



pre-cleaned

low
particle



certified



**National Scientific
Pre-cleaned Vials
for Mass Spectroscopy**

 NATIONAL SCIENTIFIC

bonded, ultra-pure closures



LC/MS
GC/MS

Manufacturing the Ultimate Vial for Mass Spectroscopy

More than a quarter century of expertise goes into the production of every National Scientific Certified Mass Spec vial. It starts with production of the highest quality glass tubing selected for chemical stability, inertness, clarity and purity. Certified vials are formed under the strictest automated manufacturing and quality controls systems to produce a physically uniform product that has the longest record of continuous performance in the industry. National Scientific Mass Spec vials are manufactured to the same high quality standards as our Certified Vial products including in-process verification of 13 physical characteristics that are critical to reproducible performance.

Chromatographers have always depended on high temperature glass forming methods to burn off organic contaminants in a vial that might be detected by instrumentation. Residual compounds that might survive the glass forming process were either not detected by traditional chromatography techniques or were present in concentrations too low to affect separation and analysis. Recent advances in instrument construction and separation techniques have resulted in cases where the high temperature glass forming techniques no longer produce a vial with no detectable background.

Certified Mass Spec vials undergo additional processing to remove trace artifacts introduced by manufacturing methods. The vials are cleaned by our proprietary processing methods in a GMP compliant

fully validated clean room environment. Each production lot is tested for particle counts, LC/MS and GC/MS background according to a sampling plan designed to assure consistently superior performance from every vial.

As chromatographic instruments and techniques continue to advance it can be seen that an unprocessed sample vial is beginning to limit the ability to produce reliable results.

After processing the vials are immediately packed into our pre-cleaned, inert vial trays. Our ultra high purity bonded PTFE/Silicone closures packaged in an airtight, resealable container completes the configuration of a product offering unmatched purity for the most challenging applications.

National Scientific Mass Spec Certified Vials

Industry's **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 13 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.

National Scientific Mass Spec Vials undergo a proprietary cleaning process that greatly reduces the background particulates and their potential affect on high sensitivity chromatography. The table below gives a comparison of the particle distribution obtained from an analysis of standard vials versus the National Scientific Mass Spec Vials. All National Scientific Mass Spec 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 high-

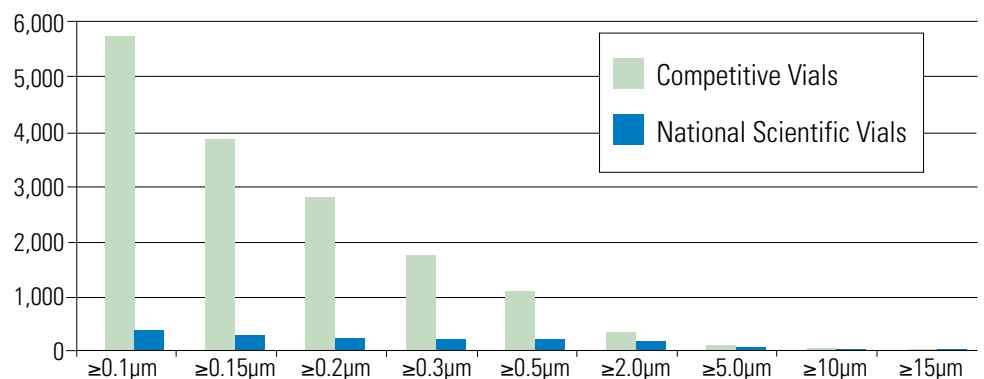
est counts occurring in the range below 0.5µm. This has traditionally been of little concern when GC inlet liners or HPLC guard columns are used. GC techniques employing on-column injection create the need for a sample vial with minimal background particulates to prevent an accumulation of foreign material 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.

The table below shows the results obtained from particulate analysis of a typical unprocessed vial compared to the National Scientific Certified Mass Spec vials. The processed vial shows a significant reduction in total particle counts.

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

Typical Cumulative Particle Counts



Low LC/MS Background

Samples of Pre-cleaned Mass Spec vials and closures were exposed to acetonitrile at room temperature for 2 hours. Potential non-volatile organic compounds were determined using LC/UV and LC/MS with several ionization techniques: positive electrospray, negative electrospray and positive atmospheric pressure ionization (APCI).

