPANY | | | | B | |
| INVOICE ATTN TO | | | | C | |
| ADDRESS | | | | D | |
| CITY / STATE / ZIP | | | | E | |
| PHONE | | | | F | |
| FAX | | | | G | |
| E-MAIL | | | | H | |
| | | | | I | |
| | | | | J | |

| PROJECT NAME | Complaint 200444807 |
|---|---|
| PROJECT No. | |
| | |
| COMPANY NAME | Colorado Oil & Gas Conservation Commission |
| SEND REPORT TO | Peter Gintautas |
| ADDRESS | 1120 Lincoln St., Suite 801 |
| CITY / STATE / ZIP | Denver, CO 80203 |
| PHONE | 719-679-1326 |
| FAX | |
| E-MAIL | peter.gintautas@state.co.us |

| LAB ID | FIELD ID | MATRIX | SAMPLE DATE | SAMPLE TIME | # OF BOTTLES | PRESERVATIVE | QC | A | B | C | D | E | F | G | H | I | J | SEE NOTES SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 757228 Ditlev-Simonsen flowline excavations | W | 3/19/18 | 11:32 | 3 | 1 | | X | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
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*Time Zone (Circle): MST Matrix: O = oil S = soil NS = non-soil solid W = water L = liquid E = extract F = filter

| NOTES | REPORT LEVEL / QC REQUIRED | |
|---|---|---|
| 5 of 49 | | Summary (Standard QC) |
| | X | LEVEL II (Standard QC) |
| | | LEVEL III (Std QC + forms) |
| | | LEVEL IV (Std QC + forms + raw data) |

PRESERVATION KEY: 1-HCl 2-HNO3 3-H2SO4 4-NaOH 5-NaOH/ZnAcetate 6-NaHSO4 7-4°C 8-Other

Form 202r9

| | SIGNATURE | PRINTED NAME | DATE | TIME |
|---|---|---|---|---|
| RELINQUISHED BY | | Peter Gintautas | 3/19/2018 | 13:24 |
| RECEIVED BY | Emily Lyons | Emily Lyons | 3.19.18 | 1326 |
| RELINQUISHED BY | | | | |
| RECEIVED BY | | | | |
| RELINQUISHED BY | | | | |
| RECEIVED BY | | | | |

**ALS Environmental - Fort Collins**
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client: COGCC Workorder No: 1803374

Project Manager: [illegible] Initials: [illegible] Date: 3.19.18

| | | | |
|---|---|---|---|
| 1. Does this project require any special handling in addition to standard ALS procedures? | | YES | NO |
| 2. Are custody seals on shipping containers intact? | ~~NONE~~ | YES | NO |
| 3. Are Custody seals on sample containers intact? | NONE | YES | NO |
| 4. Is there a COC (Chain-of-Custody) present or other representative documents? | | YES | NO |
| 5. Are the COC and bottle labels complete and legible? | | YES | NO |
| 6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.) | | YES | NO |
| 7. Were airbills / shipping documents present and/or removable? | DROP OFF | YES | NO |
| 8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles) | N/A | YES | NO |
| 9. Are all aqueous non-preserved samples pH 4-9? | N/A | ~~YES~~ | NO 3/19/18 |
| 10. Is there sufficient sample for the requested analyses? | | YES | NO |
| 11. Were all samples placed in the proper containers for the requested analyses? | | YES | NO |
| 12. Are all samples within holding times for the requested analyses? | | YES | NO |
| 13. Were all sample containers received intact? (not broken or leaking, etc.) | | YES | NO |
| 14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ___ < green pea X > green pea | N/A | YES | NO |
| 15. Do any water samples contain sediment? Amount of sediment: ___ dusting X moderate ___ heavy | N/A | YES | NO |
| 16. Were the samples shipped on ice? | | YES | ~~NO~~ 3/19/18 |
| 17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4 | RAD ONLY | YES | ~~NO~~ 3/19/18 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cooler #: | 1 | | | | | | |
| Temperature (°C): | 5.4 | | | | | | |
| No. of custody seals on cooler: | 0 | | | | | | |
| DOT Survey/ Acceptance Information — External µR/hr reading: | N/A | | | | | | |
| Background µR/hr reading: | 10 | | | | | | |

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

**Additional Information:** PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

bottle 1, no headspace, sediment present
bottle 2, pea sized headspace, moderate sediment
bottle 3, * greater than pea, heavy sediment

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

**Project Manager Signature / Date:** [signature] 3/19/18 ~~3/19/18~~ 3/20/18

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

# GC/MS Volatiles

## Method SW8260_25C

## Method Blank

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3MB

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80771

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | DF | Result | Result Qualifier | Reporting Limit | MDL |
|---|---|---|---|---|---|---|
| 110-54-3 | HEXANE | 1 | 1 | U | 1 | 0.31 |
| 108-87-2 | METHYL CYCLOHEXANE | 1 | 1 | U | 1 | 0.3 |
| 71-36-3 | N-BUTANOL | 1 | 50 | U | 50 | 30 |
| 75-65-0 | TERT-BUTANOL | 1 | 50 | U | 50 | 60 |
| 75-71-8 | DICHLORODIFLUOROMETHANE | 1 | 1 | U | 1 | 0.32 |
| 74-87-3 | CHLOROMETHANE | 1 | 1 | U | 1 | 0.3 |
| 75-01-4 | VINYL CHLORIDE | 1 | 1 | U | 1 | 0.31 |
| 74-83-9 | BROMOMETHANE | 1 | 1 | U | 1 | 0.3 |
| 75-00-3 | CHLOROETHANE | 1 | 1 | U | 1 | 0.32 |
| 75-69-4 | TRICHLOROFLUOROMETHANE | 1 | 1 | U | 1 | 0.31 |
| 75-35-4 | 1,1-DICHLOROETHENE | 1 | 1 | U | 1 | 0.3 |
| 76-13-1 | 1,1,2-TRICHLORO-1,2,2-TRIFLUOROET | 1 | 1 | U | 1 | 0.3 |
| 67-64-1 | ACETONE | 1 | 10 | U | 10 | 3 |
| 74-88-4 | IODOMETHANE | 1 | 1 | U | 1 | 0.3 |
| 75-15-0 | CARBON DISULFIDE | 1 | 1 | U | 1 | 0.3 |
| 75-09-2 | METHYLENE CHLORIDE | 1 | 1 | U | 1 | 0.3 |
| 156-60-5 | TRANS-1,2-DICHLOROETHENE | 1 | 1 | U | 1 | 0.33 |
| 1634-04-4 | METHYL TERTIARY BUTYL ETHER | 1 | 1 | U | 1 | 0.31 |
| 75-34-3 | 1,1-DICHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 108-05-4 | VINYL ACETATE | 1 | 2 | U | 2 | 0.78 |
| 156-59-2 | CIS-1,2-DICHLOROETHENE | 1 | 1 | U | 1 | 0.33 |
| 78-93-3 | 2-BUTANONE | 1 | 10 | U | 10 | 3 |
| 74-97-5 | BROMOCHLOROMETHANE | 1 | 1 | U | 1 | 0.32 |
| 67-66-3 | CHLOROFORM | 1 | 1 | U | 1 | 0.3 |
| 71-55-6 | 1,1,1-TRICHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 594-20-7 | 2,2-DICHLOROPROPANE | 1 | 1 | U | 1 | 0.33 |
| 110-82-7 | CYCLOHEXANE | 1 | 1 | U | 1 | 0.32 |
| 56-23-5 | CARBON TETRACHLORIDE | 1 | 1 | U | 1 | 0.32 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Method Blank

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3MB

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80771

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | DF | Result | Result Qualifier | Reporting Limit | MDL |
|---|---|---|---|---|---|---|
| 563-58-6 | 1,1-DICHLOROPROPENE | 1 | 1 | U | 1 | 0.3 |
| 107-06-2 | 1,2-DICHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 71-43-2 | BENZENE | 1 | 1 | U | 1 | 0.32 |
| 79-01-6 | TRICHLOROETHENE | 1 | 1 | U | 1 | 0.31 |
| 78-87-5 | 1,2-DICHLOROPROPANE | 1 | 1 | U | 1 | 0.3 |
| 74-95-3 | DIBROMOMETHANE | 1 | 1 | U | 1 | 0.31 |
| 75-27-4 | BROMODICHLOROMETHANE | 1 | 1 | U | 1 | 0.35 |
| 10061-01-5 | CIS-1,3-DICHLOROPROPENE | 1 | 1 | U | 1 | 0.33 |
| 108-10-1 | 4-METHYL-2-PENTANONE | 1 | 10 | U | 10 | 3 |
| 108-88-3 | TOLUENE | 1 | 1 | U | 1 | 0.31 |
| 10061-02-6 | TRANS-1,3-DICHLOROPROPENE | 1 | 1 | U | 1 | 0.33 |
| 79-00-5 | 1,1,2-TRICHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 591-78-6 | 2-HEXANONE | 1 | 10 | U | 10 | 3 |
| 127-18-4 | TETRACHLOROETHENE | 1 | 1 | U | 1 | 0.3 |
| 142-28-9 | 1,3-DICHLOROPROPANE | 1 | 1 | U | 1 | 0.3 |
| 124-48-1 | DIBROMOCHLOROMETHANE | 1 | 1 | U | 1 | 0.35 |
| 106-93-4 | 1,2-DIBROMOETHANE | 1 | 1 | U | 1 | 0.3 |
| 544-10-5 | 1-CHLOROHEXANE | 1 | 1 | U | 1 | 0.3 |
| 108-90-7 | CHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 630-20-6 | 1,1,1,2-TETRACHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 100-41-4 | ETHYLBENZENE | 1 | 1 | U | 1 | 0.31 |
| 179601-23-1 | M+P-XYLENE | 1 | 1 | U | 1 | 0.31 |
| 95-47-6 | O-XYLENE | 1 | 1 | U | 1 | 0.31 |
| 100-42-5 | STYRENE | 1 | 1 | U | 1 | 0.32 |
| 75-25-2 | BROMOFORM | 1 | 1 | U | 1 | 0.34 |
| 98-82-8 | ISOPROPYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 96-18-4 | 1,2,3-TRICHLOROPROPANE | 1 | 1 | U | 1 | 0.3 |
| 79-34-5 | 1,1,2,2-TETRACHLOROETHANE | 1 | 1 | U | 1 | 0.3 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Method Blank

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3MB

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80771

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | DF | Result | Result Qualifier | Reporting Limit | MDL |
|---|---|---|---|---|---|---|
| 108-86-1 | BROMOBENZENE | 1 | 1 | U | 1 | 0.3 |
| 103-65-1 | N-PROPYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 95-49-8 | 2-CHLOROTOLUENE | 1 | 1 | U | 1 | 0.3 |
| 108-67-8 | 1,3,5-TRIMETHYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 106-43-4 | 4-CHLOROTOLUENE | 1 | 1 | U | 1 | 0.3 |
| 98-06-6 | TERT-BUTYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 95-63-6 | 1,2,4-TRIMETHYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 135-98-8 | SEC-BUTYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 541-73-1 | 1,3-DICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 99-87-6 | P-ISOPROPYLTOLUENE | 1 | 1 | U | 1 | 0.3 |
| 106-46-7 | 1,4-DICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 104-51-8 | N-BUTYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 95-50-1 | 1,2-DICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 96-12-8 | 1,2-DIBROMO-3-CHLOROPROPANE | 1 | 2 | U | 2 | 0.66 |
| 120-82-1 | 1,2,4-TRICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 87-68-3 | HEXACHLOROBUTADIENE | 1 | 1 | U | 1 | 0.3 |
| 91-20-3 | NAPHTHALENE | 1 | 1 | U | 1 | 0.3 |
| 87-61-6 | 1,2,3-TRICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 123-91-1 | 1,4-DIOXANE | 1 | 100 | U | 100 | 60 |
| 64-17-5 | ETHANOL | 1 | 40 | U | 40 | 60 |
| 78-83-1 | ISOBUTYL ALCOHOL | 1 | 40 | U | 40 | 30 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Method Blank

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3MB

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80771

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | DF | Result | Result Qualifier | Reporting Limit | MDL |
|---|---|---|---|---|---|---|

## Surrogate Recovery

| CASNO | Surrogate Analyte | Result | Flag | Spike Amount | Percent Recovery | Control Limits |
|---|---|---|---|---|---|---|
| 460-00-4 | 4-BROMOFLUOROBENZENE | 24.3 | | 25 | 97 | 85 - 115 |
| 1868-53-7 | DIBROMOFLUOROMETHANE | 25 | | 25 | 100 | 84 - 118 |
| 2037-26-5 | TOLUENE-D8 | 24.4 | | 25 | 98 | 85 - 115 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25

## Tentatively Identified Compounds

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Field ID:**
**Lab ID:** VL180322-3MB

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Clean DF:** 1
**File Name:** C80771

| CASNO | Retention Time | Target Analyte | Dilution Factor | Result | Units | Qualifier |
|---|---|---|---|---|---|---|
| | | NONE DETECTED | 1 | | | U |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Sample Results

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Field ID:** 757228 Ditlev-Simonsen flo
**Lab ID:** 1803374-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 19-Mar-18
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18
**Prep Method:** SW5030 Rev C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** As Received
**File Name:** C80796

**Analyst:** Joe Kostelnik
**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Dilution Factor | Result | Result Qualifier | Reporting Limit | MDL |
|---|---|---|---|---|---|---|
| 110-54-3 | HEXANE | 1 | 1 | U | 1 | 0.31 |
| 108-87-2 | METHYL CYCLOHEXANE | 1 | 1.8 | | 1 | 0.3 |
| 71-36-3 | N-BUTANOL | 1 | 50 | U | 50 | 30 |
| 75-65-0 | TERT-BUTANOL | 1 | 50 | U | 50 | 60 |
| 75-71-8 | DICHLORODIFLUOROMETHANE | 1 | 1 | U | 1 | 0.32 |
| 74-87-3 | CHLOROMETHANE | 1 | 1 | U | 1 | 0.3 |
| 75-01-4 | VINYL CHLORIDE | 1 | 1 | U | 1 | 0.31 |
| 74-83-9 | BROMOMETHANE | 1 | 1 | U | 1 | 0.3 |
| 75-00-3 | CHLOROETHANE | 1 | 1 | U | 1 | 0.32 |
| 75-69-4 | TRICHLOROFLUOROMETHANE | 1 | 1 | U | 1 | 0.31 |
| 75-35-4 | 1,1-DICHLOROETHENE | 1 | 1 | U | 1 | 0.3 |
| 76-13-1 | 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 67-64-1 | ACETONE | 1 | 5.7 | J | 10 | 3 |
| 74-88-4 | IODOMETHANE | 1 | 1 | U | 1 | 0.3 |
| 75-15-0 | CARBON DISULFIDE | 1 | 1 | U | 1 | 0.3 |
| 75-09-2 | METHYLENE CHLORIDE | 1 | 1 | U | 1 | 0.3 |
| 156-60-5 | TRANS-1,2-DICHLOROETHENE | 1 | 1 | U | 1 | 0.33 |
| 1634-04-4 | METHYL TERTIARY BUTYL ETHER | 1 | 1 | U | 1 | 0.31 |
| 75-34-3 | 1,1-DICHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 108-05-4 | VINYL ACETATE | 1 | 2 | U | 2 | 0.78 |
| 156-59-2 | CIS-1,2-DICHLOROETHENE | 1 | 1 | U | 1 | 0.33 |
| 78-93-3 | 2-BUTANONE | 1 | 10 | U | 10 | 3 |
| 74-97-5 | BROMOCHLOROMETHANE | 1 | 1 | U | 1 | 0.32 |
| 67-66-3 | CHLOROFORM | 1 | 1 | U | 1 | 0.3 |
| 71-55-6 | 1,1,1-TRICHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 594-20-7 | 2,2-DICHLOROPROPANE | 1 | 1 | U | 1 | 0.33 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Sample Results

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Field ID:** 757228 Ditlev-Simonsen flo
**Lab ID:** 1803374-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 19-Mar-18
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18
**Prep Method:** SW5030 Rev C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** As Received
**File Name:** C80796

**Analyst:** Joe Kostelnik
**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Dilution Factor | Result | Result Qualifier | Reporting Limit | MDL |
|---|---|---|---|---|---|---|
| 110-82-7 | CYCLOHEXANE | 1 | 0.75 | J | 1 | 0.32 |
| 56-23-5 | CARBON TETRACHLORIDE | 1 | 1 | U | 1 | 0.32 |
| 563-58-6 | 1,1-DICHLOROPROPENE | 1 | 1 | U | 1 | 0.3 |
| 107-06-2 | 1,2-DICHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 71-43-2 | BENZENE | 1 | 0.54 | J | 1 | 0.32 |
| 79-01-6 | TRICHLOROETHENE | 1 | 1 | U | 1 | 0.31 |
| 78-87-5 | 1,2-DICHLOROPROPANE | 1 | 1 | U | 1 | 0.3 |
| 74-95-3 | DIBROMOMETHANE | 1 | 1 | U | 1 | 0.31 |
| 75-27-4 | BROMODICHLOROMETHANE | 1 | 1 | U | 1 | 0.35 |
| 10061-01-5 | CIS-1,3-DICHLOROPROPENE | 1 | 1 | U | 1 | 0.33 |
| 108-10-1 | 4-METHYL-2-PENTANONE | 1 | 10 | U | 10 | 3 |
| 108-88-3 | TOLUENE | 1 | 1 | U | 1 | 0.31 |
| 10061-02-6 | TRANS-1,3-DICHLOROPROPENE | 1 | 1 | U | 1 | 0.33 |
| 79-00-5 | 1,1,2-TRICHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 591-78-6 | 2-HEXANONE | 1 | 10 | U | 10 | 3 |
| 127-18-4 | TETRACHLOROETHENE | 1 | 1 | U | 1 | 0.3 |
| 142-28-9 | 1,3-DICHLOROPROPANE | 1 | 1 | U | 1 | 0.3 |
| 124-48-1 | DIBROMOCHLOROMETHANE | 1 | 1 | U | 1 | 0.35 |
| 106-93-4 | 1,2-DIBROMOETHANE | 1 | 1 | U | 1 | 0.3 |
| 544-10-5 | 1-CHLOROHEXANE | 1 | 1 | U | 1 | 0.3 |
| 108-90-7 | CHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 630-20-6 | 1,1,1,2-TETRACHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 100-41-4 | ETHYLBENZENE | 1 | 1 | U | 1 | 0.31 |
| 179601-23-1 | M+P-XYLENE | 1 | 0.61 | J | 1 | 0.31 |
| 95-47-6 | O-XYLENE | 1 | 1 | U | 1 | 0.31 |
| 100-42-5 | STYRENE | 1 | 1 | U | 1 | 0.32 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Sample Results

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Field ID:** 757228 Ditlev-Simonsen flo
**Lab ID:** 1803374-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 19-Mar-18
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18
**Prep Method:** SW5030 Rev C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** As Received
**File Name:** C80796

**Analyst:** Joe Kostelnik
**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Dilution Factor | Result | Result Qualifier | Reporting Limit | MDL |
|---|---|---|---|---|---|---|
| 75-25-2 | BROMOFORM | 1 | 1 | U | 1 | 0.34 |
| 98-82-8 | ISOPROPYLBENZENE | 1 | 0.41 | J | 1 | 0.3 |
| 96-18-4 | 1,2,3-TRICHLOROPROPANE | 1 | 1 | U | 1 | 0.3 |
| 79-34-5 | 1,1,2,2-TETRACHLOROETHANE | 1 | 1 | U | 1 | 0.3 |
| 108-86-1 | BROMOBENZENE | 1 | 1 | U | 1 | 0.3 |
| 103-65-1 | N-PROPYLBENZENE | 1 | 0.5 | J | 1 | 0.3 |
| 95-49-8 | 2-CHLOROTOLUENE | 1 | 1 | U | 1 | 0.3 |
| 108-67-8 | 1,3,5-TRIMETHYLBENZENE | 1 | 1.5 | | 1 | 0.3 |
| 106-43-4 | 4-CHLOROTOLUENE | 1 | 1 | U | 1 | 0.3 |
| 98-06-6 | TERT-BUTYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 95-63-6 | 1,2,4-TRIMETHYLBENZENE | 1 | 3.3 | | 1 | 0.3 |
| 135-98-8 | SEC-BUTYLBENZENE | 1 | 0.42 | J | 1 | 0.3 |
| 541-73-1 | 1,3-DICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 99-87-6 | P-ISOPROPYLTOLUENE | 1 | 0.31 | J | 1 | 0.3 |
| 106-46-7 | 1,4-DICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 104-51-8 | N-BUTYLBENZENE | 1 | 1 | U | 1 | 0.3 |
| 95-50-1 | 1,2-DICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 96-12-8 | 1,2-DIBROMO-3-CHLOROPROPANE | 1 | 2 | U | 2 | 0.66 |
| 120-82-1 | 1,2,4-TRICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 87-68-3 | HEXACHLOROBUTADIENE | 1 | 1 | U | 1 | 0.3 |
| 91-20-3 | NAPHTHALENE | 1 | 1.2 | | 1 | 0.3 |
| 87-61-6 | 1,2,3-TRICHLOROBENZENE | 1 | 1 | U | 1 | 0.3 |
| 123-91-1 | 1,4-DIOXANE | 1 | 100 | U | 100 | 60 |
| 64-17-5 | ETHANOL | 1 | 40 | U | 40 | 60 |
| 78-83-1 | ISOBUTYL ALCOHOL | 1 | 40 | U | 40 | 30 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Sample Results

