

CHROMASOLV® HPLC Solvent Information

Product Line Overview



CHROMASOLV® LC-MS Grade Solvents

LC-MS solvents are designed specifically with low (≤ 100 ppb) levels of trace metals - such as calcium, magnesium, potassium, and sodium - that can interfere with mass spectral analysis by forming adduct species. The CHROMASOLV® LC-MS solvents also utilize specific HPLC / UV - VIS quality control tests guaranteeing traditional CHROMASOLV® specifications.

CHROMASOLV® Plus Grade Solvents

CHROMASOLV® Plus goes beyond our CHROMASOLV® HPLC to be your high-purity, multipurpose solvent. This grade is tested with a variety of analytical techniques and is suitable for myriad applications in areas such as chromatography, spectrophotometry, environmental analysis and some LC / MS analyses.

CHROMASOLV® Gradient Grade Solvents

This grade offers the same high quality as our CHROMASOLV® HPLC, but with added testing for HPLC - suitability via gradient analysis and UV-VIS spectroscopy.

CHROMASOLV® HPLC Grade Solvents

Ideal for use with HPLC instrumentation and organic synthesis - CHROMASOLV® HPLC solvents are sub-micron filtered and undergo rigorous specification testing to provide you with lot-to-lot consistency.

CHROMASOLV® Mobile Phase Solvents

Convenient and accurate pre-blended solvents for HPLC and LC-MS applications eliminate time-consuming mobile phase preparation as well as lost sample information and instrument down - time caused by impure mobile phases. For consistent baselines and minimal background noise, these blends are prepared with ultra pure acids.

Specification Comparison Within CHROMASOLV® Listings

CHROMASOLV® solvents come in a variety of grades designed to offer customers an optimal combination of performance and value. In order to illustrate differences between material grades, specifications for the three most common solvents employed in reversed-phase HPLC, acetonitrile, methanol and water, are presented below. In general, specification differences between solvent grades stem from the quantity and stringency of QC testing. It should be noted that for the HPLC gradient tests, direct comparison is often difficult due to differences in solvent programs, column type / dimensions, and detector wavelength.

Table I - Acetonitrile

	CHROMASOLV Plus (34998)	CHROMASOLV Gradient (34851)
GC Purity	>= 99.9%	>= 99.9%
GC - ECD	<= 10 ng / L Heptachlor Epoxide	-
Residue	<=2 mg/L	<=2 mg/L
Water (KF)	<= 0.01%	<= 0.01%
Free Acid	<= 0.001% (as Acetic Acid)	<= 0.001% (as Acetic Acid)
Free Base	<= 0.0001% (as NH3)	<= 0.0002% (as NH3)
Optical Properties		
UV 190nm	-	-
UV 195nm	<= 0.1	<= 0.13
UV 200nm	<= 0.02	<= 0.03
UV 210nm	-	-
UV 220nm	-	-
UV 228nm	<= 0.005	-
UV 230nm	-	<= 0.004
UV 235nm	-	-
UV 400nm	-	-
Fluorescence (quinine)	<= 0.5ppb @254 nm <= 0.5ppb @365 nm	<= 1.0ppb @254 nm <= 0.5ppb @365 nm
HPLC Gradient		
210 nm	<= 1mAU	<= 3mAU
254 nm	<= 0.2 mAU	<= 0.5 mAU
Baseline Rise	<= 12 mAU	<= 15 mAU

Table II - Methanol

	CHROMASOLV Plus (646377)	CHROMASOLV Gradient (34885)	CHROMASOLV (34860)
GC Purity	>=99.9%	>=99.9%	>=99.9%
GC - ECD	<= 10 ng / L Heptachlor Epoxide	-	-
Residue	<= 2 mg/L	<= 5 mg/L	<= 5 mg/L
Water (KF)	<= 0.05%	<= 0.02%	<= 0.03%
Carbonyl Compounds (%)	<= 0.001	-	-
Titration Acid	<= 0.3 ueq / g	-	-
Titration Base	<= 0.2 ueq / g	-	-
Optical Properties			
UV 205nm	<= 1.0	-	-
UV 210nm	<= 0.8	<= 0.5	<= 0.5
UV 220nm	<= 0.2	<= 0.3	<= 0.3
UV 225nm	-	-	-
UV 230nm	<= 0.1	-	-
UV 235nm	-	<= 0.1	<= 0.1
UV 240nm	-	-	-
UV 250nm	<= 0.02	-	-
UV 260nm	-	<= 0.01	<= 0.01
UV 400nm	<= 0.005	-	-
Fluorescence (quinine)	-	<= 1ppb @254 nm	<= 1ppb @254 nm
Fluorescence (quinine)	-	<= 1ppb @365 nm	<= 1ppb @365 nm
HPLC Gradient			
230 nm	-	<= 2 mAU	-
254 nm	<= 5 mAU	<= 5 mAU	-