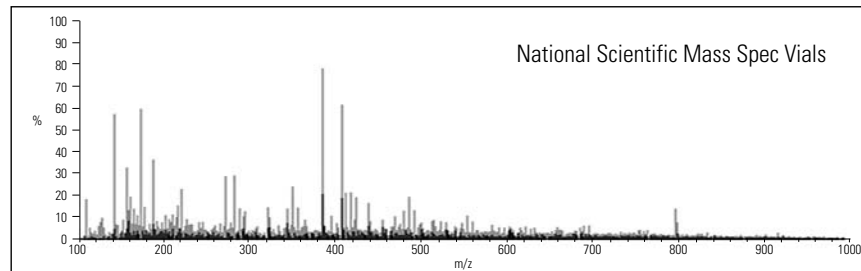
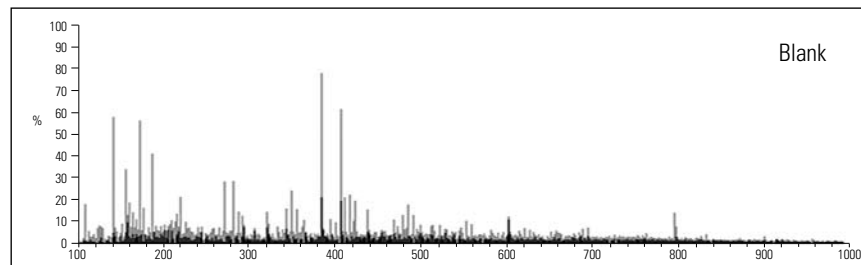
Additional testing was conducted on samples exposed to acetonitrile for 2 hours at a temperature of 50°C to determine the effect of severe operating conditions.

The results of the room temperature and 50°C 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 shipping container.

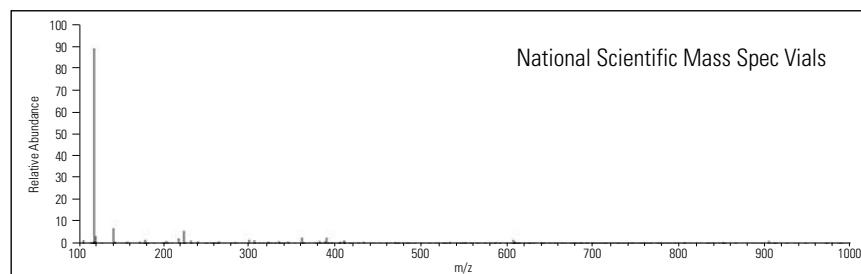
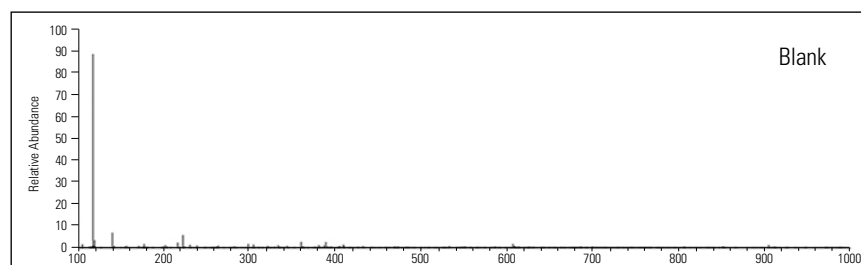
The second scan for each figure represents an injection of an equal quantity of the extracting solvent after exposure to the pre-cleaned sample vial.

LC/MS Background Scan



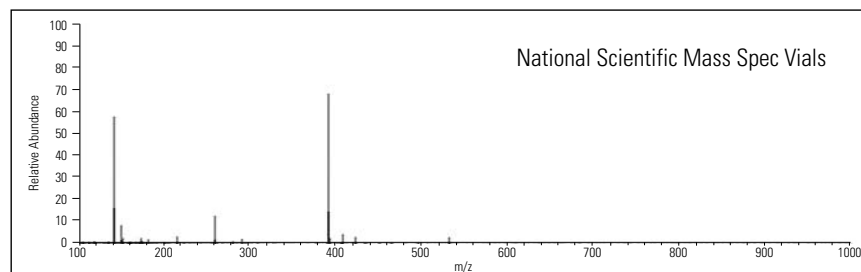
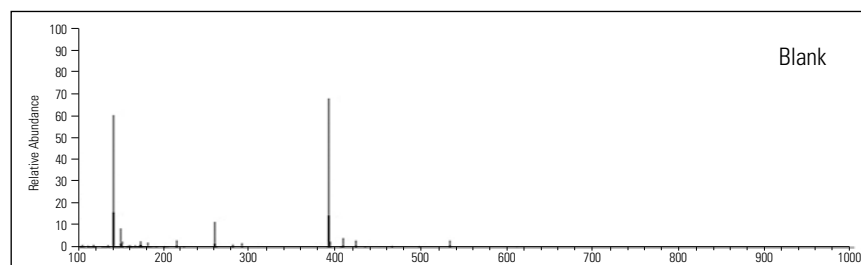
Conditions:
Positive ESI
100 to 1000m/z
1.51e5

