eurofins | EAG Laboratories

ISO 17025

ACCREDITED
CERTIFICATE #2797.06

Test Report
Identification of Volatile Organic Compounds in Clean Room Materials

Arcoplast

Ghislain Beauregard

ghislain@arcoplast.com

106 Crafton Drive

O'Fallon, MO 63366

USA

EAG Job #V1NNW211

REVISION	DESCRIPTION	DATE
0	Initial report.	December 16, 2022
1	Corrected "Arcoplast" spelling mistakes throughout report.	December 27, 2022
2	Information pertaining to S1 was separated from the initial report and was reported in a separate report (Revision 2)	February 13, 2023
3	Information pertaining to S2 was separated from the initial report and was reported in a separate report (Revision 3)	February 13, 2023

EXECUTIVE SUMMARY FOR
Ghislain Beauregard
Arcoplast

February 13, 2023

STUDY OBJECTIVE

V1NNW211 The objective of the study was to analyze the submitted sample via a customized GC/MS approach for potential off-gassing contaminants.

SUMMARY OF ANALYTICAL RESULTS AND INTERPRETATIONS

The submitted sample "Arcoplast gfrmc Panel" (S2) was analyzed in duplicate for off-gassing volatile organic compounds (VOCs) by GC/MS after a 24-hour equilibration period. VOCs were not detected in either of the preparations of "Arcoplast gfrmc Panel" (S2). See the body of the report for further details regarding the analysis performed.

SAMPLE DESCRIPTION	OBSERVED VOC SPECIES
Arcoplast gfrmc Panel (S2)	No VOCs detected

SUGGESTED FUTURE WORK

In order to estimate a limit of detection, it is recommended to analyze an analytical standard(s) at a known concentration under the same equilibration conditions and instrumental parameters.

SAMPLE LOG-IN

SAMPLE NUMBER	DESCRIPTION	DATE RECEIVED
S2	Arcoplast gfrmc Panel, Qty: 3	14 Nov 2022

Please remember we dispose of samples 30 days after the date of this Executive Summary unless instructed otherwise.

Thank You for choosing **Eurofins EAG Materials Science, LLC**. Please feel free to contact either reviewer with any questions or comments associated with this report or any additional work. We look forward to working with you in the future.

Reviewed By:

Shaun Loeffelman, M.S.
Senior Manager of Analytical Services

Prepared By:

Nathan Colley, Ph.D.
Scientist

We want your feedback! Please visit us at https://www.eag.com/survey/?job=V1NNW211 to fill out a brief survey.
For questions about our quality management system, you can reach our Quality team at Quality-MS@eurofinseag.com.

IDENTIFICATION OF VOLATILE ORGANIC COMPOUNDS IN CLEAN ROOM MATERIALS ANALYTICAL RESULTS AND INTERPRETATIONS

SAMPLE PREPARATION

The panel sample (S2) was prepared for analysis using the following approaches:

- Each sample was sealed in a 1L Altef gas sampling bag using a heat sealer; a control blank was prepared as well.
- A consistent volume of atmosphere was added to each sample preparation using a gas tight syringe.
- The sample preparations were allowed to equilibrate at room temperature for 24 hours prior to analysis of the headspace within the bag.

Sample Analysis Performance Date(s): 11/29/2022 - 12/06/2022

GAS CHROMATOGRAPHY WITH MASS SPECTROMETRY (GC/MS)

After 24 hours of equilibration at room temperature, a gas-tight syringe was used to collect 0.5 mL of the headspace from each sample preparation for analysis by GC/MS. Note that all sample preparations and controls were offset by 1 hour in order to maintain a constant 24 hour equilibration period. Table 1 below summarizes the results form GC/MS analysis with library matching. The corresponding GC/MS chromatograms are provided in Figure 1 and Figure 2. No VOCs were detected in "Arcoplast gfrmc Panel" (S2). Since analytical reference standards were not analyzed in this study, estimated limits of detection cannot be provided.

Table 1. Summary of GC/MS Results for S2

SAMPLE NO.	REPLICATE 1		REPLICATE 2	
	OBSERVED VOC SPECIES[1]	CAS NO.	OBSERVED VOC SPECIES[1]	CAS NO.
S2	No VOCs detected	N/A	No VOCs detected	N/A

[1]The tentative structural assignments are based on mass spectral library matching and interpretation. For this scope of work, analytical reference standards were not analyzed to confirm the presence of the individual components.