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Field ID:** 757228 Ditlev-Simonsen flo
**Lab ID:** 1803374-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 19-Mar-18
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18
**Prep Method:** SW5030 Rev C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** As Received
**File Name:** C80796

**Analyst:** Joe Kostelnik
**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Dilution Factor | Result | Result Qualifier | Reporting Limit | MDL |
|---|---|---|---|---|---|---|

## Surrogate Recovery

| CASNO | Surrogate Analyte | Result | Flag | Spike Amount | Percent Recovery | Control Limits |
|---|---|---|---|---|---|---|
| 460-00-4 | 4-BROMOFLUOROBENZENE | 24 | | 25 | 96 | 85 - 115 |
| 1868-53-7 | DIBROMOFLUOROMETHANE | 25.2 | | 25 | 101 | 84 - 118 |
| 2037-26-5 | TOLUENE-D8 | 24.9 | | 25 | 100 | 85 - 115 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25

## Tentatively Identified Compounds

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Field ID:** 757228 Ditlev-Simonsen flo
**Lab ID:** 1803374-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 19-Mar-18
**Date Extracted:** 22-Mar-18
**Date Analyzed:** 22-Mar-18

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Clean DF:** 1
**File Name:** C80796

| CASNO | Retention Time | Target Analyte | Dilution Factor | Result | Units | Qualifier |
|---|---|---|---|---|---|---|
| | 10.56 | SUBSTITUTED BENZENE1 | 1 | 1 | UG/L | J |
| | 10.94 | SUBSTITUTED BENZENE2 | 1 | 0.98 | UG/L | J |
| | 11.46 | SUBSTITUTED BENZENE3 | 1 | 1.2 | UG/L | J |
| | 11.62 | ETHYLDIMETHYLBENZENE1 | 1 | 0.8 | UG/L | J |
| | 11.71 | SUBSTITUTED BENZENE4 | 1 | 1.2 | UG/L | J |
| | 12.30 | SUBSTITUTED BENZENE5 | 1 | 1.7 | UG/L | J |
| 119-64-2 | 12.44 | 1,2,3,4-TETRAHYDRO-NAPHTHALENE | 1 | 0.79 | UG/L | J |
| | 12.60 | SUBSTITUTED BENZENE6 | 1 | 1 | UG/L | J |
| | 12.67 | 2,3-DIHYDRO-1,1-DIMETHYL-1H-INDENE | 1 | 1 | UG/L | J |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Laboratory Control Sample and Laboratory Control Sample Duplicate

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3LCS

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 03/22/2018
**Date Analyzed:** 03/22/2018
**Prep Method:** SW5030C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80768

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Spike Added | LCS Result | Reporting Limit | Result Qualifier | LCS % Rec. | Control Limits |
|---|---|---|---|---|---|---|---|
| 110-54-3 | HEXANE | 10 | 9.87 | 1 | | 99 | 60 - 140% |
| 108-87-2 | METHYL CYCLOHEXANE | 10 | 11.1 | 1 | | 111 | 60 - 140% |
| 71-36-3 | N-BUTANOL | 500 | 399 | 50 | | 80 | 50 - 150% |
| 75-65-0 | TERT-BUTANOL | 500 | 463 | 50 | | 93 | 50 - 150% |
| 75-71-8 | DICHLORODIFLUOROMETHANE | 10 | 10.8 | 1 | | 108 | 63 - 125% |
| 74-87-3 | CHLOROMETHANE | 10 | 10.1 | 1 | | 101 | 73 - 122% |
| 75-01-4 | VINYL CHLORIDE | 10 | 11.6 | 1 | | 116 | 72 - 123% |
| 74-83-9 | BROMOMETHANE | 10 | 9.71 | 1 | | 97 | 68 - 123% |
| 75-00-3 | CHLOROETHANE | 10 | 11.1 | 1 | | 111 | 74 - 124% |
| 75-69-4 | TRICHLOROFLUOROMETHANE | 10 | 11.8 | 1 | | 118 | 74 - 124% |
| 75-35-4 | 1,1-DICHLOROETHENE | 10 | 11.1 | 1 | | 111 | 77 - 119% |
| 76-13-1 | 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETH | 10 | 11.5 | 1 | | 115 | 79 - 122% |
| 67-64-1 | ACETONE | 40 | 40.9 | 10 | | 102 | 62 - 142% |
| 74-88-4 | IODOMETHANE | 10 | 9.25 | 1 | | 92 | 72 - 126% |
| 75-15-0 | CARBON DISULFIDE | 10 | 10.9 | 1 | | 109 | 76 - 121% |
| 75-09-2 | METHYLENE CHLORIDE | 10 | 9.76 | 1 | | 98 | 71 - 130% |
| 156-60-5 | TRANS-1,2-DICHLOROETHENE | 10 | 11 | 1 | | 110 | 82 - 117% |
| 1634-04-4 | METHYL TERTIARY BUTYL ETHER | 20 | 19.6 | 1 | | 98 | 77 - 119% |
| 75-34-3 | 1,1-DICHLOROETHANE | 10 | 10.4 | 1 | | 104 | 83 - 119% |
| 108-05-4 | VINYL ACETATE | 10 | 8.98 | 2 | | 90 | 76 - 121% |
| 156-59-2 | CIS-1,2-DICHLOROETHENE | 10 | 10.5 | 1 | | 105 | 83 - 117% |
| 78-93-3 | 2-BUTANONE | 40 | 35.9 | 10 | | 90 | 70 - 135% |
| 74-97-5 | BROMOCHLOROMETHANE | 10 | 11.2 | 1 | | 112 | 83 - 121% |
| 67-66-3 | CHLOROFORM | 10 | 10.7 | 1 | | 107 | 82 - 119% |
| 71-55-6 | 1,1,1-TRICHLOROETHANE | 10 | 11.3 | 1 | | 113 | 80 - 120% |
| 594-20-7 | 2,2-DICHLOROPROPANE | 10 | 11.2 | 1 | | 112 | 83 - 125% |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Laboratory Control Sample and Laboratory Control Sample Duplicate

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3LCS

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 03/22/2018
**Date Analyzed:** 03/22/2018
**Prep Method:** SW5030C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80768

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Spike Added | LCS Result | Reporting Limit | Result Qualifier | LCS % Rec. | Control Limits |
|---|---|---|---|---|---|---|---|
| 110-82-7 | CYCLOHEXANE | 20 | 21.2 | 1 | | 106 | 60 - 140% |
| 56-23-5 | CARBON TETRACHLORIDE | 10 | 11.2 | 1 | | 112 | 77 - 122% |
| 563-58-6 | 1,1-DICHLOROPROPENE | 10 | 10.5 | 1 | | 105 | 84 - 118% |
| 107-06-2 | 1,2-DICHLOROETHANE | 10 | 11 | 1 | | 110 | 74 - 128% |
| 71-43-2 | BENZENE | 10 | 10.3 | 1 | | 103 | 83 - 117% |
| 79-01-6 | TRICHLOROETHENE | 10 | 11.2 | 1 | | 112 | 83 - 117% |
| 78-87-5 | 1,2-DICHLOROPROPANE | 10 | 10.2 | 1 | | 102 | 84 - 120% |
| 74-95-3 | DIBROMOMETHANE | 10 | 11.1 | 1 | | 111 | 79 - 122% |
| 75-27-4 | BROMODICHLOROMETHANE | 10 | 10.2 | 1 | | 102 | 76 - 122% |
| 10061-01-5 | CIS-1,3-DICHLOROPROPENE | 10 | 9.86 | 1 | | 99 | 81 - 120% |
| 108-10-1 | 4-METHYL-2-PENTANONE | 40 | 36.9 | 10 | | 92 | 73 - 125% |
| 108-88-3 | TOLUENE | 10 | 10.7 | 1 | | 107 | 82 - 113% |
| 10061-02-6 | TRANS-1,3-DICHLOROPROPENE | 10 | 10.4 | 1 | | 104 | 81 - 114% |
| 79-00-5 | 1,1,2-TRICHLOROETHANE | 10 | 10.2 | 1 | | 102 | 78 - 116% |
| 591-78-6 | 2-HEXANONE | 40 | 38.4 | 10 | | 96 | 71 - 124% |
| 127-18-4 | TETRACHLOROETHENE | 10 | 11.5 | 1 | | 115 | 84 - 117% |
| 142-28-9 | 1,3-DICHLOROPROPANE | 10 | 10.2 | 1 | | 102 | 80 - 115% |
| 124-48-1 | DIBROMOCHLOROMETHANE | 10 | 10.3 | 1 | | 103 | 82 - 118% |
| 106-93-4 | 1,2-DIBROMOETHANE | 10 | 11.1 | 1 | | 111 | 79 - 114% |
| 544-10-5 | 1-CHLOROHEXANE | 10 | 10.3 | 1 | | 103 | 80 - 117% |
| 108-90-7 | CHLOROBENZENE | 10 | 11 | 1 | | 110 | 81 - 113% |
| 630-20-6 | 1,1,1,2-TETRACHLOROETHANE | 10 | 11.7 | 1 | * | 117 | 78 - 113% |
| 100-41-4 | ETHYLBENZENE | 10 | 11.2 | 1 | | 112 | 81 - 113% |
| 179601-23- | M+P-XYLENE | 20 | 21.6 | 1 | | 108 | 82 - 115% |
| 95-47-6 | O-XYLENE | 10 | 10.5 | 1 | | 105 | 81 - 115% |
| 100-42-5 | STYRENE | 10 | 10.4 | 1 | | 104 | 78 - 118% |
| 75-25-2 | BROMOFORM | 10 | 10.1 | 1 | | 101 | 70 - 120% |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Laboratory Control Sample and Laboratory Control Sample Duplicate

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3LCS

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 03/22/2018
**Date Analyzed:** 03/22/2018
**Prep Method:** SW5030C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80768

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Spike Added | LCS Result | Reporting Limit | Result Qualifier | LCS % Rec. | Control Limits |
|---|---|---|---|---|---|---|---|
| 98-82-8 | ISOPROPYLBENZENE | 10 | 11.4 | 1 | * | 114 | 80 - 113% |
| 96-18-4 | 1,2,3-TRICHLOROPROPANE | 10 | 9.63 | 1 | | 96 | 78 - 117% |
| 79-34-5 | 1,1,2,2-TETRACHLOROETHANE | 10 | 9.19 | 1 | | 92 | 75 - 121% |
| 108-86-1 | BROMOBENZENE | 10 | 10.7 | 1 | | 107 | 81 - 114% |
| 103-65-1 | N-PROPYLBENZENE | 10 | 10.2 | 1 | | 102 | 79 - 116% |
| 95-49-8 | 2-CHLOROTOLUENE | 10 | 10.3 | 1 | | 103 | 79 - 116% |
| 108-67-8 | 1,3,5-TRIMETHYLBENZENE | 10 | 10.6 | 1 | | 106 | 78 - 116% |
| 106-43-4 | 4-CHLOROTOLUENE | 10 | 10.6 | 1 | | 106 | 78 - 115% |
| 98-06-6 | TERT-BUTYLBENZENE | 10 | 10.1 | 1 | | 101 | 76 - 120% |
| 95-63-6 | 1,2,4-TRIMETHYLBENZENE | 10 | 9.69 | 1 | | 97 | 80 - 117% |
| 135-98-8 | SEC-BUTYLBENZENE | 10 | 10.5 | 1 | | 105 | 78 - 115% |
| 541-73-1 | 1,3-DICHLOROBENZENE | 10 | 10.8 | 1 | | 108 | 79 - 115% |
| 99-87-6 | P-ISOPROPYLTOLUENE | 10 | 10.8 | 1 | | 108 | 77 - 116% |
| 106-46-7 | 1,4-DICHLOROBENZENE | 10 | 10.8 | 1 | | 108 | 82 - 114% |
| 104-51-8 | N-BUTYLBENZENE | 10 | 11.2 | 1 | | 112 | 79 - 117% |
| 95-50-1 | 1,2-DICHLOROBENZENE | 10 | 10.7 | 1 | | 107 | 82 - 114% |
| 96-12-8 | 1,2-DIBROMO-3-CHLOROPROPANE | 10 | 9.19 | 2 | | 92 | 73 - 125% |
| 120-82-1 | 1,2,4-TRICHLOROBENZENE | 10 | 11.2 | 1 | | 112 | 75 - 120% |
| 87-68-3 | HEXACHLOROBUTADIENE | 10 | 11.8 | 1 | | 118 | 71 - 124% |
| 91-20-3 | NAPHTHALENE | 10 | 10.2 | 1 | | 102 | 71 - 131% |
| 87-61-6 | 1,2,3-TRICHLOROBENZENE | 10 | 11.1 | 1 | | 111 | 70 - 131% |
| 123-91-1 | 1,4-DIOXANE | 200 | 214 | 100 | | 107 | 50 - 150% |
| 64-17-5 | ETHANOL | 200 | 186 | 40 | | 93 | 50 - 150% |
| 78-83-1 | ISOBUTYL ALCOHOL | 200 | 167 | 40 | | 84 | 50 - 150% |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Laboratory Control Sample and Laboratory Control Sample Duplicate

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3LCSD

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 03/22/2018
**Date Analyzed:** 03/22/2018
**Prep Method:** SW5030C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80769

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Spike Added | LCSD Result | Reporting Limit | Result Qualifier | LCSD % Rec. | RPD Limit | RPD |
|---|---|---|---|---|---|---|---|---|
| 110-54-3 | HEXANE | 10 | 9.11 | 1 | | 91 | 30 | 8 |
| 108-87-2 | METHYL CYCLOHEXANE | 10 | 10.2 | 1 | | 102 | 30 | 9 |
| 71-36-3 | N-BUTANOL | 500 | 399 | 50 | | 80 | 30 | 0 |
| 75-65-0 | TERT-BUTANOL | 500 | 483 | 50 | | 97 | 30 | 4 |
| 75-71-8 | DICHLORODIFLUOROMETHANE | 10 | 10.1 | 1 | | 101 | 20 | 7 |
| 74-87-3 | CHLOROMETHANE | 10 | 9.89 | 1 | | 99 | 20 | 2 |
| 75-01-4 | VINYL CHLORIDE | 10 | 11.2 | 1 | | 112 | 20 | 3 |
| 74-83-9 | BROMOMETHANE | 10 | 9.39 | 1 | | 94 | 20 | 3 |
| 75-00-3 | CHLOROETHANE | 10 | 10.2 | 1 | | 102 | 20 | 8 |
| 75-69-4 | TRICHLOROFLUOROMETHANE | 10 | 10.7 | 1 | | 107 | 20 | 10 |
| 75-35-4 | 1,1-DICHLOROETHENE | 10 | 10.2 | 1 | | 102 | 20 | 8 |
| 76-13-1 | 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETH | 10 | 10.6 | 1 | | 106 | 20 | 8 |
| 67-64-1 | ACETONE | 40 | 40.6 | 10 | | 101 | 30 | 1 |
| 74-88-4 | IODOMETHANE | 10 | 8.98 | 1 | | 90 | 20 | 3 |
| 75-15-0 | CARBON DISULFIDE | 10 | 10.2 | 1 | | 102 | 20 | 6 |
| 75-09-2 | METHYLENE CHLORIDE | 10 | 9.46 | 1 | | 95 | 20 | 3 |
| 156-60-5 | TRANS-1,2-DICHLOROETHENE | 10 | 10.2 | 1 | | 102 | 20 | 8 |
| 1634-04-4 | METHYL TERTIARY BUTYL ETHER | 20 | 18.8 | 1 | | 94 | 20 | 4 |
| 75-34-3 | 1,1-DICHLOROETHANE | 10 | 10.1 | 1 | | 101 | 20 | 3 |
| 108-05-4 | VINYL ACETATE | 10 | 8.71 | 2 | | 87 | 20 | 3 |
| 156-59-2 | CIS-1,2-DICHLOROETHENE | 10 | 10.2 | 1 | | 102 | 20 | 2 |
| 78-93-3 | 2-BUTANONE | 40 | 35.4 | 10 | | 88 | 30 | 1 |
| 74-97-5 | BROMOCHLOROMETHANE | 10 | 10.3 | 1 | | 103 | 20 | 9 |
| 67-66-3 | CHLOROFORM | 10 | 10.1 | 1 | | 101 | 20 | 6 |
| 71-55-6 | 1,1,1-TRICHLOROETHANE | 10 | 10.5 | 1 | | 105 | 20 | 7 |
| 594-20-7 | 2,2-DICHLOROPROPANE | 10 | 10.5 | 1 | | 105 | 20 | 6 |
| 110-82-7 | CYCLOHEXANE | 20 | 19.5 | 1 | | 97 | 30 | 8 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Laboratory Control Sample and Laboratory Control Sample Duplicate

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3LCSD

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 03/22/2018
**Date Analyzed:** 03/22/2018
**Prep Method:** SW5030C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80769

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Spike Added | LCSD Result | Reporting Limit | Result Qualifier | LCSD % Rec. | RPD Limit | RPD |
|---|---|---|---|---|---|---|---|---|
| 56-23-5 | CARBON TETRACHLORIDE | 10 | 10.1 | 1 | | 101 | 20 | 10 |
| 563-58-6 | 1,1-DICHLOROPROPENE | 10 | 9.64 | 1 | | 96 | 20 | 8 |
| 107-06-2 | 1,2-DICHLOROETHANE | 10 | 10 | 1 | | 100 | 20 | 9 |
| 71-43-2 | BENZENE | 10 | 9.49 | 1 | | 95 | 20 | 9 |
| 79-01-6 | TRICHLOROETHENE | 10 | 10.6 | 1 | | 106 | 20 | 5 |
| 78-87-5 | 1,2-DICHLOROPROPANE | 10 | 9.8 | 1 | | 98 | 20 | 4 |
| 74-95-3 | DIBROMOMETHANE | 10 | 10.2 | 1 | | 102 | 20 | 8 |
| 75-27-4 | BROMODICHLOROMETHANE | 10 | 9.83 | 1 | | 98 | 20 | 4 |
| 10061-01-5 | CIS-1,3-DICHLOROPROPENE | 10 | 9.76 | 1 | | 98 | 20 | 1 |
| 108-10-1 | 4-METHYL-2-PENTANONE | 40 | 37.9 | 10 | | 95 | 30 | 2 |
| 108-88-3 | TOLUENE | 10 | 9.3 | 1 | | 93 | 20 | 14 |
| 10061-02-6 | TRANS-1,3-DICHLOROPROPENE | 10 | 9.27 | 1 | | 93 | 20 | 11 |
| 79-00-5 | 1,1,2-TRICHLOROETHANE | 10 | 9.54 | 1 | | 95 | 20 | 7 |
| 591-78-6 | 2-HEXANONE | 40 | 35.1 | 10 | | 88 | 30 | 9 |
| 127-18-4 | TETRACHLOROETHENE | 10 | 10.5 | 1 | | 105 | 20 | 9 |
| 142-28-9 | 1,3-DICHLOROPROPANE | 10 | 9.37 | 1 | | 94 | 20 | 8 |
| 124-48-1 | DIBROMOCHLOROMETHANE | 10 | 9.39 | 1 | | 94 | 20 | 9 |
| 106-93-4 | 1,2-DIBROMOETHANE | 10 | 10.1 | 1 | | 101 | 20 | 9 |
| 544-10-5 | 1-CHLOROHEXANE | 10 | 9.26 | 1 | | 93 | 20 | 10 |
| 108-90-7 | CHLOROBENZENE | 10 | 10.1 | 1 | | 101 | 20 | 8 |
| 630-20-6 | 1,1,1,2-TETRACHLOROETHANE | 10 | 10.3 | 1 | | 103 | 20 | 13 |
| 100-41-4 | ETHYLBENZENE | 10 | 9.98 | 1 | | 100 | 20 | 12 |
| 179601-23- | M+P-XYLENE | 20 | 19.6 | 1 | | 98 | 20 | 10 |
| 95-47-6 | O-XYLENE | 10 | 9.82 | 1 | | 98 | 20 | 7 |
| 100-42-5 | STYRENE | 10 | 9.88 | 1 | | 99 | 20 | 5 |
| 75-25-2 | BROMOFORM | 10 | 9.1 | 1 | | 91 | 20 | 11 |
| 98-82-8 | ISOPROPYLBENZENE | 10 | 10.3 | 1 | | 103 | 20 | 10 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Laboratory Control Sample and Laboratory Control Sample Duplicate

