Air Liquide Electronics U.S. LP
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Work Order: **19-10767**
Revision: **1**
Report Date: **30-Oct-19**
Order Date: **13-Oct-19**
P.O.: **70269618**
Release:
Approved By: **Karen Gruschka**
Title: **CHEMIST**

BALAZS ™ TEST RESULTS

If you have any questions regarding the results, please call Tiffany Wilkus at (510) 624-4045

Background and Summary:

On 10/10/19, one HCl solution (Hydrochloric acid 23deg) was received for analysis of extractable organic compounds by GC-FID (Gas Chromatography with Flame Ionization Detector) and GC-MSD (Gas Chromatography with Mass Selective Detector).

Sample ID	Sample Mass (g)
Hydrochloric Acid 23deg	34.26

Sample Preparation:

Approximately 30mL of sample was extracted with 3mL of hexanes. The extracted solution was concentrated to 1mL and spiked with a known volume of n-Hexadecane internal standard. The extract was analyzed by GC-MS and GC-FID.

A calibration curve for chlorobenzene ranging in concentration from 10 - 100 ppbv was also run by GC-FID.

GC-FID/MS Instrumentation:

GC-FID:

The system used for the analysis was an Agilent 7890B GC with a FID. The GC-FID was equipped with a

non-polar phase (dimethyl polysiloxane) capillary column. The following temperature program was used for the GC: the oven was held at an initial temperature of 35°C for 5 minutes, ramped at a rate of 15°C/minute to 280°C and held at the final temperature for 20 minutes. The injection port temperature was 250°C. The sample injection volume was 1.0 µL, and the GC was operated in splitless mode.

GC-MS:

The system used for the analysis was an Agilent 7890B GC with a 5977 quadrupole MSD. The GC was equipped with a non-polar dimethyl polysiloxane phase capillary column. The following temperature program was used for the GC: the oven was held at an initial temperature of 35°C for 5 minutes, ramped at a rate of 10°C/minute to 230°C and held at the final temperature for 21 minutes. The injection port temperature was 230°C. The sample injection volume was 0.5 µL, and the GC was operated in split mode with a ratio of 20:1.

Each compound passed down the GC column at a characteristic rate. As each compound exited the gas chromatograph, it entered the MSD where it was ionized using electron impact ionization (70 eV). The MSD collected a full mass spectrum (10-700 amu) approximately once per second.

Results:

Quantitative amounts of the chlorobenzene were calculated using the calibration curve.

Chlorobenzene was not detected at or above 10ppbv.

No other impurities were detected by this method.

The labeled chromatograms are provided.

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Sample: 1224083 [BLANK HEXANES] **Site ID: METHOD BLANK**

Component	Detection Limit	Result Value	Units
G0111-GCL-N-R-C Solvent (Mixture) Normalized Area % Assay by GC- FID			
Chlorobenzene	10	*	ppb

* = Analysis revealed that the analyte was not found at or about the detection limit

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Sample: 1224084 [HYDROCHLORIC ACID 23deg] **Site ID:** **BATCH HOKX1320600919**

Component	Detection Limit	Result Value	Units
G0111-GCL-N-R-C Solvent (Mixture) Normalized Area % Assay by GC- FID			
Chlorobenzene	10	*	ppb

* = Analysis revealed that the analyte was not found at or about the detection limit

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Figure 1
Sample ID: Control; Hexanes Extraction Blank
Method of Analysis: Liquid Injection-GC-MS (Gas Chromatography-Mass Spectrometry)
Objective: Pure solvent analysis by GC-MS - Qualitative
Sampling Conditions: Direct injection of hexane extracted solution.
Balazs Work Order: 19-10767