Figure 1. Full GC/MS Stacked Chromatograms of S2 preparations

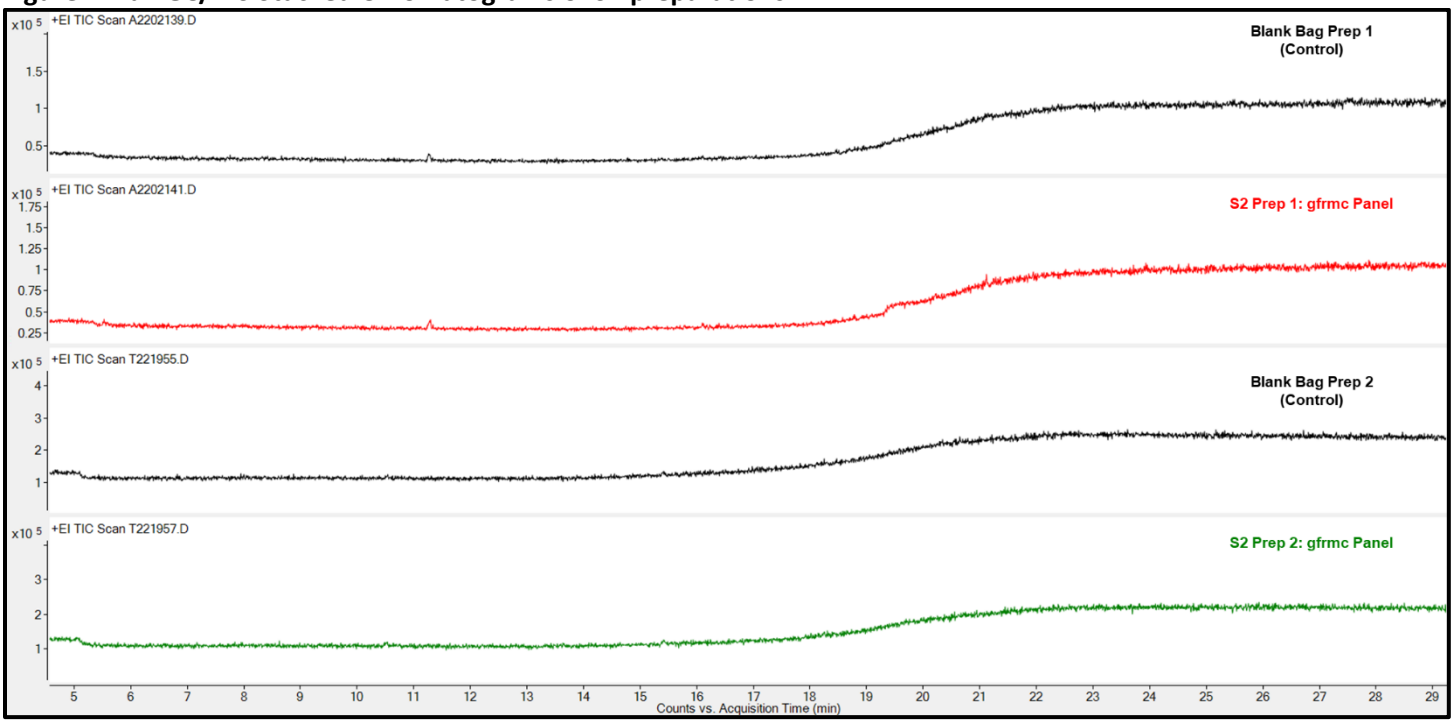
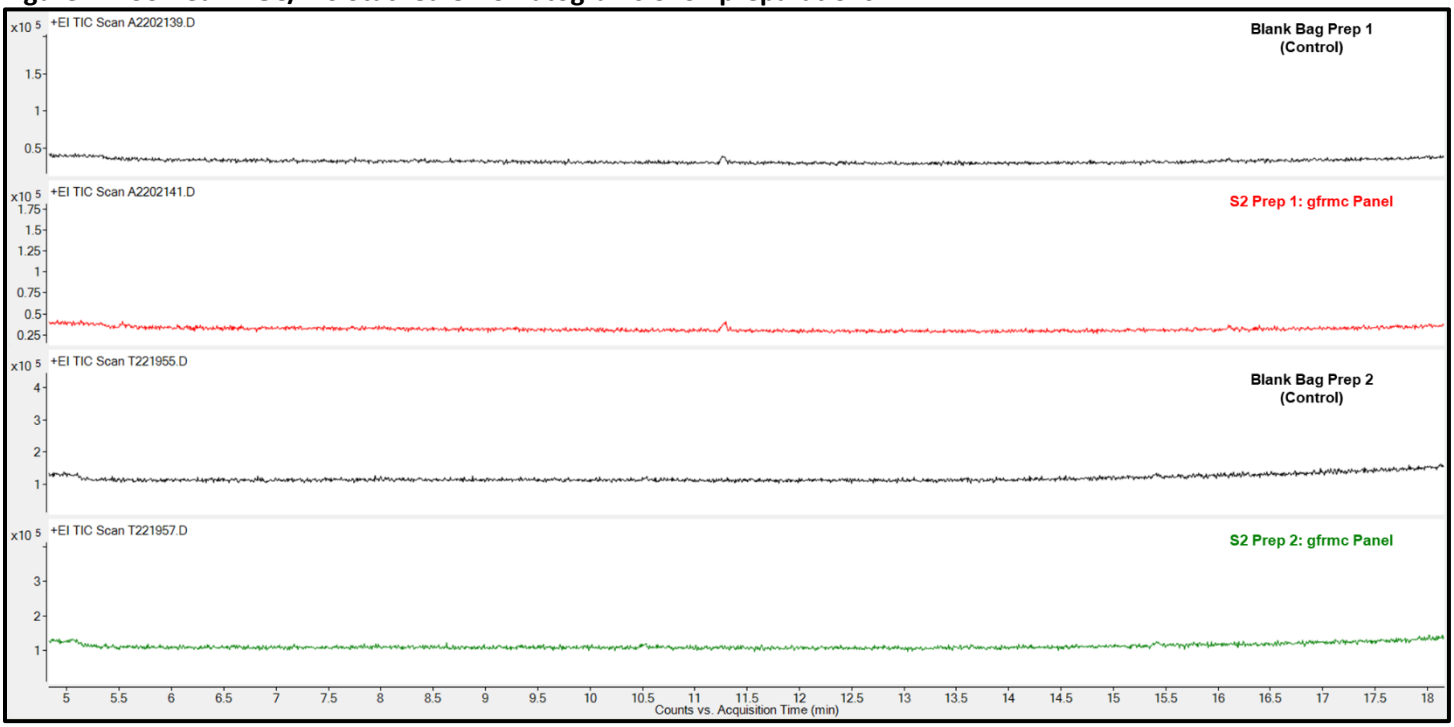