**Lab Name:** ALS -- Fort Collins
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

**Lab ID:** VL180322-3LCSD

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** N/A
**Date Extracted:** 03/22/2018
**Date Analyzed:** 03/22/2018
**Prep Method:** SW5030C

**Prep Batch:** VL180322-3
**QCBatchID:** VL180322-3-3
**Run ID:** VL180322-3A
**Cleanup:** NONE
**Basis:** N/A
**File Name:** C80769

**Sample Aliquot:** 10 ml
**Final Volume:** 10 ml
**Result Units:** UG/L
**Clean DF:** 1

| CASNO | Target Analyte | Spike Added | LCSD Result | Reporting Limit | Result Qualifier | LCSD % Rec. | RPD Limit | RPD |
|---|---|---|---|---|---|---|---|---|
| 96-18-4 | 1,2,3-TRICHLOROPROPANE | 10 | 9.42 | 1 | | 94 | 20 | 2 |
| 79-34-5 | 1,1,2,2-TETRACHLOROETHANE | 10 | 8.91 | 1 | | 89 | 20 | 3 |
| 108-86-1 | BROMOBENZENE | 10 | 9.9 | 1 | | 99 | 20 | 8 |
| 103-65-1 | N-PROPYLBENZENE | 10 | 9.67 | 1 | | 97 | 20 | 6 |
| 95-49-8 | 2-CHLOROTOLUENE | 10 | 9.89 | 1 | | 99 | 20 | 4 |
| 108-67-8 | 1,3,5-TRIMETHYLBENZENE | 10 | 9.79 | 1 | | 98 | 20 | 8 |
| 106-43-4 | 4-CHLOROTOLUENE | 10 | 10.1 | 1 | | 101 | 20 | 6 |
| 98-06-6 | TERT-BUTYLBENZENE | 10 | 9.42 | 1 | | 94 | 20 | 7 |
| 95-63-6 | 1,2,4-TRIMETHYLBENZENE | 10 | 9.78 | 1 | | 98 | 20 | 1 |
| 135-98-8 | SEC-BUTYLBENZENE | 10 | 9.8 | 1 | | 98 | 20 | 7 |
| 541-73-1 | 1,3-DICHLOROBENZENE | 10 | 10.2 | 1 | | 102 | 20 | 6 |
| 99-87-6 | P-ISOPROPYLTOLUENE | 10 | 9.82 | 1 | | 98 | 20 | 9 |
| 106-46-7 | 1,4-DICHLOROBENZENE | 10 | 10.1 | 1 | | 101 | 20 | 6 |
| 104-51-8 | N-BUTYLBENZENE | 10 | 10.2 | 1 | | 102 | 20 | 10 |
| 95-50-1 | 1,2-DICHLOROBENZENE | 10 | 9.97 | 1 | | 100 | 20 | 7 |
| 96-12-8 | 1,2-DIBROMO-3-CHLOROPROPANE | 10 | 9.11 | 2 | | 91 | 20 | 1 |
| 120-82-1 | 1,2,4-TRICHLOROBENZENE | 10 | 10.6 | 1 | | 106 | 20 | 6 |
| 87-68-3 | HEXACHLOROBUTADIENE | 10 | 11 | 1 | | 110 | 20 | 6 |
| 91-20-3 | NAPHTHALENE | 10 | 9.7 | 1 | | 97 | 20 | 5 |
| 87-61-6 | 1,2,3-TRICHLOROBENZENE | 10 | 10.8 | 1 | | 108 | 20 | 3 |
| 123-91-1 | 1,4-DIOXANE | 200 | 180 | 100 | | 90 | 30 | 17 |
| 64-17-5 | ETHANOL | 200 | 191 | 40 | | 95 | 30 | 2 |
| 78-83-1 | ISOBUTYL ALCOHOL | 200 | 169 | 40 | | 85 | 30 | 1 |

**Data Package ID:** *VL1803374-1*

# GC/MS Volatiles

## Method SW8260_25C

## Laboratory Control Sample and Laboratory Control Sample Duplicate

**Lab Name:** **ALS -- Fort Collins**
**Work Order Number:** 1803374
**Client Name:** COGCC
**ClientProject ID:** Complaint 200444807

### Surrogate Recovery LCS/LCSD

| CASNO | Target Analyte | Spike Added | LCS % Rec. | LCS Flag | LCSD % Rec. | LCSD Flag | Control Limits |
|---|---|---|---|---|---|---|---|
| 460-00-4 | 4-BROMOFLUOROBENZENE | 25 | 95 | | 93 | | 85 - 115 |
| 1868-53-7 | DIBROMOFLUOROMETHANE | 25 | 106 | | 106 | | 84 - 115 |
| 2037-26-5 | TOLUENE-D8 | 25 | 101 | | 100 | | 85 - 115 |

**Data Package ID:** *VL1803374-1*

Quantitation Report (QT Reviewed)

Data File : C:\HPCHEM\1\DATA\2018\032218\C80771.D Vial: 7
Acq On : 22 Mar 2018 10:19 am Operator: JK-sop525r16
Sample : VL180322-3MB Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 22 10:37 2018 Quant Results File: 022118W.RES

Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration
DataAcq Meth : 022118W

| Internal Standards | R.T. | QIon | Response | Conc | Units | Dev(Min) |
|---|---|---|---|---|---|---|
| 1) Fluorobenzene | 5.16 | 96 | 1399842 | 25.00 | ppb | 0.00 |
| 58) Chlorobenzene-d5 | 8.78 | 82 | 555347 | 25.00 | ppb | 0.00 |
| 78) 1,4-Dichlorobenzene-d4 | 11.03 | 152 | 345384 | 25.00 | ppb | 0.00 |
| **System Monitoring Compounds** | | | | | | |
| 37) Dibromofluoromethane | 4.42 | 113 | 365489 | 25.00 | ppb | -0.01 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 100.00% | | | |
| 42) 1,2-dichloroethane-d4 | 4.80 | 65 | 352043 | 24.19 | ppb | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 96.76% | | | |
| 59) Toluene-d8 | 7.03 | 98 | 1125349 | 24.43 | ppb | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 97.72% | | | |
| 79) 4-Bromofluorobenzene | 9.99 | 95 | 392953 | 24.28 | ppb | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 97.12% | | | |

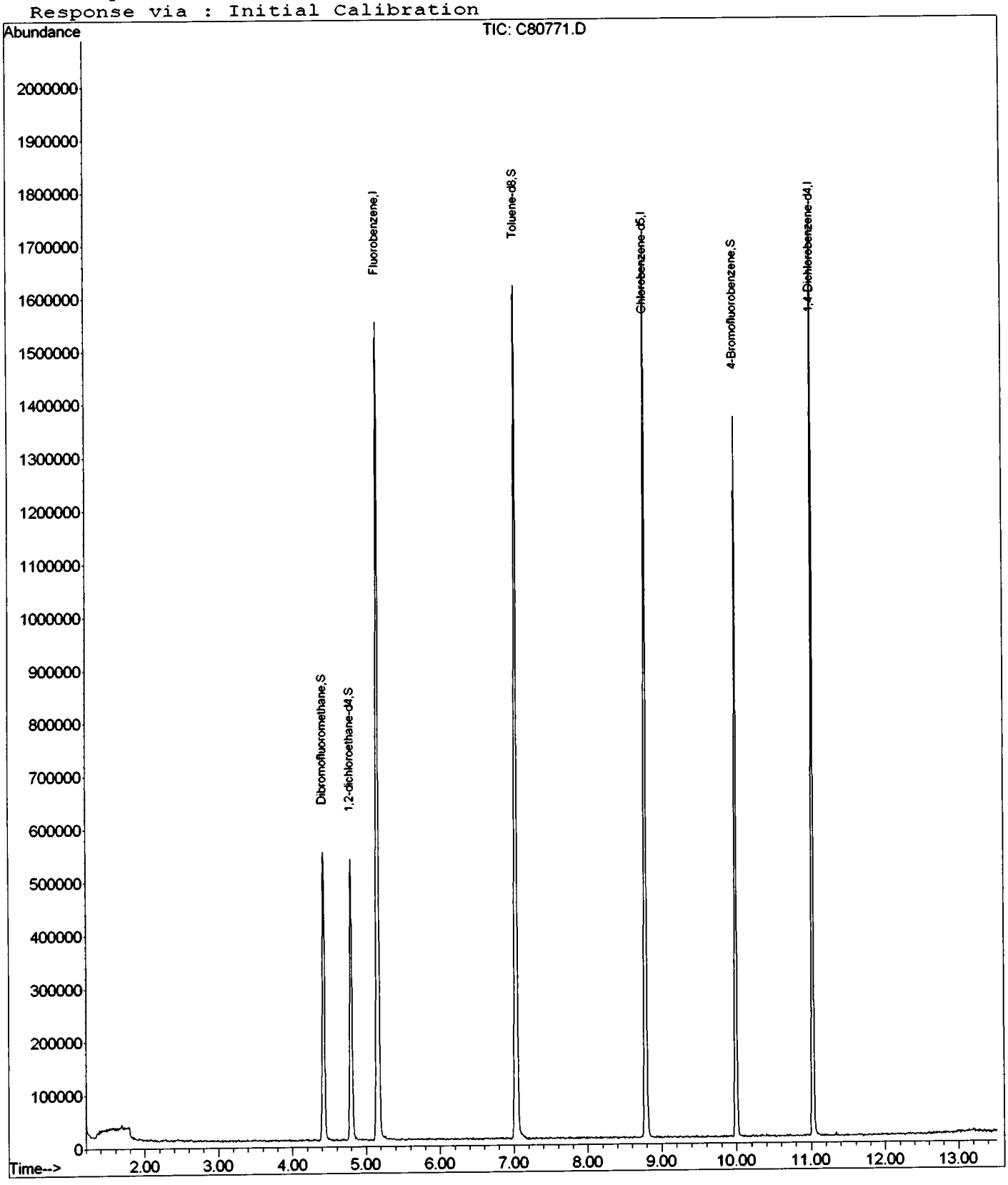
Target Compounds Qvalue

(#) = qualifier out of range (m) = manual integration
C80771.D 022118W.M Thu Mar 22 10:37:15 2018 3/23-18 Page 1

Quantitation Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80771.D  Vial: 7
Acq On : 22 Mar 2018 10:19 am  Operator: JK-sop525r16
Sample : VL180322-3MB  Inst : CSS Instr
Misc : 8260 - 10mL water  Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 22 10:37 2018  Quant Results File: 022118W.RES

Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration



Tentatively Identified Compound (LSC) summary

Operator ID: JK-sop525r16 Date Acquired: 22 Mar 2018 10:19 am
Data File: C:\HPCHEM\1\DATA\2018\032218\C80771.D
Name: VL180322-3MB
Misc: 8260 - 10mL water
Method: C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title: HPV3 - GC/MS Volatiles (S.O.P. 525)
Library Searched: C:\DATABASE\NIST129k.l

| TIC Top Hit name | RT | EstConc | Units | Area | IntStd | ISRT | ISArea | ISConc |
|---|---|---|---|---|---|---|---|---|

C80771.D 022118W.M Fri Mar 23 14:52:24 2018

Quantitation Report (QT Reviewed)

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D Vial: 32
Acq On : 22 Mar 2018 6:52 pm Operator: JK-sop525r16
Sample : 1813374-1 JK 3-26-18 Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 23 7:42 2018 Quant Results File: 022118W.RES

Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration
DataAcq Meth : 022118W

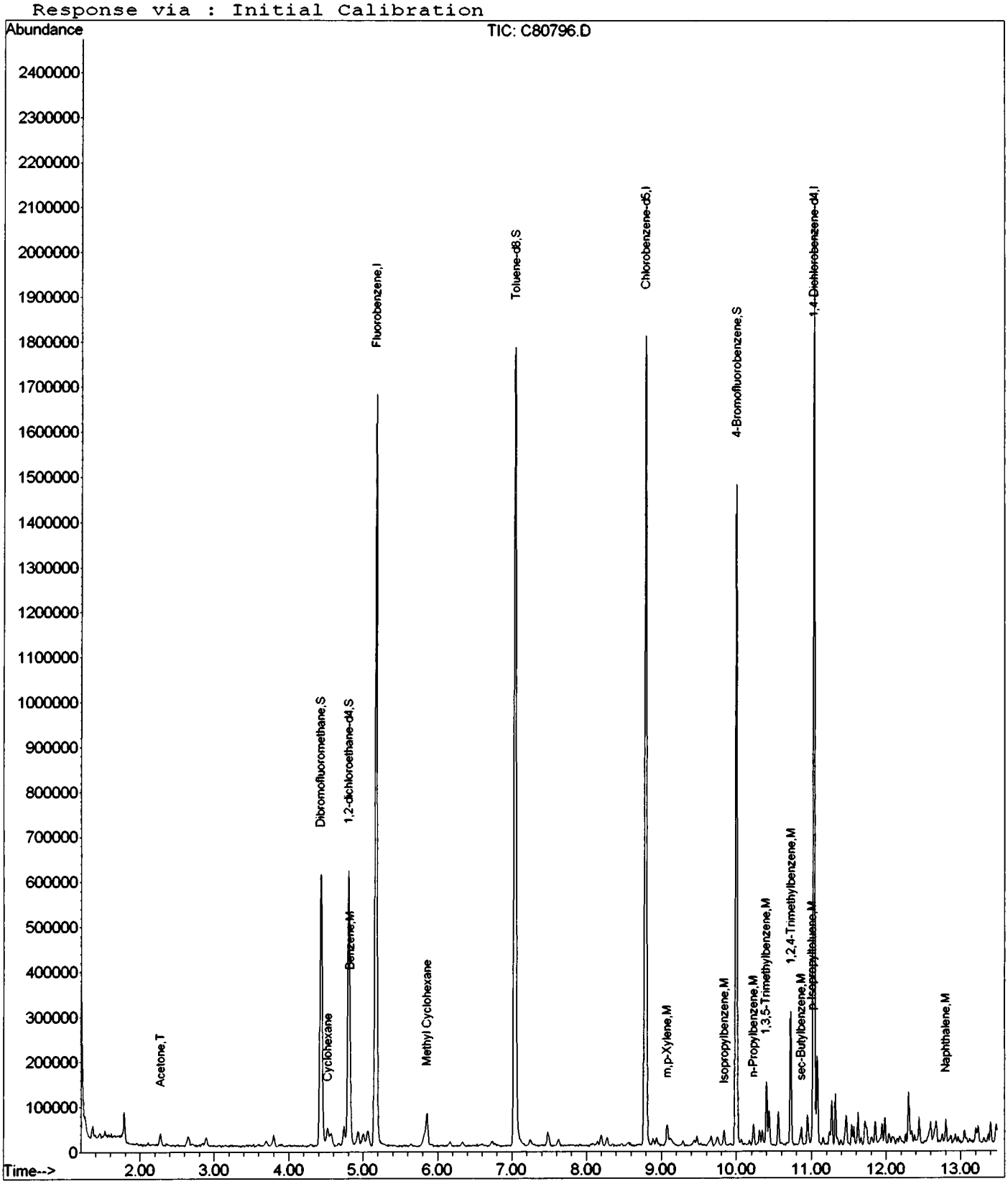
| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Fluorobenzene | 5.17 | 96 | 1499042 | 25.00 | ppb | | 0.00 |
| 58) Chlorobenzene-d5 | 8.78 | 82 | 601970 | 25.00 | ppb | | 0.00 |
| 78) 1,4-Dichlorobenzene-d4 | 11.03 | 152 | 389906 | 25.00 | ppb | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 37) Dibromofluoromethane | 4.42 | 113 | 395035 | 25.24 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 100.96% | | | | |
| 42) 1,2-dichloroethane-d4 | 4.80 | 65 | 400073 | 25.67 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 102.68% | | | | |
| 59) Toluene-d8 | 7.04 | 98 | 1244618 | 24.92 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 99.68% | | | | |
| 79) 4-Bromofluorobenzene | 10.00 | 95 | 438914 | 24.02 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 96.08% | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 13) Acetone | 2.28 | 43 | 26601 | 5.68 | ppb | | 94 |
| 39) Cyclohexane | 4.52 | 84 | 14014 | 0.75 | ppb | # | 91 |
| 45) Benzene | 4.83 | 78 | 34798 | 0.54 | ppb | | 95 |
| 49) Methyl Cyclohexane | 5.86 | 55 | 37271 | 1.79 | ppb | | 99 |
| 73) m,p-Xylene | 9.08 | 106 | 12206 | 0.61 | ppb | | 84 |
| 77) Isopropylbenzene | 9.84 | 105 | 18753 | 0.41 | ppb | | 93 |
| 82) n-Propylbenzene | 10.23 | 91 | 33602 | 0.50 | ppb | | 93 |
| 85) 1,3,5-Trimethylbenzene | 10.40 | 105 | 59305 | 1.52 | ppb | | 99 |
| 89) 1,2,4-Trimethylbenzene | 10.73 | 105 | 124774 | 3.31 | ppb | | 99 |
| 90) sec-Butylbenzene | 10.87 | 105 | 20364 | 0.42 | ppb | | 95 |
| 91) p-Isopropyltoluene | 11.00 | 119 | 9979 | 0.31 | ppb | | 94 |
| 100) Naphthalene | 12.81 | 128 | 26276 | 1.20 | ppb | | 91 |

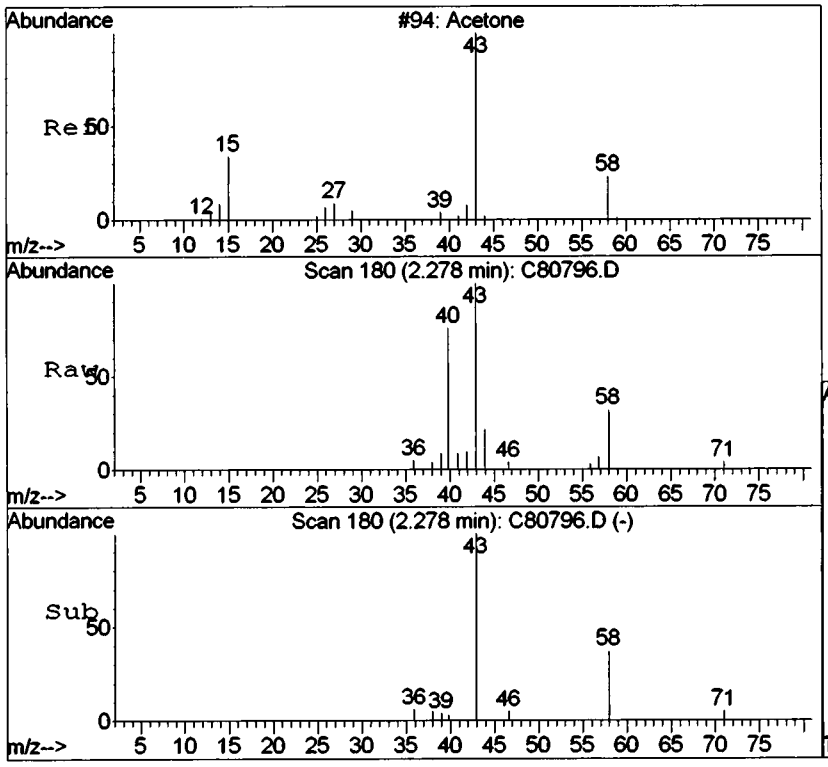
(#) = qualifier out of range (m) = manual integration

Quantitation Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D Vial: 32
Acq On : 22 Mar 2018 6:52 pm Operator: JK-sop525r16
Sample : 1813374-1 Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 23 7:42 2018 Quant Results File: 022118W.RES

Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration

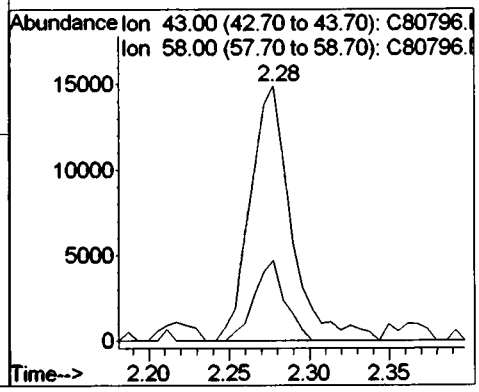


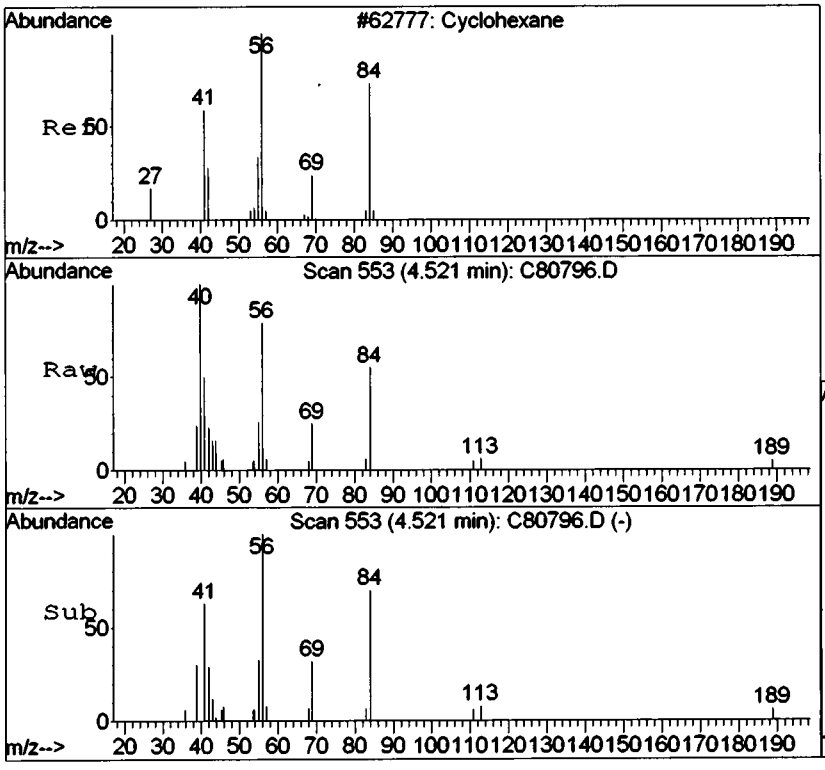



#13
Acetone
Concen: 5.68 ppb
RT: 2.28 min Scan# 180
Delta R.T. 0.01 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion: 43 Resp: 26601

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 43 | 100 | | |
| 58 | 31.5 | 0.0 | 176.5 |

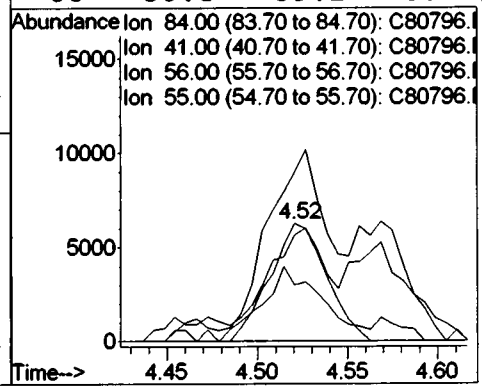


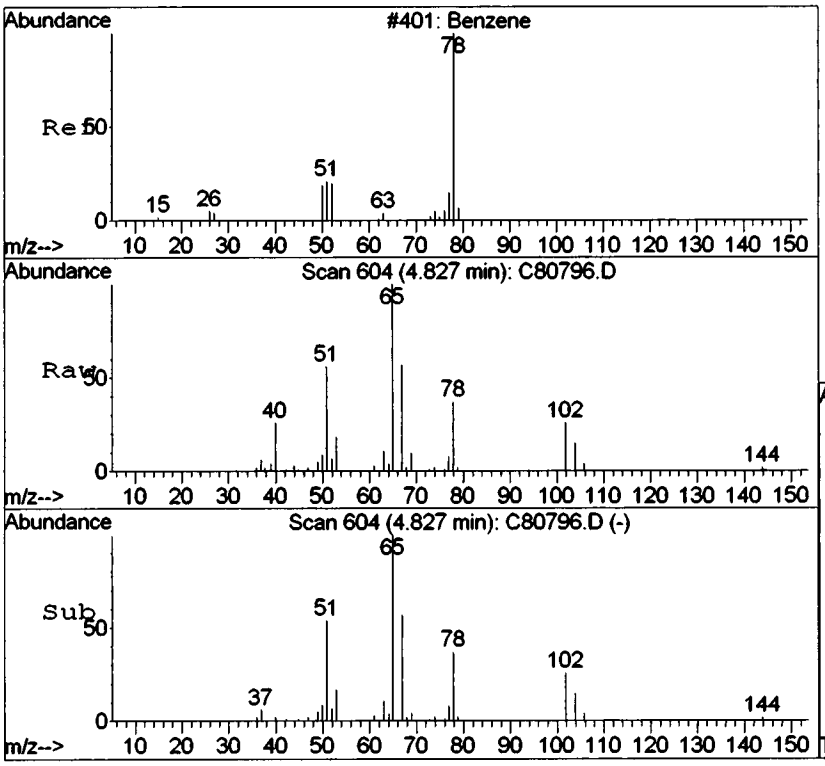




#39
Cyclohexane
Concen: 0.75 ppb
RT: 4.52 min Scan# 553
Delta R.T. -0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion: 84 Resp: 14014

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 84 | 100 | | |
| 41 | 69.7 | 66.0 | 99.0 |
| 56 | 132.2 | 109.4 | 164.2 |
| 55 | 38.3 | 39.2 | 58.8# |

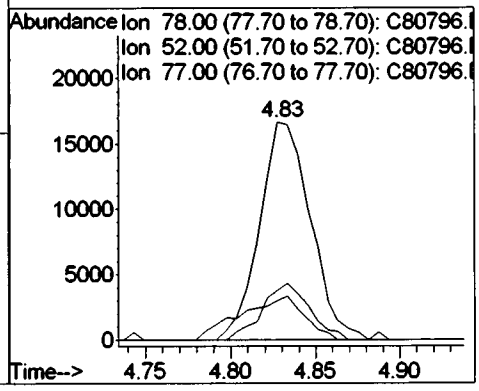


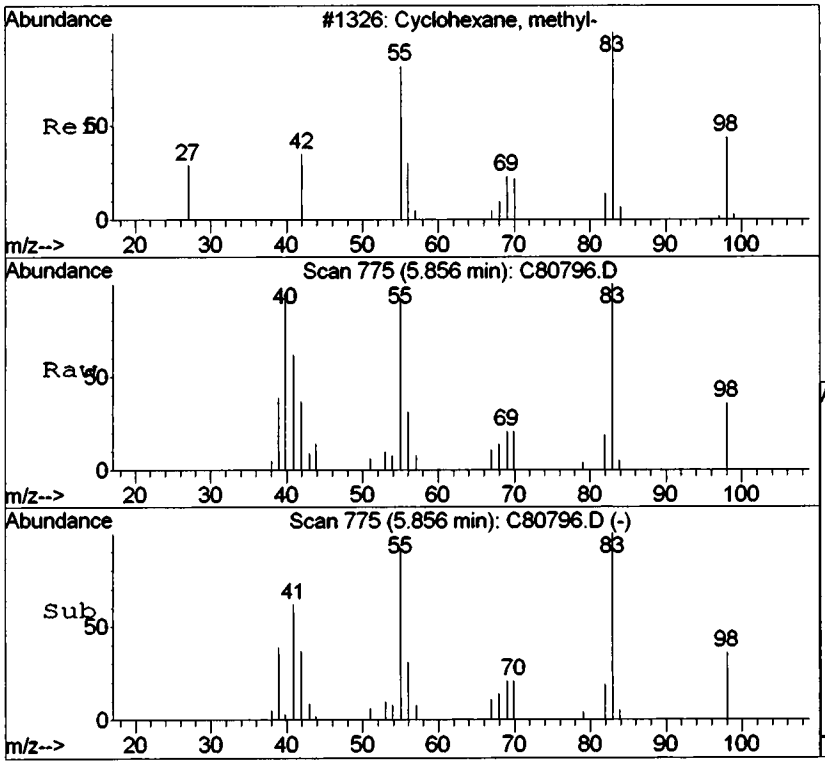



#45
Benzene
Concen: 0.54 ppb
RT: 4.83 min Scan# 604
Delta R.T. -0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion: 78 Resp: 34798

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 78 | 100 | | |
| 52 | 14.6 | 10.1 | 23.7 |
| 77 | 22.7 | 15.1 | 35.3 |

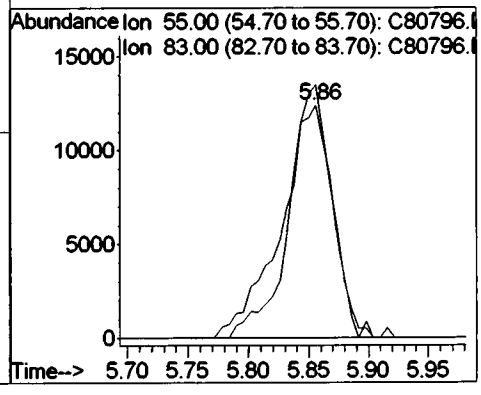


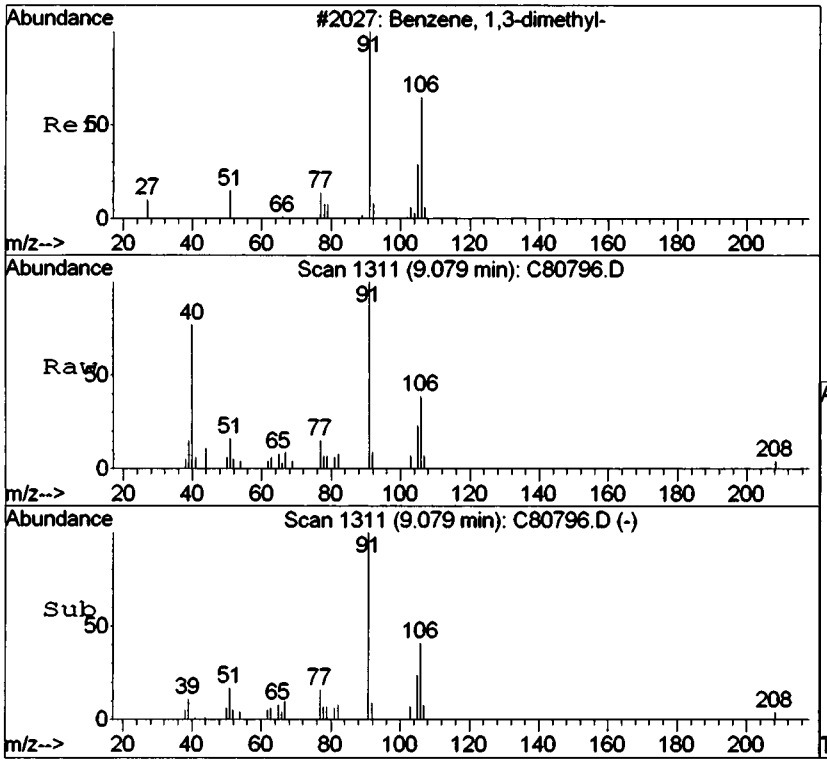




#49
Methyl Cyclohexane
Concen: 1.79 ppb
RT: 5.86 min Scan# 775
Delta R.T. 0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion: 55 Resp: 37271

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 55 | 100 | | |
| 83 | 108.6 | 64.7 | 151.1 |

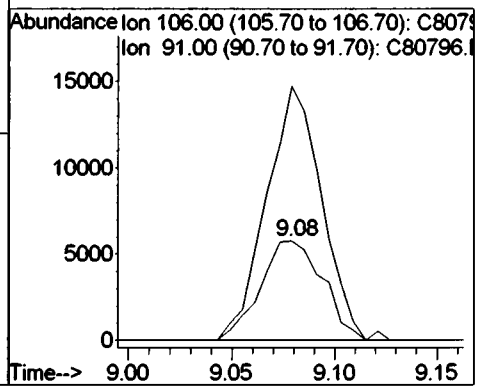


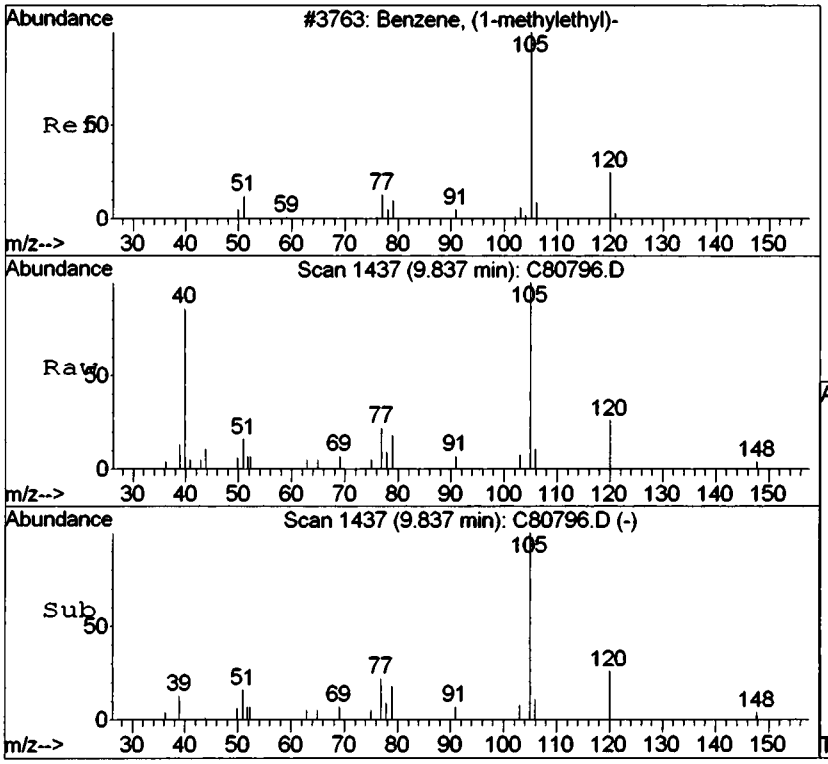



#73
m,p-Xylene
Concen: 0.61 ppb
RT: 9.08 min Scan# 1311
Delta R.T. -0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion:106 Resp: 12206

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 106 | 100 | | |
| 91 | 255.6 | 137.1 | 319.9 |

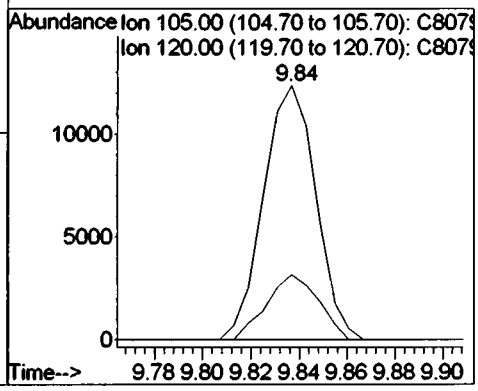


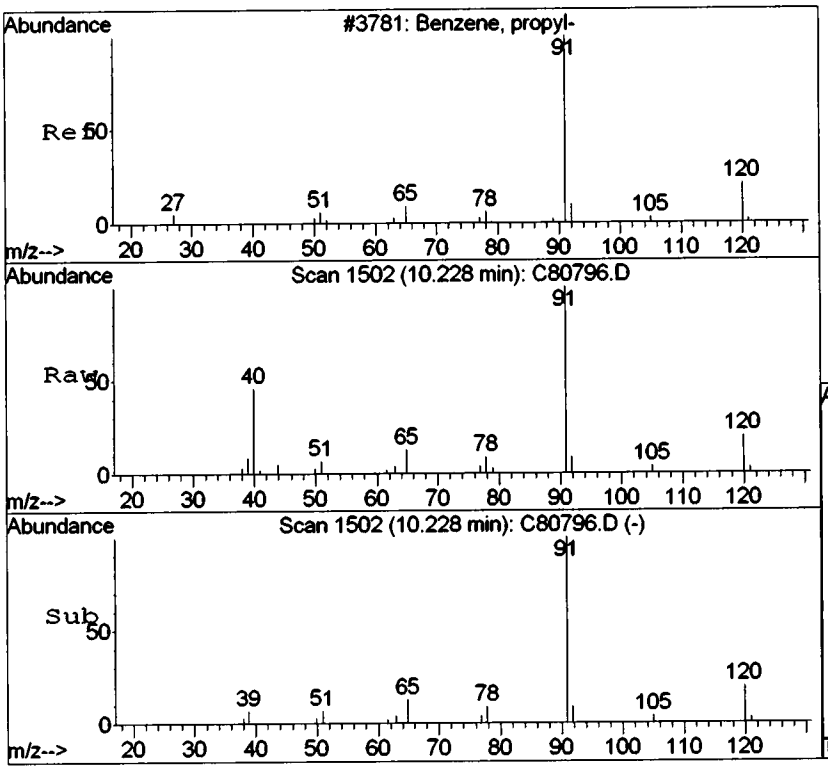




#77
Isopropylbenzene
Concen: 0.41 ppb
RT: 9.84 min Scan# 1437
Delta R.T. 0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion:105 Resp: 18753

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 105 | 100 | | |
| 120 | 25.8 | 13.5 | 31.5 |

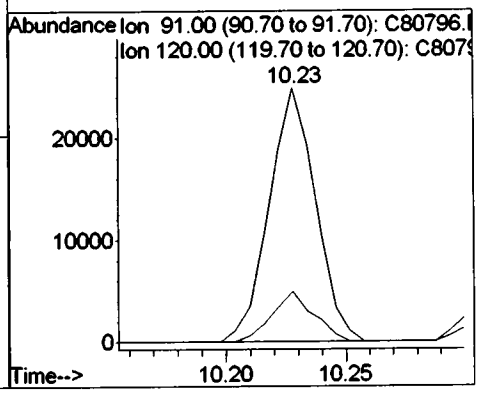


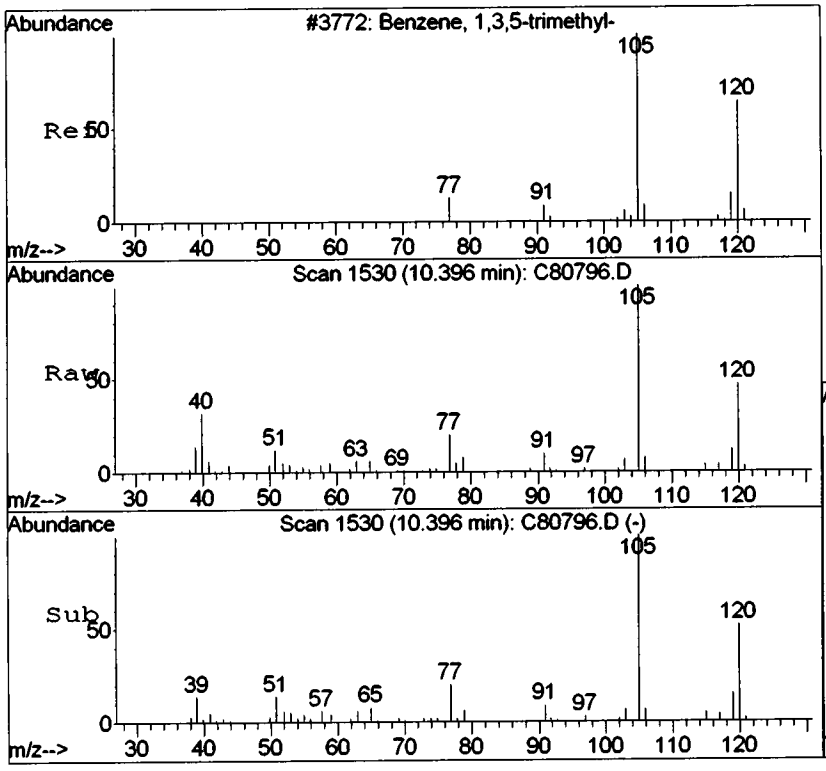



#82
n-Propylbenzene
Concen: 0.50 ppb
RT: 10.23 min Scan# 1502
Delta R.T. -0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion: 91 Resp: 33602

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 91 | 100 | | |
| 120 | 19.9 | 10.1 | 23.5 |

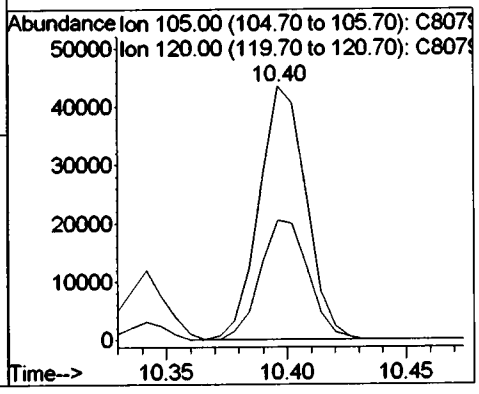


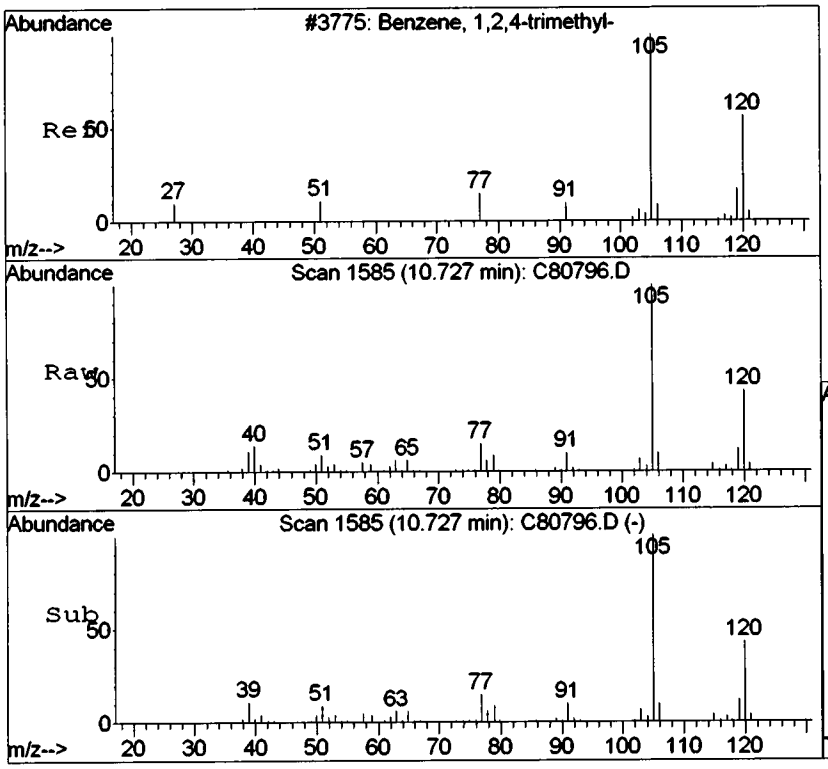




#85
1,3,5-Trimethylbenzene
Concen: 1.52 ppb
RT: 10.40 min Scan# 1530
Delta R.T. -0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion:105 Resp: 59305