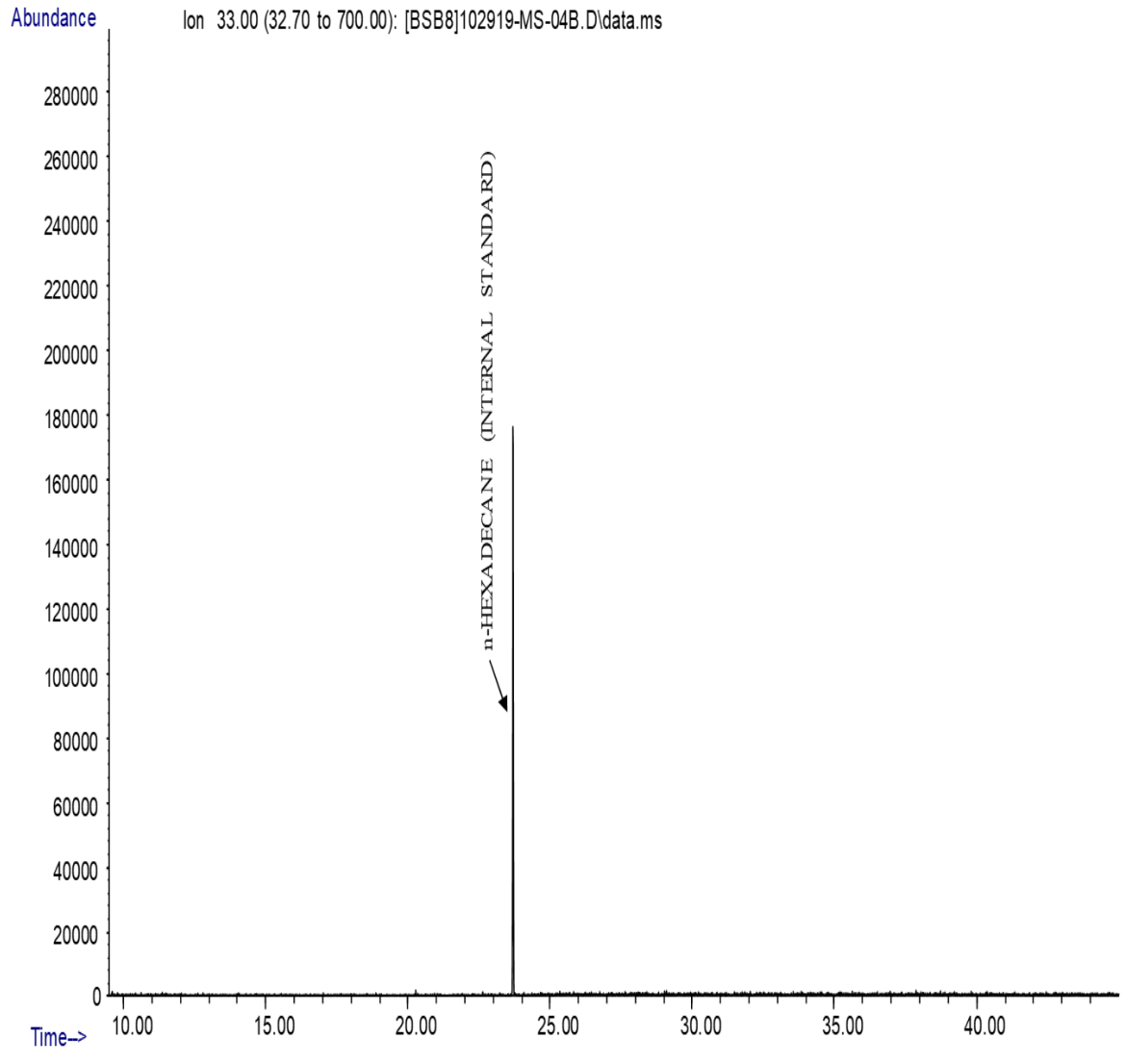

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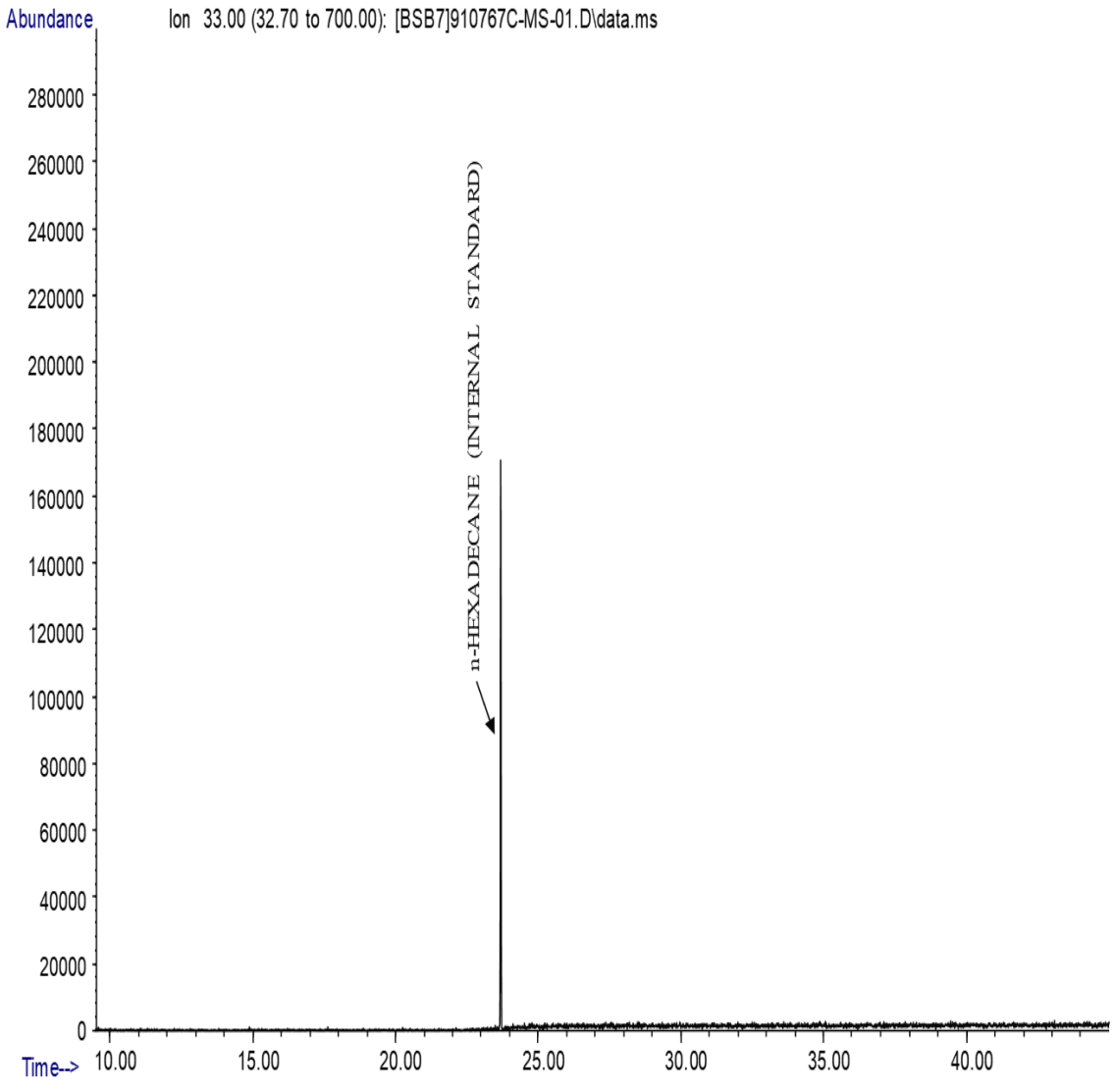
Figure 2
Sample ID: HYDROCHLORIC ACID 23 DEG, BATCH HOKX 1320600919
Method of Analysis: Liquid Injection-GC-MS (Gas Chromatography-Mass Spectrometry)
Objective: Pure solvent analysis by GC-MS - Qualitative
Sampling Conditions: Direct injection of hexane extracted solution.
Balazs Work Order: 19-10767



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