Figure 2. Zoomed-In GC/MS Stacked Chromatograms of S2 preparations



TECHNIQUE DESCRIPTIONS

GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

In GC/MS, GC resolves the sample components based on volatility, and MS detects and identifies the components. Sample components that interact less with the stationary phase spend less time in the chromatographic column. In MS, the resolved sample components are ionized and separated in a mass analyzer. The fragmentation pattern of a sample component and its computer-library match enables sample identification. For quantitative analyses, the concentrations listed in the body of the report were referenced to a known amount of an analytical reference standard. The uncertainty of these measurements is evaluated by the relative standard deviation and/or the relative percent difference as stated where applicable. For semi-quantitative analysis, the amounts listed in the tables above were referenced to a known amount of external standard. No calibration curves were prepared, and no attempt was made to correct for response factor differences between species that are structurally/functionally different. Typical reproducibility as determined by statistical process control of the measurement system is estimated at about 10% (at 95% confidence level, k ~ 2). This reproducibility is an estimate of the uncertainty of a single standard measurement over time, and the uncertainty in a specific measurement must be determined on a case by case basis. For qualitative analyses, analytical reference standards were not analyzed to confirm the presence of the individual components. In such cases, it is not possible to assign a numerical value to the “uncertainty” of the matches provided. Tentative structural assignments are based on mass spectral library matching and interpretation.