Thermo Scientific MS Certified Vials

The FIRST and ONLY pre-cleaned, low particle, low background chromatography vial

When your instrumentation, sample handling and methodology is pushing the limits, a chromatography vial that can keep up is essential.

- The only chromatography vials pre-cleaned to provide unmatched consistency
- The first low particle, low background chromatography vials
- Pre-cleaned vial packaging protects the product integrity
- High purity closures packed in air-tight re-closeable container
- Tested and certified for up to 15 critical physical characteristics affecting vial performance
- Tested and certified for low background by positive ESI LC-MS
- Tested and certified for low background by GC-MS

Low Particle Background

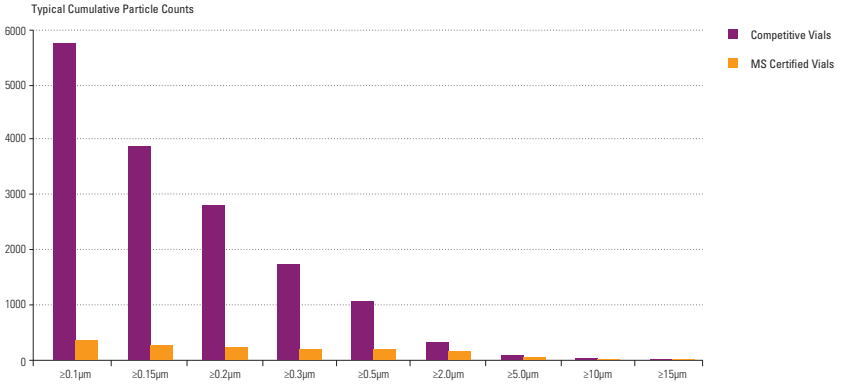
The presence of inorganic sub micron particles in all glass vials as a byproduct of the manufacturing process is a little known phenomenon that has not been extensively studied. Gas chromatographers depend on injection port liners to act as traps for particulates while the HPLC chromatographer takes extensive steps to eliminate them during sample preparation. This has been an effective strategy for routine analytical methods, but the need to work with ever lower concentrations of analytes creates the possibility of interactions with compounds of interest.

Thermo Scientific MS Certified Vials undergo a proprietary cleaning process that greatly reduces the background particulates along with their potential effect on high sensitivity chromatography. The table to the right gives a comparison of the particle distribution obtained from an analysis of standard vials versus the Thermo Scientific MS Certified Vials. All MS Certified Vials are processed and tested for background particulates.

A typical vial that has not been processed can exhibit particle counts exceeding 5000 particles per mL with the highest counts occurring in the range below 0.5µm. This has traditionally been of little concern when GC inlet liners or HPLC guard columns are used. GC techniques employing on-column injection create the need for a sample vial with minimal background particulates to prevent an accumulation of foreign material at the head of the column than might adversely affect a separation. Similarly newer techniques employing finely packed HPLC columns, capillary columns and direct connection of the analytical column to the sample valve also require the elimination of as much particulate matter as possible from the sample stream.

VIAL	≥0.1 µm	≥0.15 µm	≥0.2 µm	≥0.2 µm	≥0.5 µm	≥2.0 µm	≥5.0 µm	≥5.0 µm	≥15 µm
Competitive Vials	5,677	3,809	2,755	1,709	1,051	307	76	4	0
Thermo Scientific Vials	356	264	218	192	176	160	45	8	3

Typical Cumulative Particle Counts



The table above shows the results obtained from particulate analysis of a typical unprocessed vial compared to the Thermo Scientific MS Certified Vials. The processed vial shows a significant reduction in total particle counts.

Low LC-MS Background

Samples of MS Certified Vials and closures were exposed to acetonitrile at room temperature for 2 hours. Potential nonvolatile organic compounds were determined using LC-UV and LC-MS with several ionization techniques: positive electrospray, negative electrospray and positive atmospheric pressure ionization (APCI).