LC/MS Background Scan



Conditions:
Negative ESI
100 to 1000m/z
4.45e6

LC/MS Background Scan

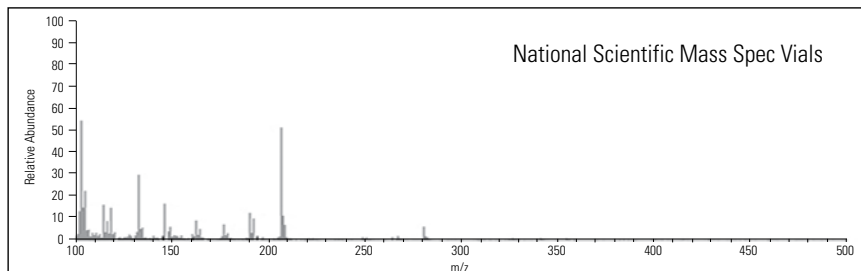
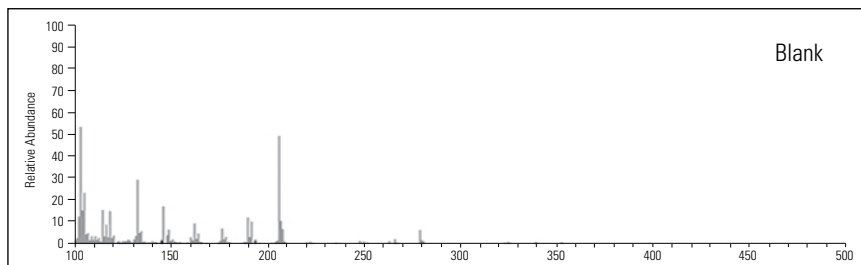


Conditions:
APCI
100 to 1000m/z
6.80e6

Low GC/MS Background

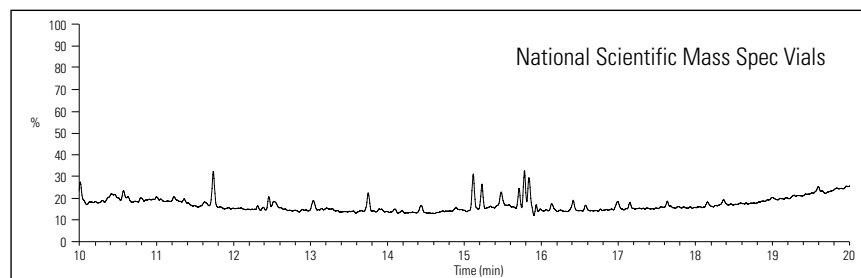
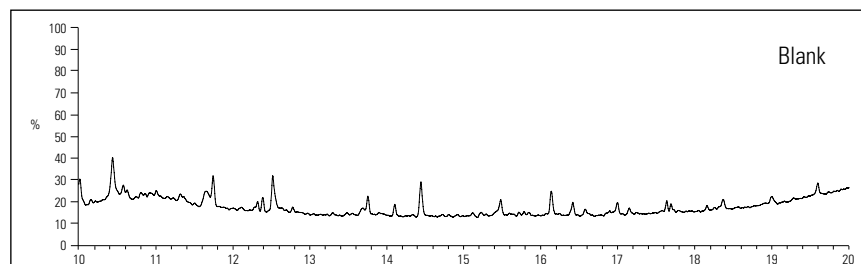
A portion of the vial extracts prepared for LC/MS analysis were taken for analysis by GC/MS. As with the LC/MS evaluation the vials were exposed at room temperature and 50°C. There was no significant difference between the room temperature and elevated temperature test results. A typical GC/MS scan is shown in the figure below with bank solvent in the upper scan and the vial extract shown in the lower scan.

GC/MS Background Scan



Conditions:
Positive EI
Oven Temp
40 to 290°C
50 to 500m/z
2.00e5

GC/MS Background Chromatogram



Conditions:
TIC F: +c
1.50E7
Full ms
(50.00 to 650.00)

Certified Mass Spec Vial Products and Ordering Information

Description	Blue Cap/PTFE Silicone Septa	Grey Cap/PTFE Silicone Septa, Pre-slit
Target DP 200µL clear ID fused insert vial	MSCERT4000-30LVW	MSCERT4000-36LVW
Target DP 350µL clear ID fused insert vial	MSCERT4000-31LVW	MSCERT4000-37LVW
Target DP 900µL clear precision taper vial	MSCERT4000-32	MSCERT4000-38
Target DP 1mL clear total recovery vial	MSCERT4000-33TR	MSCERT4000-39TR
Target DP 2mL clear ID vial	MSCERT4000-34W**	MSCERT4000-40W**
Target DP 2mL amber ID vial	MSCERT4000-35W	MSCERT4000-41W
Silanized Target DP 2mL Clear ID Vial	MSCERT4000-S34W	MSCERT4000-S40W
Silanized Target DP 2mL Amber ID Vial	MSCERT4000-S35W	MSCERT4000-S41W

** Products contained in this sample pack



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