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 105 | 100 | | |
| 120 | 47.1 | 27.8 | 65.0 |

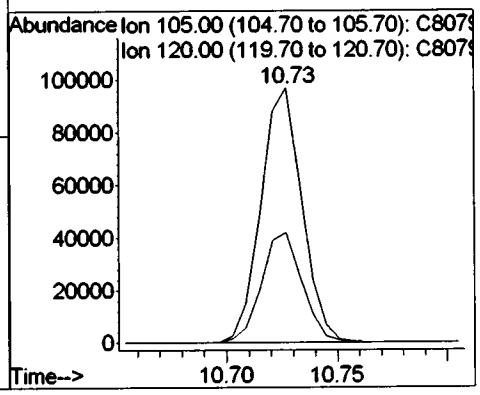


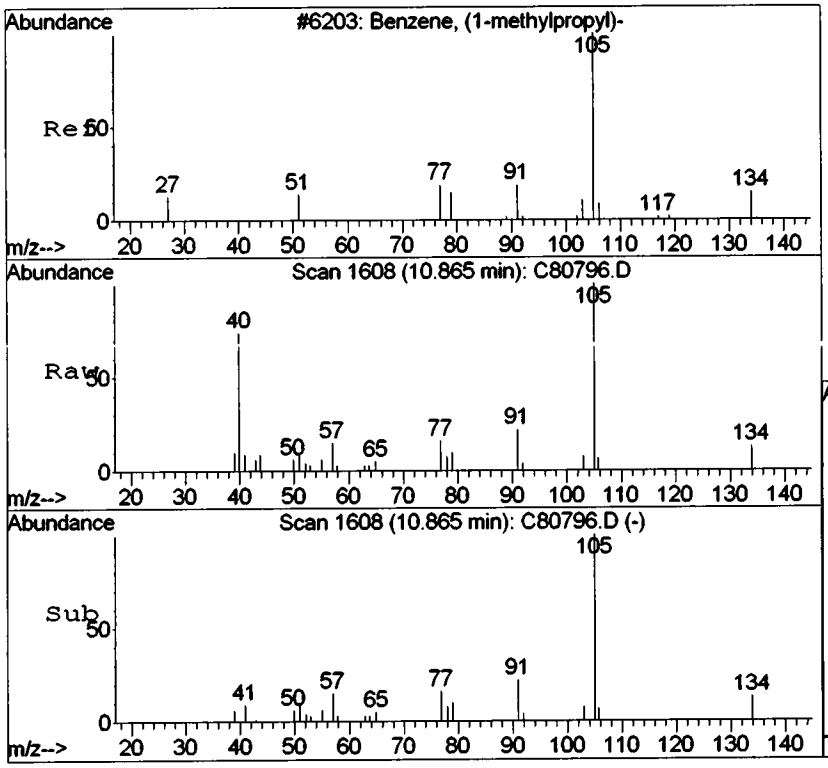



#89
1,2,4-Trimethylbenzene
Concen: 3.31 ppb
RT: 10.73 min Scan# 1585
Delta R.T. 0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion:105 Resp: 124774

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 105 | 100 | | |
| 120 | 43.5 | 26.5 | 61.9 |

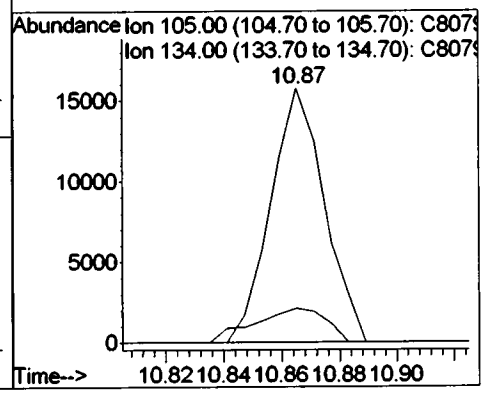


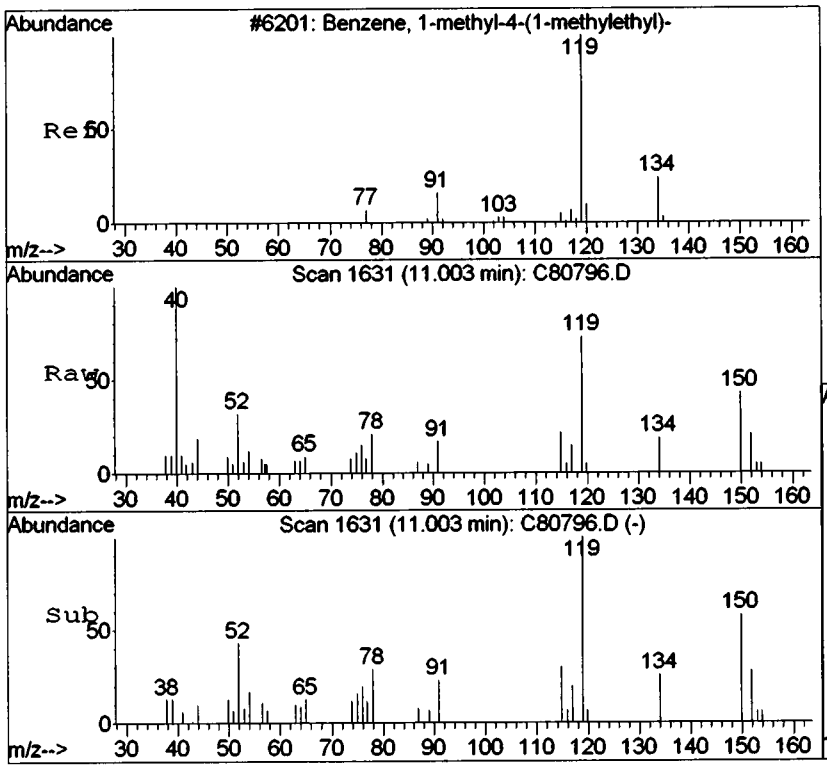




#90
sec-Butylbenzene
Concen: 0.42 ppb
RT: 10.87 min Scan# 1608
Delta R.T. -0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion:105 Resp: 20364

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 105 | 100 | | |
| 134 | 13.5 | 9.3 | 21.7 |

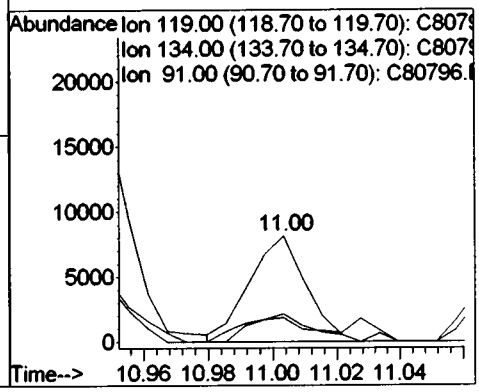


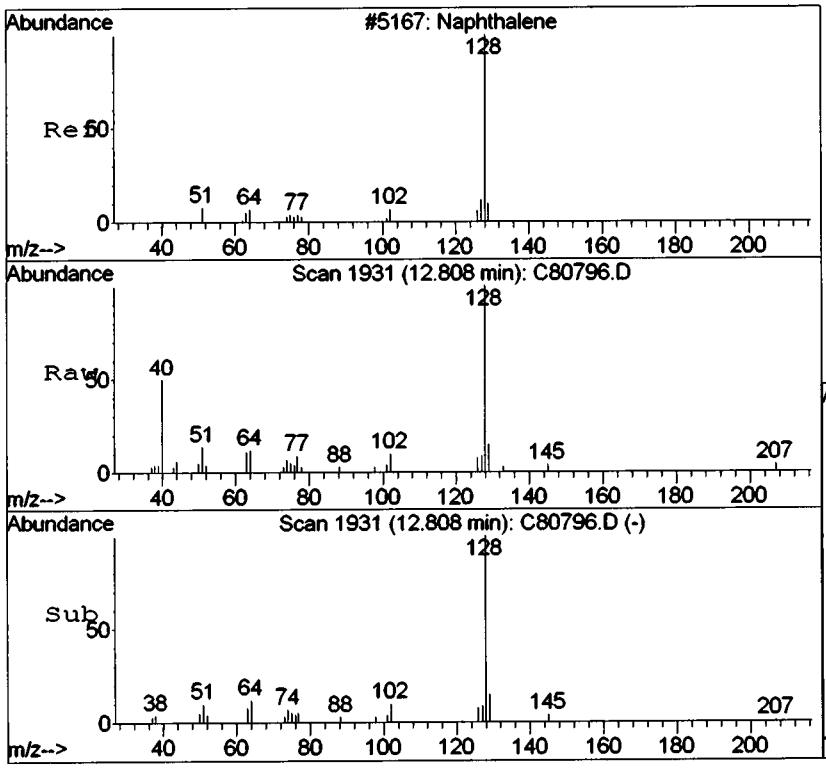



#91
p-Isopropyltoluene
Concen: 0.31 ppb
RT: 11.00 min Scan# 1631
Delta R.T. 0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion:119 Resp: 9979

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 119 | 100 | | |
| 134 | 26.2 | 14.0 | 32.8 |
| 91 | 22.6 | 15.4 | 36.0 |

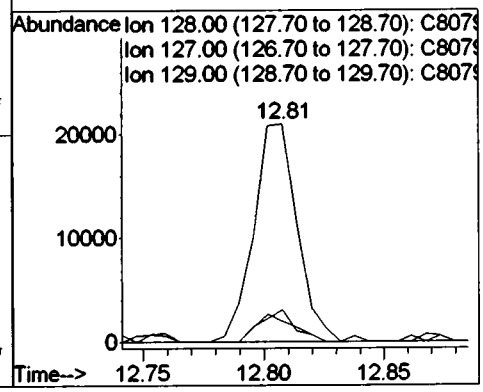



#100
Naphthalene
Concen: 1.20 ppb
RT: 12.81 min Scan# 1931
Delta R.T. 0.00 min
Lab File: C80796.D
Acq: 22 Mar 2018 6:52 pm

Tgt Ion:128 Resp: 26276

| Ion | Ratio | Lower | Upper |
|---|---|---|---|
| 128 | 100 | | |
| 127 | 9.2 | 7.4 | 17.2 |
| 129 | 14.6 | 6.5 | 15.3 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D  Vial: 32
Acq On : 22 Mar 2018 6:52 pm  Operator: JK-sop525r16
Sample : 1813374-1  Inst : CSS Instr
Misc : 8260 - 10mL water  Multiplr: 1.00
MS Integration Params: ETTICS.P

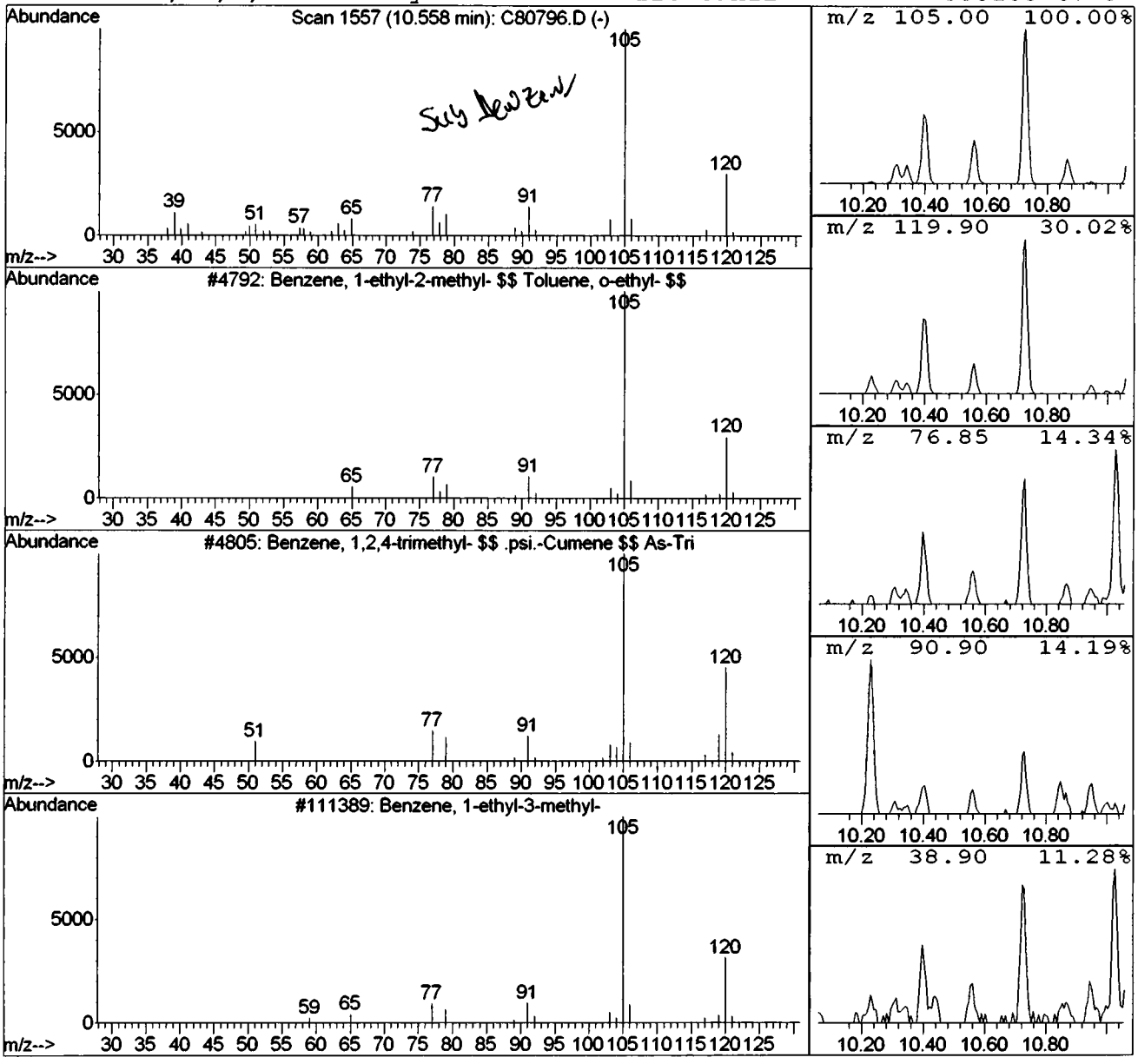
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 1 Benzene, 1-ethyl-2-methyl- $$ Concentration Rank 6

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 10.56 | 1.00 ppb | 105214 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | Benzene, 1-ethyl-2-methyl- $$ Tolue | 120 | C9H12 | 000611-14-3 | 90 |
| 2 | Benzene, 1,2,4-trimethyl- $$ .psi.- | 120 | C9H12 | 000095-63-6 | 90 |
| 3 | Benzene, 1-ethyl-3-methyl- | 120 | C9H12 | 000620-14-4 | 87 |
| 4 | Benzene, 1,3,5-trimethyl- | 120 | C9H12 | 000108-67-8 | 87 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D  Vial: 32
Acq On : 22 Mar 2018 6:52 pm  Operator: JK-sop525r16
Sample : 1813374-1  Inst : CSS Instr
Misc : 8260 - 10mL water  Multiplr: 1.00
MS Integration Params: ETTICS.P

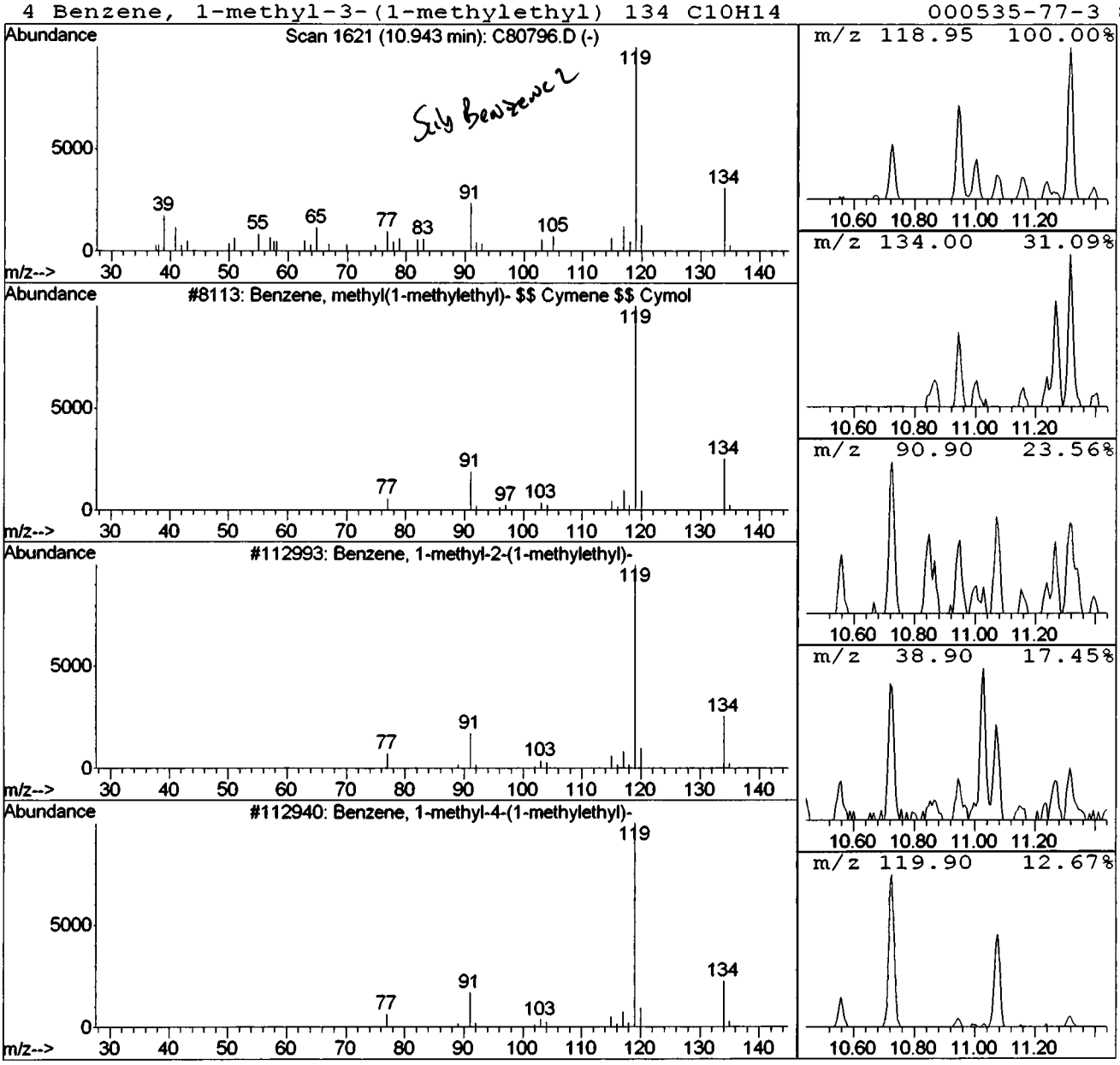
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 2 Benzene, methyl(1-methylethyl) Concentration Rank 7

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 10.94 | 0.98 ppb | 103467 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | Benzene, methyl(1-methylethyl)- $$ | 134 | C10H14 | 025155-15-1 | 87 |
| 2 | Benzene, 1-methyl-2-(1-methylethyl) | 134 | C10H14 | 000527-84-4 | 87 |
| 3 | Benzene, 1-methyl-4-(1-methylethyl) | 134 | C10H14 | 000099-87-6 | 87 |
| 4 | Benzene, 1-methyl-3-(1-methylethyl) | 134 | C10H14 | 000535-77-3 | 87 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D  Vial: 32
Acq On : 22 Mar 2018 6:52 pm  Operator: JK-sop525r16
Sample : 1813374-1  Inst : CSS Instr
Misc : 8260 - 10mL water  Multiplr: 1.00
MS Integration Params: ETTICS.P