Additional testing was conducted on samples exposed to acetonitrile for 2 hours at a temperature of 50°C to determine the effect of severe operating conditions.

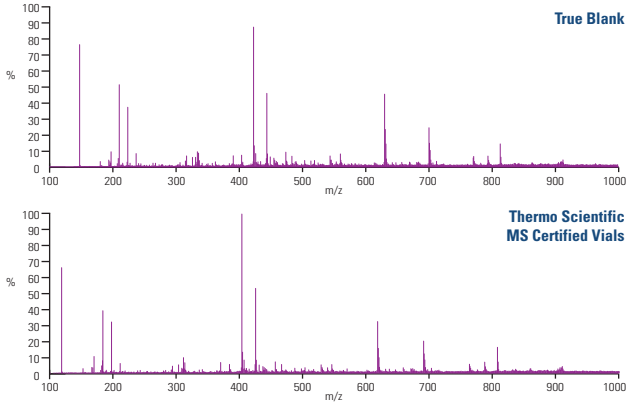
The results of the room temperature and 50°C tests were essentially the same indicating that the background contribution from the processed vials is minimal over a wide range of conditions. Typical background scans for the room temperature exposure are shown in the following figures.

The top scan in each figure is the result of injecting the pure blank extracting solvent without exposure to glassware other than the original reagent container and a pre-extracted sample vial.

The second scan for each figure represents an injection of an equal quantity of the extracting solvent after exposure to the pre-cleaned sample vial.

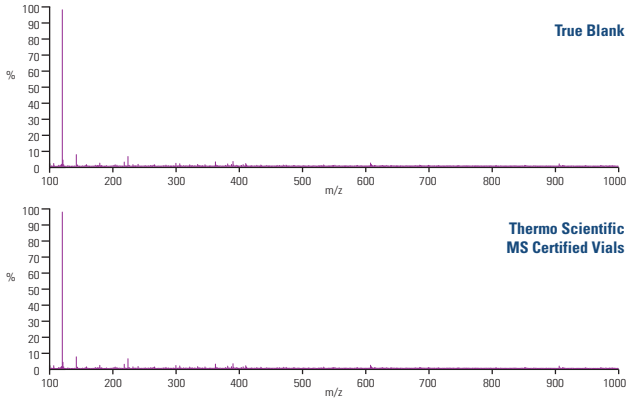
Comparison of the scans shows that the pre-cleaned MS Certified Vial does not contribute to the detectable background even at very high instrument sensitivity settings.

LC/MS Background Scan (Positive ESI)



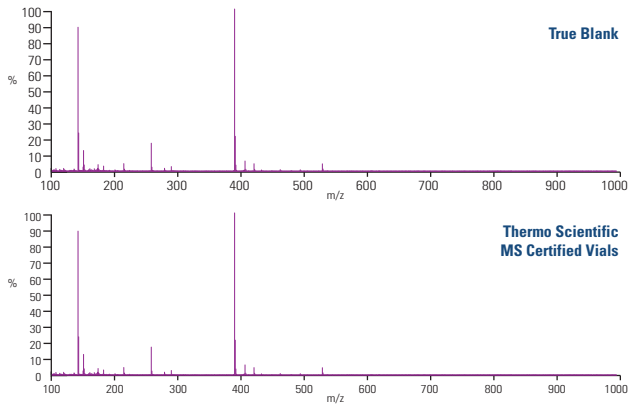
Conditions:
RT: 0.01-25.01
AV: 1211
NL: 2.31E4
T: +c ESI Full MS
[100.00-1000.00]

LC/MS Background Scan (Negative ESI)



Conditions:
RT: 0.01-25.00
AV: 1155
NL: 4.45E6
T: - c ESI Full ms
[50.00-1500.00]

LC/MS Background Scan (APCI)



Conditions:
RT: 0.00-25.01
AV: 1209
NL: 6.79E7
T: + c APCI Full ms
[50.00-1500.00]