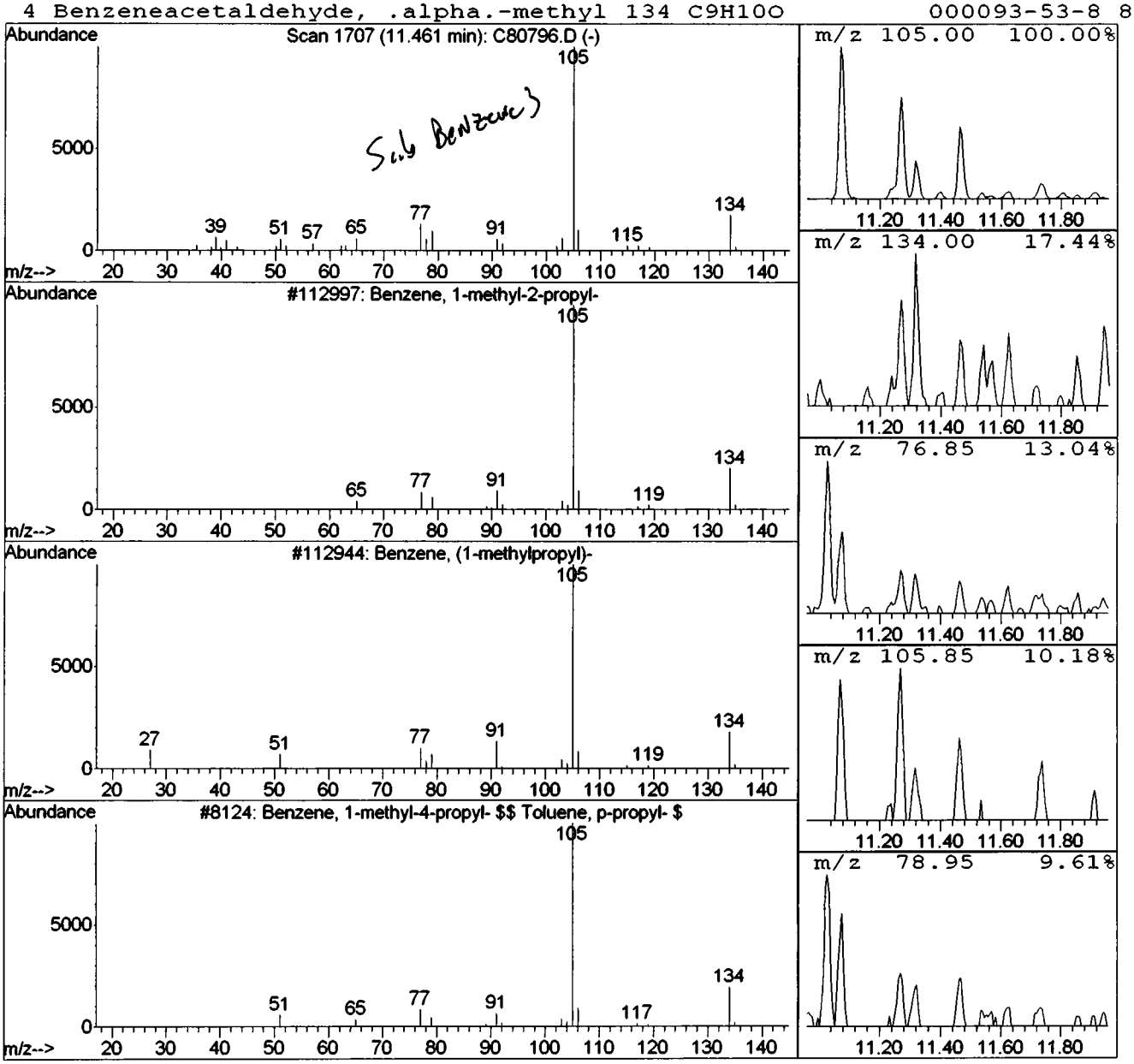
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 3 Benzene, 1-methyl-2-propyl- Concentration Rank 3

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 11.46 | 1.15 ppb | 121080 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | Benzene, 1-methyl-2-propyl- | 134 | C10H14 | 001074-17-5 | 90 |
| 2 | Benzene, (1-methylpropyl)- | 134 | C10H14 | 000135-98-8 | 87 |
| 3 | Benzene, 1-methyl-4-propyl- $$ Tolu | 134 | C10H14 | 001074-55-1 | 83 |
| 4 | Benzeneacetaldehyde, .alpha.-methyl | 134 | C9H10O | 000093-53-8 | 80 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D  Vial: 32
Acq On : 22 Mar 2018 6:52 pm  Operator: JK-sop525r16
Sample : 1813374-1  Inst : CSS Instr
Misc : 8260 - 10mL water  Multiplr: 1.00
MS Integration Params: ETTICS.P

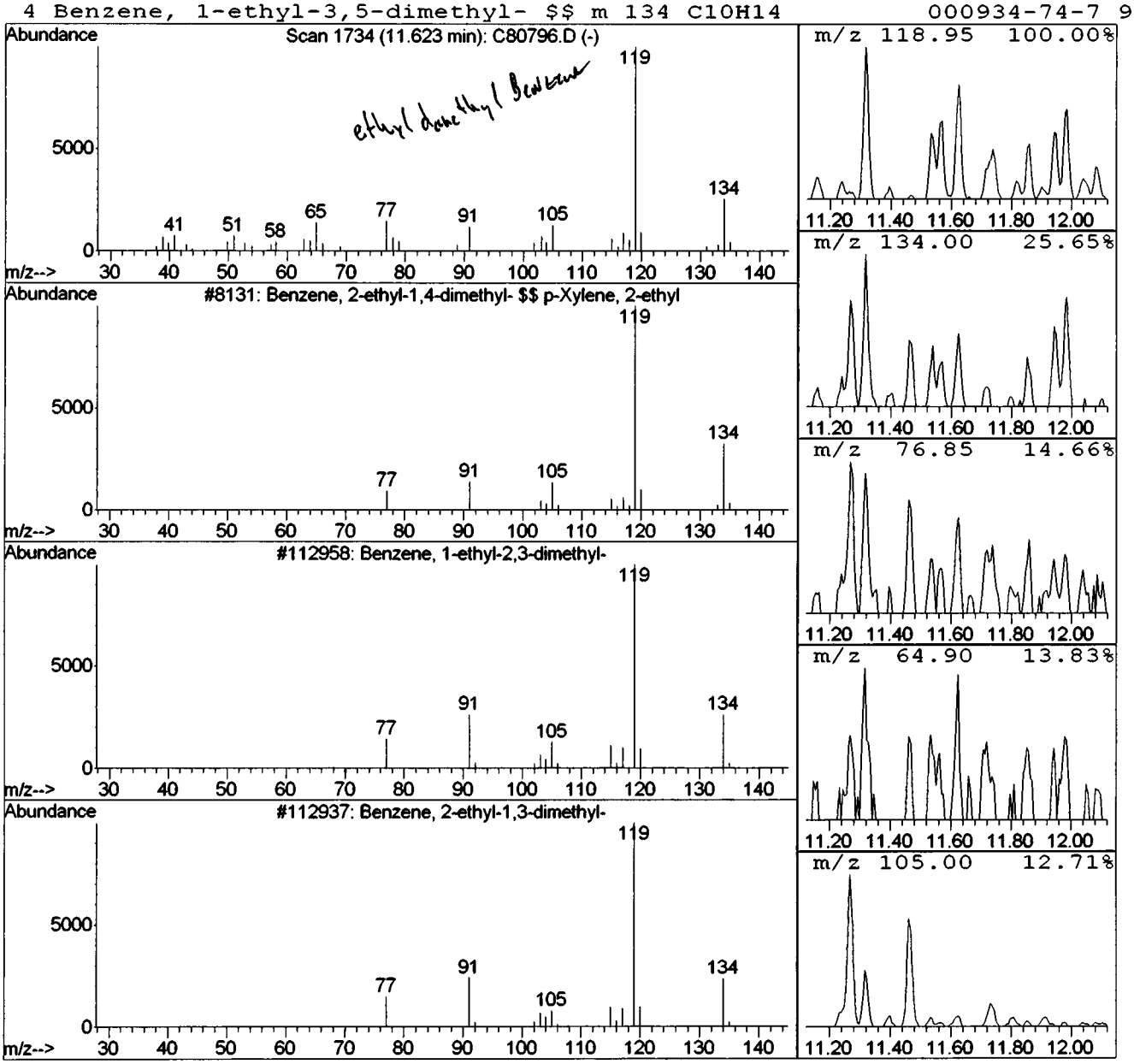
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 4 Benzene, 2-ethyl-1,4-dimethyl- Concentration Rank 8

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 11.62 | 0.80 ppb | 84445 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | Benzene, 2-ethyl-1,4-dimethyl- $$ p | 134 | C10H14 | 001758-88-9 | 94 |
| 2 | Benzene, 1-ethyl-2,3-dimethyl- | 134 | C10H14 | 000933-98-2 | 91 |
| 3 | Benzene, 2-ethyl-1,3-dimethyl- | 134 | C10H14 | 002870-04-4 | 91 |
| 4 | Benzene, 1-ethyl-3,5-dimethyl- $$ m | 134 | C10H14 | 000934-74-7 | 91 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D  Vial: 32
Acq On : 22 Mar 2018 6:52 pm  Operator: JK-sop525r16
Sample : 1813374-1  Inst : CSS Instr
Misc : 8260 - 10mL water  Multiplr: 1.00
MS Integration Params: ETTICS.P

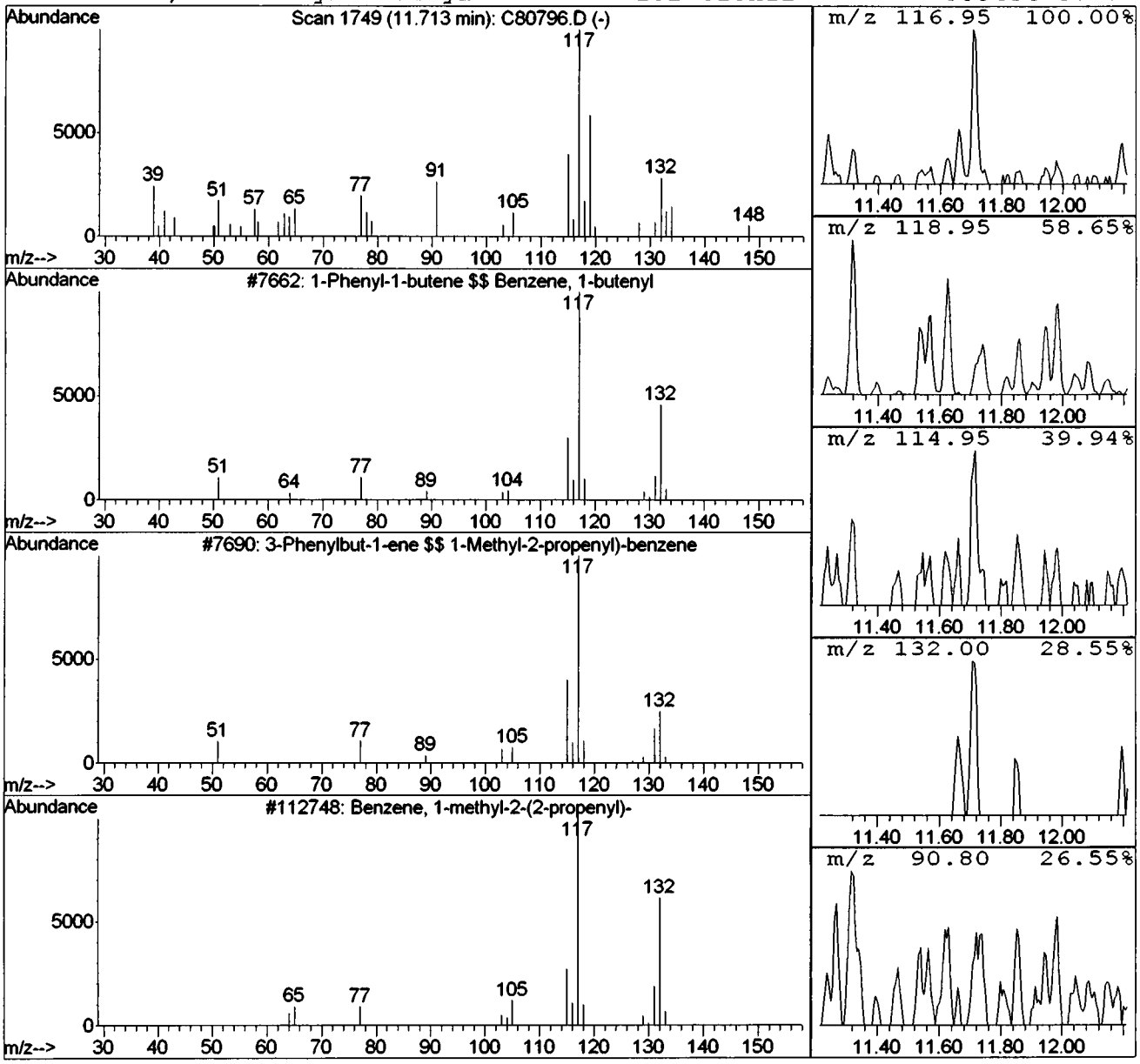
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 5 1-Phenyl-1-butene $$ Benzene, Concentration Rank 2

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 11.71 | 1.21 ppb | 127624 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | 1-Phenyl-1-butene $$ Benzene, 1-but | 132 | C10H12 | 000824-90-8 | 52 |
| 2 | 3-Phenylbut-1-ene $$ 1-Methyl-2-pro | 132 | C10H12 | 000934-10-1 | 52 |
| 3 | Benzene, 1-methyl-2-(2-propenyl)- | 132 | C10H12 | 001587-04-8 | 47 |
| 4 | Benzene, 1-ethenyl-4-ethyl- | 132 | C10H12 | 003454-07-7 | 46 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D  Vial: 32
Acq On : 22 Mar 2018 6:52 pm  Operator: JK-sop525r16
Sample : 1813374-1  Inst : CSS Instr
Misc : 8260 - 10mL water  Multiplr: 1.00
MS Integration Params: ETTICS.P

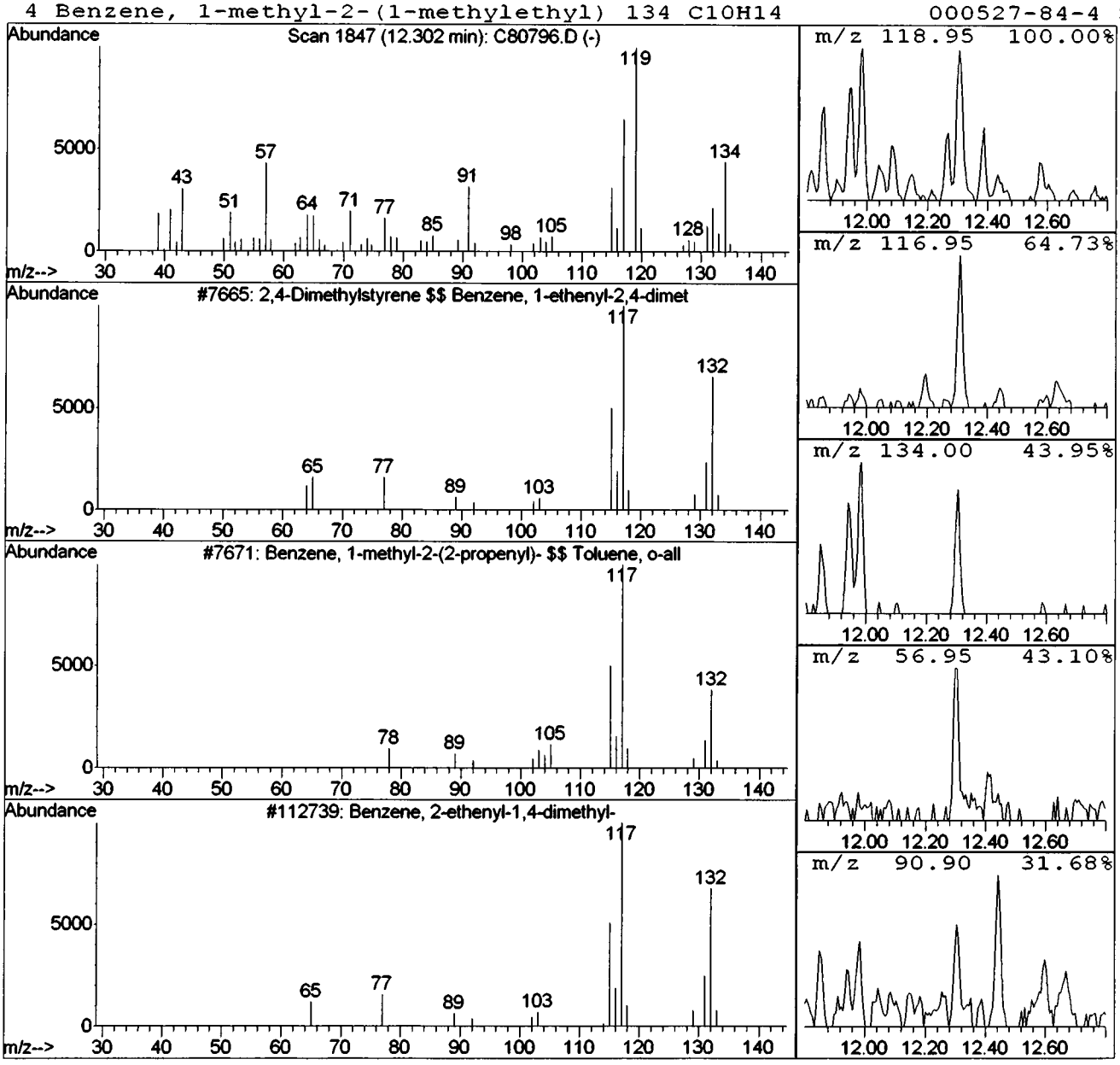
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 6 2,4-Dimethylstyrene $$ Benzene Concentration Rank 1

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 12.30 | 1.66 ppb | 175010 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | 2,4-Dimethylstyrene $$ Benzene, 1-e | 132 | C10H12 | 002234-20-0 | 86 |
| 2 | Benzene, 1-methyl-2-(2-propenyl)- $ | 132 | C10H12 | 001587-04-8 | 86 |
| 3 | Benzene, 2-ethenyl-1,4-dimethyl- | 132 | C10H12 | 002039-89-6 | 83 |
| 4 | Benzene, 1-methyl-2-(1-methylethyl) | 134 | C10H14 | 000527-84-4 | 55 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D  Vial: 32
Acq On : 22 Mar 2018 6:52 pm  Operator: JK-sop525r16
Sample : 1813374-1  Inst : CSS Instr
Misc : 8260 - 10mL water  Multiplr: 1.00
MS Integration Params: ETTICS.P

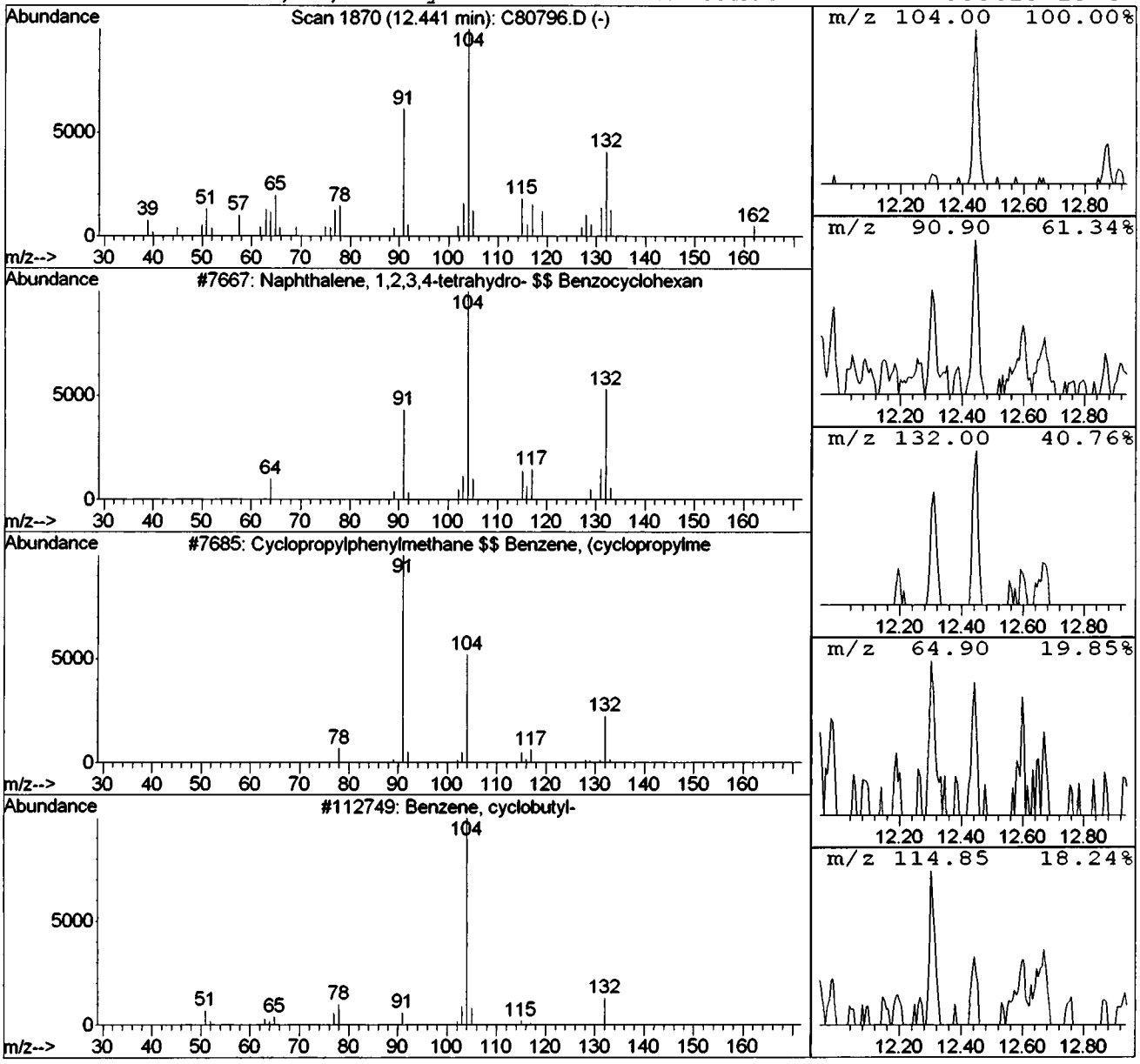
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 7 Naphthalene, 1,2,3,4-tetrahydr Concentration Rank 9

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 12.44 | 0.79 ppb | 83074 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | Naphthalene, 1,2,3,4-tetrahydro- $$ | 132 | C10H12 | 000119-64-2 | 94 |
| 2 | Cyclopropylphenylmethane $$ Benzene | 132 | C10H12 | 001667-00-1 | 53 |
| 3 | Benzene, cyclobutyl- | 132 | C10H12 | 004392-30-7 | 50 |
| 4 | 2H-Inden-2-one, 1,3-dihydro- | 132 | C9H8O | 000615-13-4 | 49 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D Vial: 32
Acq On : 22 Mar 2018 6:52 pm Operator: JK-sop525r16
Sample : 1813374-1 Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: ETTICS.P

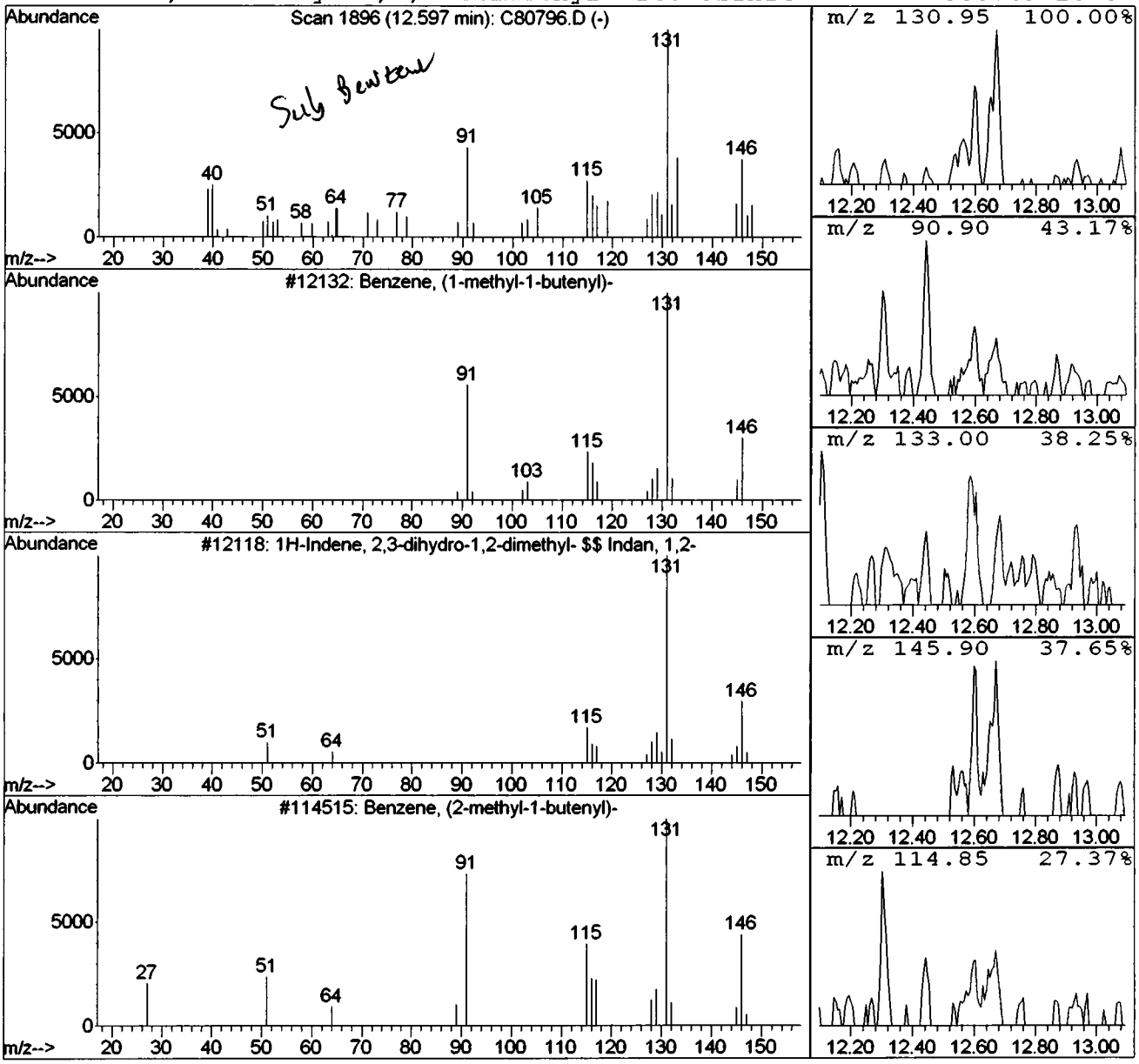
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 8 Benzene, (1-methyl-1-butenyl)- Concentration Rank 5

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 12.60 | 1.02 ppb | 107699 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | Benzene, (1-methyl-1-butenyl)- | 146 | C11H14 | 053172-84-2 | 86 |
| 2 | 1H-Indene, 2,3-dihydro-1,2-dimethyl | 146 | C11H14 | 017057-82-8 | 70 |
| 3 | Benzene, (2-methyl-1-butenyl)- | 146 | C11H14 | 056253-64-6 | 58 |
| 4 | Benzene, 2-ethenyl-1,3,5-trimethyl- | 146 | C11H14 | 000769-25-5 | 58 |



Library Search Compound Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80796.D Vial: 32
Acq On : 22 Mar 2018 6:52 pm Operator: JK-sop525r16
Sample : 1813374-1 Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: ETTICS.P

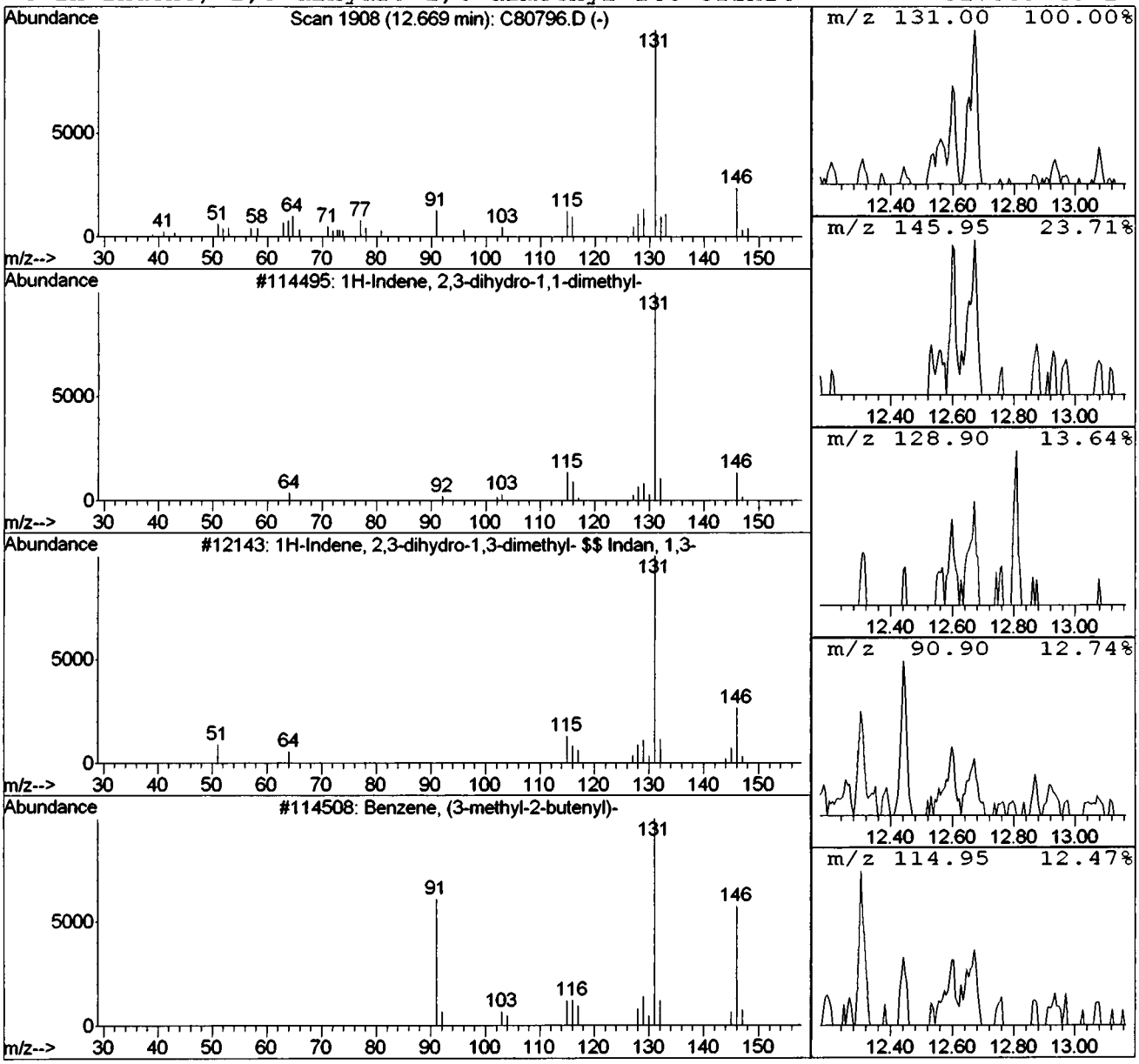
Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Library : C:\DATABASE\NIST129k.l

**********

Peak Number 9 1H-Indene, 2,3-dihydro-1,1-dim Concentration Rank 4

| R.T. | EstConc | Area | Relative to ISTD | R.T. |
|---|---|---|---|---|
| 12.67 | 1.03 ppb | 108902 | 1,4-Dichlorobenzene-d4 | 11.03 |

| Hit# of 5 | Tentative ID | MW | MolForm | CAS# | Qual |
|---|---|---|---|---|---|
| 1 | 1H-Indene, 2,3-dihydro-1,1-dimethyl | 146 | C11H14 | 004912-92-9 | 90 |
| 2 | 1H-Indene, 2,3-dihydro-1,3-dimethyl | 146 | C11H14 | 004175-53-5 | 87 |
| 3 | Benzene, (3-methyl-2-butenyl)- | 146 | C11H14 | 004489-84-3 | 87 |
| 4 | 1H-Indene, 2,3-dihydro-1,6-dimethyl | 146 | C11H14 | 017059-48-2 | 87 |



Quantitation Report (Not Reviewed)

Data File : C:\HPCHEM\1\DATA\2018\032218\C80768.D Vial: 4
Acq On : 22 Mar 2018 9:14 am Operator: JK-sop525r16
Sample : VL180322-3CCS Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 22 9:50 2018 Quant Results File: 022118W.RES

Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration
DataAcq Meth : 022118W

| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Fluorobenzene | 5.16 | 96 | 1355877 | 25.00 | ppb | | 0.00 |
| 58) Chlorobenzene-d5 | 8.78 | 82 | 537780 | 25.00 | ppb | | 0.00 |
| 78) 1,4-Dichlorobenzene-d4 | 11.03 | 152 | 375609 | 25.00 | ppb | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 37) Dibromofluoromethane | 4.42 | 113 | 373874 | 26.41 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 105.64% | | | | |
| 42) 1,2-dichloroethane-d4 | 4.80 | 65 | 377050 | 26.75 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 107.00% | | | | |
| 59) Toluene-d8 | 7.03 | 98 | 1131119 | 25.36 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 101.44% | | | | |
| 79) 4-Bromofluorobenzene | 9.99 | 95 | 418995 | 23.80 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 95.20% | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Dichlorodifluoromethane | 1.27 | 85 | 178866 | 10.84 | ppb | | 98 |
| 3) Chloromethane | 1.39 | 50 | 257874 | 10.14 | ppb | | 99 |
| 4) Vinyl chloride | 1.46 | 62 | 218649 | 11.62 | ppb | | 97 |
| 5) Bromomethane | 1.66 | 96 | 106597 | 9.71 | ppb | | 98 |
| 6) Chloroethane | 1.73 | 64 | 100330 | 11.05 | ppb | | 96 |
| 7) Trichlorofluoromethane | 1.89 | 101 | 205558 | 11.80 | ppb | | 98 |
| 8) Ethanol | 2.00 | 45 | 26139 | 186.40 | ppb | # | 86 |
| 9) Diethyl Ether | 2.06 | 59 | 103209 | 9.98 | ppb | | 99 |
| 10) Acrolein | 2.17 | 56 | 213259 | 86.00 | ppb | | 97 |
| 11) 1,1,2-Trichloro-1,2,2-trif | 2.25 | 101 | 135399 | 11.47 | ppb | | 97 |
| 12) 1,1-Dichloroethene | 2.25 | 96 | 130312 | 11.06 | ppb | | 96 |
| 13) Acetone | 2.27 | 43 | 120359 | 40.85 | ppb | | 95 |
| 14) Iodomethane | 2.38 | 142 | 106956 | 9.25 | ppb | | 96 |
| 15) Carbon Disulfide | 2.44 | 76 | 543037 | 10.90 | ppb | | 98 |
| 16) Methyl Acetate | 2.50 | 43 | 89007 | 9.00 | ppb | | 96 |
| 17) Allyl chloride | 2.53 | 76 | 90762 | 10.41 | ppb | | 86 |
| 18) Acetonitrile | 2.49 | 41 | 138520 | 81.23 | ppb | | 97 |
| 19) Methylene chloride | 2.64 | 84 | 169233 | 9.76 | ppb | | 96 |
| 20) tert-Butanol | 2.70 | 59 | 472555 | 463.46 | ppb | | 97 |
| 21) Methyl-t-butyl-ether | 2.86 | 73 | 596305 | 19.60 | ppb | | 96 |
| 22) trans-1,2-Dichloroethene | 2.88 | 96 | 147420 | 10.98 | ppb | | 95 |
| 23) Acrylonitrile | 2.83 | 53 | 436595 | 94.42 | ppb | | 98 |
| 24) Hexane | 3.14 | 57 | 135120 | 9.87 | ppb | | 98 |
| 25) Isopropyl ether | 3.32 | 45 | 579484 | 9.67 | ppb | | 97 |
| 26) Vinyl Acetate | 3.29 | 86 | 18028 | 8.98 | ppb | | 90 |
| 27) 1,1-Dichloroethane | 3.30 | 63 | 317921 | 10.38 | ppb | | 99 |
| 28) Chloroprene | 3.38 | 53 | 222488 | 10.55 | ppb | | 97 |
| 29) Ethyl tert-butyl ether | 3.69 | 59 | 451079 | 10.21 | ppb | | 98 |
| 30) 2,2-Dichloropropane | 3.90 | 77 | 211287 | 11.15 | ppb | | 98 |
| 31) 2-Butanone | 3.87 | 43 | 208808 | 35.85 | ppb | | 97 |
| 32) cis-1,2-Dichloroethene | 3.89 | 96 | 159830 | 10.46 | ppb | | 93 |
| 33) Propionitrile | 3.94 | 54 | 138934 | 91.82 | ppb | # | 97 |
| 34) Methacrylonitrile | 4.10 | 67 | 43255 | 9.06 | ppb | | 95 |
| 35) Bromochloromethane | 4.15 | 128 | 65000 | 11.21 | ppb | | 81 |
| 36) Chloroform | 4.25 | 83 | 283670 | 10.71 | ppb | | 97 |
| 38) 1,1,1-Trichloroethane | 4.43 | 97 | 181075 | 11.27 | ppb | | 96 |
| 39) Cyclohexane | 4.51 | 84 | 356572 | 21.16 | ppb | | 98 |
| 40) Carbon tetrachloride | 4.60 | 117 | 130681 | 11.16 | ppb | | 97 |
| 41) 1,1-Dichloropropene | 4.60 | 75 | 210717 | 10.45 | ppb | | 97 |
| 43) Isobutyl alcohol | 4.71 | 43 | 85012 | 167.30 | ppb | | 96 |

(#) = qualifier out of range (m) = manual integration

Quantitation Report (Not Reviewed)

Data File : C:\HPCHEM\1\DATA\2018\032218\C80768.D Vial: 4
Acq On : 22 Mar 2018 9:14 am Operator: JK-sop525r16
Sample : VL180322-3CCS Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 22 9:50 2018 Quant Results File: 022118W.RES

Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration
DataAcq Meth : 022118W