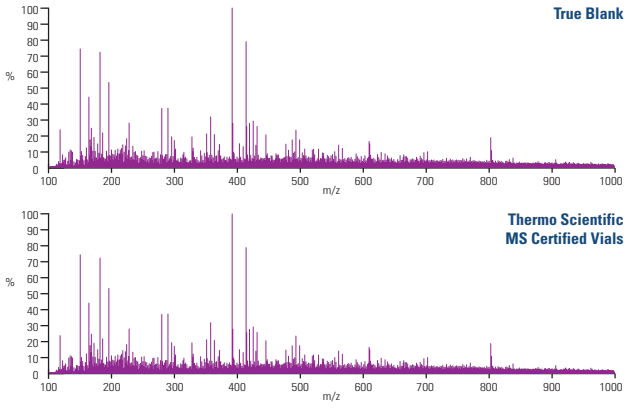
LC conditions

- Instrument: Thermo Scientific™ Accela™ 1250 HPLC with Thermo Scientific™ LCQ Deca XP™ MS
- Column: Thermo Scientific™ Hypersil GOLD™ 3µm, 50x2.1mm (Part number 25003-052130)
- Mobile phase: A – H_2O + 0.1% formic acid; B – MeOH + 0.1% formic acid (10-100% B 20 min)
- Flow rate: 0.3mL/min
- Temperature: 40°C
- Injection vol.: 10µL
- MS detection: Positive EI; Full scan 50 to 650mu

Low GC-MS Background

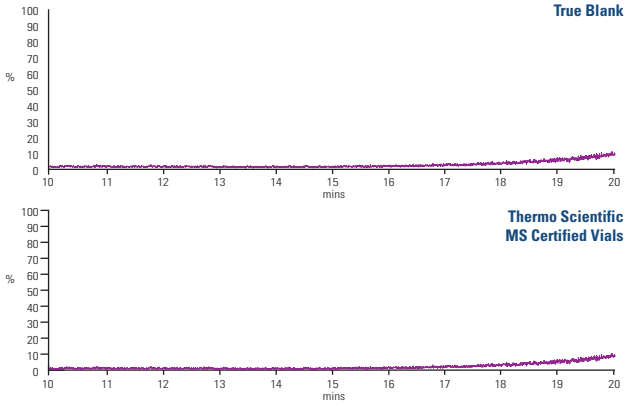
A portion of the vial extracts prepared for LC-MS analysis were taken for analysis by GC-MS. As with the LC-MS evaluation the vials were exposed at room temperature and 50°C. There was no significant difference between the room temperature and elevated temperature test results. A typical GC-MS scan is shown in the figure below with blank solvent in the upper scan and the vial extract shown in the lower scan. Monitoring of the TIC chromatogram between 10 and 20 minutes has been used to determine if any volatile organic species are present after the cleaning process.

GC-MS Background Scan (Positive ESI)



Conditions:
RT: 0.01-25.00
AV: 1167
NL: 1.50E5
T: + c Full MS
[50.00-1500.00]

GC-MS Background Scan (TIC)



Conditions:
RT: 10.0-20.00
NL: 1.00E7
TIC MS

GC conditions

- Instrument: Thermo Scientific™ TRACE™ Ultra GC-MS ISQ with Thermo Scientific™ TriPlus™ RSH autosampler
- Column: Thermo Scientific™ TraceGOLD™ TG-5MS 30m x 0.25mm x 0.25µm, (Part number 26098-1420)
- Carrier gas: Helium
- Flow rate: 1.2mL/min
- Oven program: 40°C, hold for 0.5min; 15°C /min to 150°C, hold for 1 min; 10°C /min to 290°C, hold for 5 min
- Inlet temperature: 250° C; Split flow: 50mL/min
- Injection vol.: 1µL splitless
- MS detection: Positive EI; Full scan 50 to 650m/z

Each batch of vials and caps is tested using these conditions against a blank sample

GC-MS background scan

GC-MS TIC