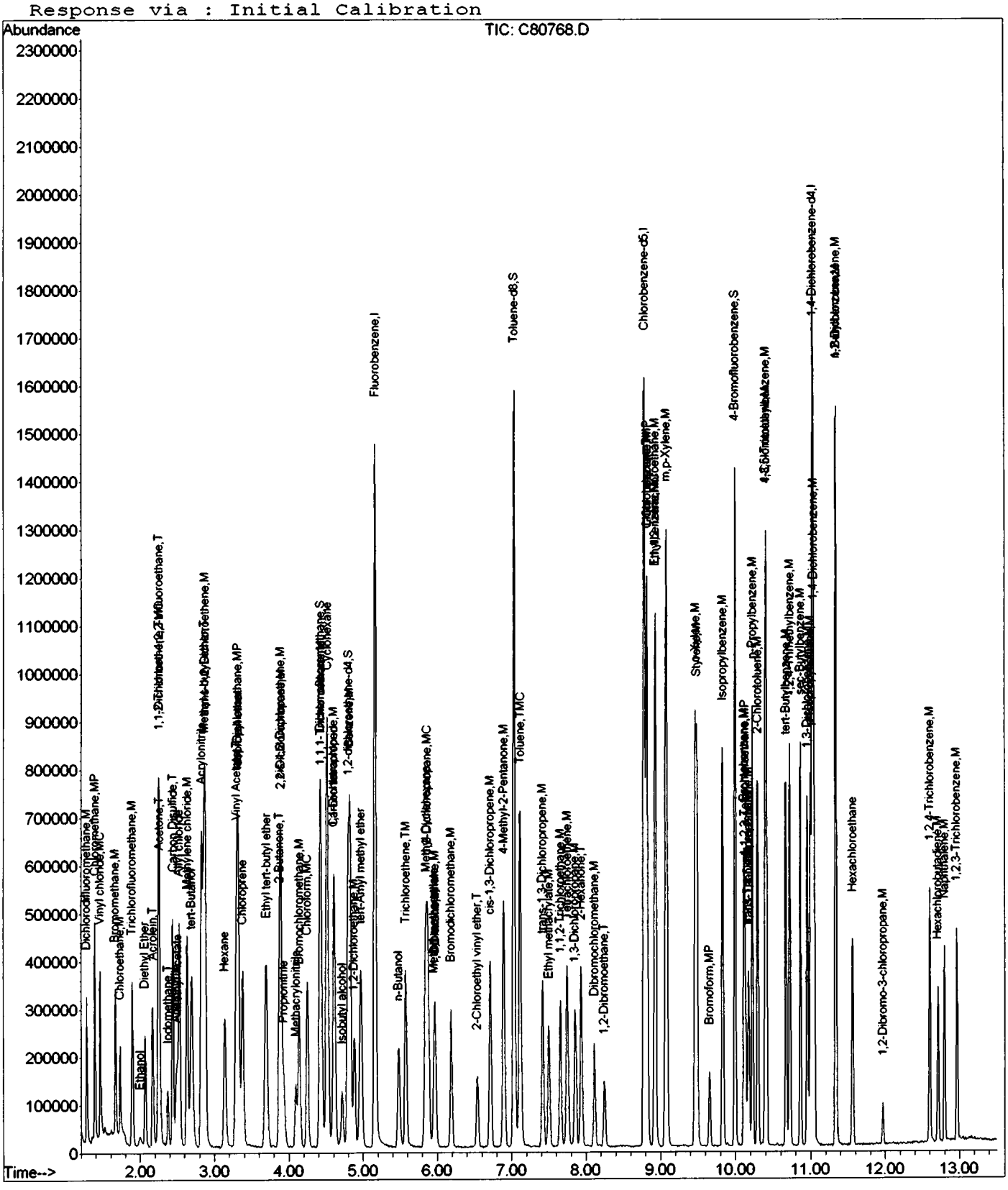
| | Compound | R.T. | QIon | Response | Conc | Unit | | Qvalue |
|---|---|---|---|---|---|---|---|---|
| 44) | tert-Amyl methyl ether | 4.97 | 87 | 65940 | 9.95 | ppb | | 96 |
| 45) | Benzene | 4.83 | 78 | 607452 | 10.34 | ppb | | 98 |
| 46) | 1,2-Dichloroethane | 4.88 | 62 | 172783 | 10.99 | ppb | | 98 |
| 47) | n-Butanol | 5.48 | 56 | 127529 | 398.75 | ppb | | 95 |
| 48) | Trichloroethene | 5.58 | 130 | 122799 | 11.16 | ppb | | 97 |
| 49) | Methyl Cyclohexane | 5.84 | 55 | 186429 | 11.13 | ppb | | 92 |
| 50) | 1,2-Dichloropropane | 5.87 | 63 | 174579 | 10.24 | ppb | | 97 |
| 51) | Methyl methacrylate | 5.95 | 69 | 68410 | 9.79 | ppb | | 96 |
| 52) | 1,4-Dioxane | 5.98 | 88 | 19443 | 213.78 | ppb | # | 83 |
| 53) | Dibromomethane | 5.97 | 93 | 93859 | 11.12 | ppb | | 93 |
| 54) | Bromodichloromethane | 6.18 | 83 | 203432 | 10.22 | ppb | | 98 |
| 55) | 2-Chloroethyl vinyl ether | 6.54 | 63 | 72795 | 8.49 | ppb | | 96 |
| 56) | cis-1,3-Dichloropropene | 6.71 | 75 | 250602 | 9.86 | ppb | | 97 |
| 57) | 4-Methyl-2-Pentanone | 6.89 | 43 | 443313 | 36.94 | ppb | | 97 |
| 60) | Toluene | 7.12 | 91 | 537296 | 10.67 | ppb | | 97 |
| 61) | Ethyl methacrylate | 7.50 | 69 | 139362 | 9.29 | ppb | | 98 |
| 62) | trans-1,3-Dichloropropene | 7.42 | 75 | 197176 | 10.35 | ppb | | 99 |
| 63) | 1,1,2-Trichloroethane | 7.66 | 83 | 104419 | 10.24 | ppb | | 97 |
| 64) | Tetrachloroethene | 7.75 | 164 | 93532 | 11.55 | ppb | | 97 |
| 65) | 2-Hexanone | 7.93 | 58 | 155551 | 38.37 | ppb | | 95 |
| 66) | 1,3-Dichloropropane | 7.85 | 76 | 188048 | 10.17 | ppb | | 99 |
| 67) | Dibromochloromethane | 8.11 | 129 | 108615 | 10.25 | ppb | | 97 |
| 68) | 1,2-Dibromoethane | 8.25 | 107 | 102668 | 11.10 | ppb | | 93 |
| 69) | 1-Chlorohexane | 8.82 | 91 | 186143 | 10.29 | ppb | | 94 |
| 70) | Chlorobenzene | 8.81 | 112 | 305739 | 10.97 | ppb | | 95 |
| 71) | Ethylbenzene | 8.93 | 91 | 596149 | 11.24 | ppb | | 100 |
| 72) | 1,1,1,2-Tetrachloroethane | 8.92 | 131 | 108256 | 11.69 | ppb | | 98 |
| 73) | m,p-Xylene | 9.08 | 106 | 384429 | 21.60 | ppb | | 97 |
| 74) | o-Xylene | 9.47 | 106 | 188766 | 10.51 | ppb | | 99 |
| 75) | Styrene | 9.49 | 104 | 319595 | 10.43 | ppb | | 97 |
| 76) | Bromoform | 9.65 | 173 | 61102 | 10.14 | ppb | | 97 |
| 77) | Isopropylbenzene | 9.83 | 105 | 462988 | 11.42 | ppb | | 99 |
| 80) | 1,1,2,2-Tetrachloroethane | 10.13 | 83 | 147065 | 9.19 | ppb | | 94 |
| 81) | trans-1,4-Dichloro-2-buten | 10.17 | 53 | 26163 | 8.53 | ppb | | 96 |
| 82) | n-Propylbenzene | 10.23 | 91 | 662307 | 10.25 | ppb | | 99 |
| 83) | 1,2,3-Trichloropropane | 10.18 | 110 | 25220 | 9.63 | ppb | | 100 |
| 84) | Bromobenzene | 10.11 | 156 | 128531 | 10.69 | ppb | | 92 |
| 85) | 1,3,5-Trimethylbenzene | 10.39 | 105 | 397648 | 10.60 | ppb | | 99 |
| 86) | 2-Chlorotoluene | 10.30 | 126 | 113227 | 10.27 | ppb | | 92 |
| 87) | 4-Chlorotoluene | 10.41 | 126 | 115094 | 10.65 | ppb | | 99 |
| 88) | tert-Butylbenzene | 10.67 | 134 | 65362 | 10.08 | ppb | | 96 |
| 89) | 1,2,4-Trimethylbenzene | 10.72 | 105 | 351945 | 9.69 | ppb | | 100 |
| 90) | sec-Butylbenzene | 10.86 | 105 | 494120 | 10.53 | ppb | | 99 |
| 91) | p-Isopropyltoluene | 11.00 | 119 | 339904 | 10.79 | ppb | | 100 |
| 92) | 1,3-Dichlorobenzene | 10.95 | 146 | 227142 | 10.80 | ppb | | 97 |
| 93) | 1,4-Dichlorobenzene | 11.04 | 146 | 227450 | 10.79 | ppb | | 97 |
| 94) | n-Butylbenzene | 11.33 | 91 | 433496 | 11.22 | ppb | | 98 |
| 95) | 1,2-Dichlorobenzene | 11.34 | 146 | 209376 | 10.69 | ppb | | 98 |
| 96) | Hexachloroethane | 11.56 | 119 | 86731 | 10.30 | ppb | # | 90 |
| 97) | 1,2-Dibromo-3-chloropropan | 11.97 | 157 | 16008 | 9.19 | ppb | | 93 |
| 98) | 1,2,4-Trichlorobenzene | 12.60 | 180 | 113955 | 11.23 | ppb | | 97 |
| 99) | Hexachlorobutadiene | 12.71 | 225 | 34695 | 11.77 | ppb | | 93 |
| 100) | Naphthalene | 12.80 | 128 | 215539 | 10.18 | ppb | | 98 |
| 101) | 1,2,3-Trichlorobenzene | 12.96 | 180 | 95588 | 11.06 | ppb | | 96 |

(#) = qualifier out of range (m) = manual integration

Quantitation Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80768.D Vial: 4
Acq On : 22 Mar 2018 9:14 am Operator: JK-sop525r16
Sample : VL180322-3CCS Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 22 9:50 2018 Quant Results File: 022118W.RES

Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration



Quantitation Report (Not Reviewed)

Data File : C:\HPCHEM\1\DATA\2018\032218\C80769.D Vial: 5
Acq On : 22 Mar 2018 9:35 am Operator: JK-sop525r16
Sample : VL180322-3LCSD Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 22 9:49 2018 Quant Results File: 022118W.RES

Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration
DataAcq Meth : 022118W

| Internal Standards | R.T. | QIon | Response | Conc | Units | | Dev(Min) |
|---|---|---|---|---|---|---|---|
| 1) Fluorobenzene | 5.16 | 96 | 1450963 | 25.00 | ppb | | 0.00 |
| 58) Chlorobenzene-d5 | 8.78 | 82 | 610269 | 25.00 | ppb | | -0.01 |
| 78) 1,4-Dichlorobenzene-d4 | 11.03 | 152 | 409320 | 25.00 | ppb | | 0.00 |
| **System Monitoring Compounds** | | | | | | | |
| 37) Dibromofluoromethane | 4.42 | 113 | 403410 | 26.62 | ppb | | -0.01 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 106.48% | | | | |
| 42) 1,2-dichloroethane-d4 | 4.80 | 65 | 400977 | 26.58 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 106.32% | | | | |
| 59) Toluene-d8 | 7.03 | 98 | 1262162 | 24.93 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 99.72% | | | | |
| 79) 4-Bromofluorobenzene | 9.99 | 95 | 448001 | 23.35 | ppb | | 0.00 |
| Spiked Amount 25.000 | Range 85 - 115 | | Recovery = 93.40% | | | | |
| **Target Compounds** | | | | | | | Qvalue |
| 2) Dichlorodifluoromethane | 1.27 | 85 | 177888 | 10.08 | ppb | | 100 |
| 3) Chloromethane | 1.39 | 50 | 269209 | 9.89 | ppb | | 99 |
| 4) Vinyl chloride | 1.46 | 62 | 226500 | 11.24 | ppb | | 100 |
| 5) Bromomethane | 1.66 | 96 | 110333 | 9.39 | ppb | | 99 |
| 6) Chloroethane | 1.73 | 64 | 99341 | 10.23 | ppb | | 95 |
| 7) Trichlorofluoromethane | 1.89 | 101 | 199248 | 10.69 | ppb | | 97 |
| 8) Ethanol | 1.99 | 45 | 28632 | 190.97 | ppb | | 92 |
| 9) Diethyl Ether | 2.07 | 59 | 100911 | 9.12 | ppb | | 97 |
| 10) Acrolein | 2.17 | 56 | 233440 | 87.97 | ppb | | 99 |
| 11) 1,1,2-Trichloro-1,2,2-trif | 2.25 | 101 | 133380 | 10.56 | ppb | | 92 |
| 12) 1,1-Dichloroethene | 2.26 | 96 | 128224 | 10.17 | ppb | | 95 |
| 13) Acetone | 2.26 | 43 | 127932 | 40.56 | ppb | | 94 |
| 14) Iodomethane | 2.38 | 142 | 110800 | 8.98 | ppb | | 96 |
| 15) Carbon Disulfide | 2.44 | 76 | 545200 | 10.22 | ppb | | 99 |
| 16) Methyl Acetate | 2.50 | 43 | 97769 | 9.24 | ppb | | 97 |
| 17) Allyl chloride | 2.53 | 76 | 93727 | 10.04 | ppb | | 93 |
| 18) Acetonitrile | 2.49 | 41 | 134372 | 72.12 | ppb | | 97 |
| 19) Methylene chloride | 2.64 | 84 | 175479 | 9.46 | ppb | | 99 |
| 20) tert-Butanol | 2.70 | 59 | 526800 | 482.81 | ppb | | 97 |
| 21) Methyl-t-butyl-ether | 2.86 | 73 | 611822 | 18.79 | ppb | | 96 |
| 22) trans-1,2-Dichloroethene | 2.88 | 96 | 146062 | 10.16 | ppb | | 94 |
| 23) Acrylonitrile | 2.83 | 53 | 456106 | 92.17 | ppb | | 99 |
| 24) Hexane | 3.14 | 57 | 133455 | 9.11 | ppb | | 95 |
| 25) Isopropyl ether | 3.32 | 45 | 620538 | 9.68 | ppb | | 97 |
| 26) Vinyl Acetate | 3.29 | 86 | 18703 | 8.71 | ppb | # | 62 |
| 27) 1,1-Dichloroethane | 3.30 | 63 | 329774 | 10.06 | ppb | | 97 |
| 28) Chloroprene | 3.38 | 53 | 228387 | 10.12 | ppb | | 96 |
| 29) Ethyl tert-butyl ether | 3.69 | 59 | 453469 | 9.59 | ppb | | 98 |
| 30) 2,2-Dichloropropane | 3.90 | 77 | 213238 | 10.52 | ppb | | 100 |
| 31) 2-Butanone | 3.86 | 43 | 220479 | 35.37 | ppb | | 98 |
| 32) cis-1,2-Dichloroethene | 3.89 | 96 | 167002 | 10.21 | ppb | | 89 |
| 33) Propionitrile | 3.93 | 54 | 154619 | 95.48 | ppb | # | 97 |
| 34) Methacrylonitrile | 4.10 | 67 | 44281 | 8.67 | ppb | | 95 |
| 35) Bromochloromethane | 4.14 | 128 | 63773 | 10.28 | ppb | | 99 |
| 36) Chloroform | 4.25 | 83 | 286323 | 10.10 | ppb | | 97 |
| 38) 1,1,1-Trichloroethane | 4.43 | 97 | 180645 | 10.51 | ppb | | 97 |
| 39) Cyclohexane | 4.51 | 84 | 351254 | 19.48 | ppb | | 99 |
| 40) Carbon tetrachloride | 4.60 | 117 | 127115 | 10.15 | ppb | | 98 |
| 41) 1,1-Dichloropropene | 4.61 | 75 | 207853 | 9.64 | ppb | | 97 |
| 43) Isobutyl alcohol | 4.72 | 43 | 92150 | 169.46 | ppb | | 95 |

(#) = qualifier out of range (m) = manual integration



3-23-18

Quantitation Report (Not Reviewed)

Data File : C:\HPCHEM\1\DATA\2018\032218\C80769.D Vial: 5
Acq On : 22 Mar 2018 9:35 am Operator: JK-sop525r16
Sample : VL180322-3LCSD Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 22 9:49 2018 Quant Results File: 022118W.RES

Quant Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration
DataAcq Meth : 022118W

| | Compound | R.T. | QIon | Response | Conc | Unit | | Qvalue |
|---|---|---|---|---|---|---|---|---|
| 44) | tert-Amyl methyl ether | 4.97 | 87 | 69527 | 9.81 | ppb | | 94 |
| 45) | Benzene | 4.83 | 78 | 596383 | 9.49 | ppb | | 98 |
| 46) | 1,2-Dichloroethane | 4.88 | 62 | 168798 | 10.03 | ppb | | 98 |
| 47) | n-Butanol | 5.47 | 56 | 136655 | 399.28 | ppb | | 96 |
| 48) | Trichloroethene | 5.58 | 130 | 124472 | 10.57 | ppb | | 94 |
| 49) | Methyl Cyclohexane | 5.85 | 55 | 183067 | 10.20 | ppb | | 94 |
| 50) | 1,2-Dichloropropane | 5.87 | 63 | 178836 | 9.80 | ppb | # | 98 |
| 51) | Methyl methacrylate | 5.96 | 69 | 68479 | 9.15 | ppb | | 98 |
| 52) | 1,4-Dioxane | 5.97 | 88 | 17497 | 180.21 | ppb | | 90 |
| 53) | Dibromomethane | 5.97 | 93 | 92547 | 10.25 | ppb | | 93 |
| 54) | Bromodichloromethane | 6.19 | 83 | 209296 | 9.83 | ppb | | 97 |
| 55) | 2-Chloroethyl vinyl ether | 6.54 | 63 | 72517 | 7.91 | ppb | | 97 |
| 56) | cis-1,3-Dichloropropene | 6.71 | 75 | 265370 | 9.76 | ppb | | 95 |
| 57) | 4-Methyl-2-Pentanone | 6.89 | 43 | 486275 | 37.87 | ppb | | 98 |
| 60) | Toluene | 7.12 | 91 | 531106 | 9.30 | ppb | | 100 |
| 61) | Ethyl methacrylate | 7.50 | 69 | 140282 | 8.24 | ppb | | 99 |
| 62) | trans-1,3-Dichloropropene | 7.42 | 75 | 200361 | 9.27 | ppb | | 98 |
| 63) | 1,1,2-Trichloroethane | 7.66 | 83 | 110405 | 9.54 | ppb | | 98 |
| 64) | Tetrachloroethene | 7.75 | 164 | 96604 | 10.51 | ppb | | 96 |
| 65) | 2-Hexanone | 7.93 | 58 | 161549 | 35.12 | ppb | | 95 |
| 66) | 1,3-Dichloropropane | 7.86 | 76 | 196538 | 9.37 | ppb | | 93 |
| 67) | Dibromochloromethane | 8.11 | 129 | 112922 | 9.39 | ppb | | 94 |
| 68) | 1,2-Dibromoethane | 8.25 | 107 | 106121 | 10.11 | ppb | | 97 |
| 69) | 1-Chlorohexane | 8.82 | 91 | 190242 | 9.26 | ppb | | 95 |
| 70) | Chlorobenzene | 8.81 | 112 | 319753 | 10.11 | ppb | | 96 |
| 71) | Ethylbenzene | 8.93 | 91 | 600343 | 9.98 | ppb | | 100 |
| 72) | 1,1,1,2-Tetrachloroethane | 8.92 | 131 | 108293 | 10.31 | ppb | | 99 |
| 73) | m,p-Xylene | 9.07 | 106 | 395630 | 19.59 | ppb | | 96 |
| 74) | o-Xylene | 9.47 | 106 | 200155 | 9.82 | ppb | | 99 |
| 75) | Styrene | 9.49 | 104 | 343396 | 9.88 | ppb | | 98 |
| 76) | Bromoform | 9.65 | 173 | 62234 | 9.10 | ppb | | 97 |
| 77) | Isopropylbenzene | 9.83 | 105 | 474014 | 10.31 | ppb | | 100 |
| 80) | 1,1,2,2-Tetrachloroethane | 10.13 | 83 | 155276 | 8.91 | ppb | | 97 |
| 81) | trans-1,4-Dichloro-2-buten | 10.17 | 53 | 27167 | 8.13 | ppb | | 91 |
| 82) | n-Propylbenzene | 10.22 | 91 | 680944 | 9.67 | ppb | | 99 |
| 83) | 1,2,3-Trichloropropane | 10.18 | 110 | 26878 | 9.42 | ppb | | 89 |
| 84) | Bromobenzene | 10.11 | 156 | 129702 | 9.90 | ppb | | 96 |
| 85) | 1,3,5-Trimethylbenzene | 10.39 | 105 | 400247 | 9.79 | ppb | | 98 |
| 86) | 2-Chlorotoluene | 10.29 | 126 | 118747 | 9.89 | ppb | | 97 |
| 87) | 4-Chlorotoluene | 10.41 | 126 | 118558 | 10.07 | ppb | | 96 |
| 88) | tert-Butylbenzene | 10.67 | 134 | 66592 | 9.42 | ppb | | 86 |
| 89) | 1,2,4-Trimethylbenzene | 10.72 | 105 | 386991 | 9.78 | ppb | | 98 |
| 90) | sec-Butylbenzene | 10.86 | 105 | 501098 | 9.80 | ppb | | 100 |
| 91) | p-Isopropyltoluene | 11.00 | 119 | 337043 | 9.82 | ppb | | 99 |
| 92) | 1,3-Dichlorobenzene | 10.95 | 146 | 233059 | 10.16 | ppb | | 98 |
| 93) | 1,4-Dichlorobenzene | 11.04 | 146 | 232384 | 10.11 | ppb | | 96 |
| 94) | n-Butylbenzene | 11.33 | 91 | 428765 | 10.19 | ppb | | 99 |
| 95) | 1,2-Dichlorobenzene | 11.34 | 146 | 212955 | 9.97 | ppb | | 98 |
| 96) | Hexachloroethane | 11.56 | 119 | 87000 | 9.48 | ppb | # | 96 |
| 97) | 1,2-Dibromo-3-chloropropan | 11.97 | 157 | 17299 | 9.11 | ppb | | 93 |
| 98) | 1,2,4-Trichlorobenzene | 12.60 | 180 | 117521 | 10.63 | ppb | | 99 |
| 99) | Hexachlorobutadiene | 12.71 | 225 | 35470 | 11.04 | ppb | | 98 |
| 100) | Naphthalene | 12.80 | 128 | 223756 | 9.70 | ppb | | 99 |
| 101) | 1,2,3-Trichlorobenzene | 12.96 | 180 | 101454 | 10.77 | ppb | | 94 |

(#) = qualifier out of range (m) = manual integration

Quantitation Report

Data File : C:\HPCHEM\1\DATA\2018\032218\C80769.D Vial: 5
Acq On : 22 Mar 2018 9:35 am Operator: JK-sop525r16
Sample : VL180322-3LCSD Inst : CSS Instr
Misc : 8260 - 10mL water Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 22 9:49 2018 Quant Results File: 022118W.RES

Method : C:\HPCHEM\1\METHODS\022118W.M (RTE Integrator)
Title : HPV3 - GC/MS Volatiles (S.O.P. 525)
Last Update : Sat Mar 17 11:18:52 2018
Response via : Initial Calibration