Table III - Water

	CHROMASOLV Plus (34877)	CHROMASOLV HPLC (270733)
Residue	<= 3 mg/L	<= 3 mg/L
Optical Properties		
Fluorescence (quinine)	<= 1 ppb @254nm	-
Fluorescence (quinine)	<= 1 ppb @365	-
UV 205nm	-	<= 0.1
UV 210nm	-	<= 0.01
UV 250nm	-	<= 0.005
UV 400nm	-	<= 0.005
HPLC Gradient		
210 nm	<= 5 mAU	<= 10 mAU
254 nm	<= 1 mAU	<= 2 mAU
Ion Chromatography		
Cl⁻	<= 10ppb	-
F⁻	<= 10ppb	-
NO₃⁻	<= 100ppb	-
SO₄⁻²	<= 100ppb	-

Comparison of Published Specifications

For informational purposes, key Sigma-Aldrich CHROMASOLV® Plus specifications for acetonitrile, methanol and water are compared with analogous product offerings from competitive vendors (listed below). It should be noted that material specifications are subject to change and the specifications listed below are not necessarily current or comprehensive. For quality comparison, 4 liter samples of competitive material were processed by our QC laboratory using the testing panel associated with the comparable Sigma-Aldrich CHROMASOLV® Plus product listing.

Acetonitrile

- B & J Brand (Burdick & Jackson): Catalog #015-4
- BAKER ANALYZED™ HPLC Reagent (J.T. Baker): Catalog #9017-03
- EMD OmniSolv® (EMD Chemicals, Inc.): Catalog #AX0142
- Fisher Optima® (Fisher Scientific): Catalog #A996
- CHROMASOLV® Plus (Sigma-Aldrich): Catalog #34998
 - o Lot 01851KD (8/19/05)
 - o Lot 16189MD (10/31/05)
 - o Lot 07737TD (12/7/05)

Methanol

- B & J Brand (Burdick & Jackson): Catalog #230-4
- BAKER ANALYZED™ HPLC Reagent (J.T. Baker): Catalog #9093-03
- EMD OmniSolv® (EMD Chemicals, Inc.): Catalog #MX0488
- Fisher Optima® (Fisher Scientific): Catalog #A454
- CHROMASOLV® Plus (Sigma-Aldrich): Catalog #646377
 - o Lot 00557MD (11/21/05)
 - o Lot 00744TD (12/13/05)
 - o Lot 92507TD (1/10/06)

Water

- B & J Brand HPLC Certified (Burdick & Jackson): Catalog #AH365-4
- BAKER ANALYZED™ HPLC Reagent (J.T. Baker): Catalog #4218-03
- EMD OmniSolv® (EMD Chemicals, Inc.): Catalog #WX0004
- Fisher Optima® (Fisher Scientific): Catalog #W7-4
- CHROMASOLV® Plus (Sigma-Aldrich): Catalog #34877
 - o Lot 00449PD (12/7/05)
 - o Lot 02360PD (12/15/05)
 - o Lot 90220TD (1/6/06)

Specification Comparison:

Table IV - Acetonitrile Specifications

	SA · CHROMASOLV Plus	B & J Brand	BAKER ANALYZED™ HPLC	EMD OmniSolv	Fisher Optima
GC Purity	>=99.9%	>=99.9%	>=99.8% (H2O Corrected)	>=99.9%	>=99.9%
GC - ECD	<= 10 ng / L Standard	<= 10 ng / L Standard	-	-	<= 10 ng / L Standard
Residue	<= 2 mg/L	<= 1 mg/L	<= 1 mg/L	<= 1 mg/L	<= 0.8 mg/L
Water (KF)	<= 0.01%	<= 0.01%	<= .01%	<= .02%	<= .01%
Free Acid	<= 0.001% (as Acetic Acid)	-	<= 0.8 ueq / g	<= 8.0 ueq / g	<= 8.0 ueq / g
Free Base	<= 0.0001% (as NH3)	-	<= 0.6 ueq / g	<= 0.16 ueq / g	<= 0.6 ueq / g
Optical Properties					
UV 189nm	-	-	-	<= 1.0	<= 1.0
UV 195nm	<= 0.1	-	-	<= 0.15	<= 0.15
UV 200nm	<= 0.02	-	<= 0.05	-	<= 0.07
UV 210nm	-	-	-	<= 0.03	<= 0.04
UV 220nm	-	-	<= 0.01	-	<= 0.02
UV 228nm	<= 0.005	-	-	-	-
UV 230nm	-	-	-	<= 0.005	-
UV 250nm	-	-	-	<= 0.005	-
UV 254nm	-	-	-	-	<= 0.005
UV 270nm	-	-	-	<= 0.005	-
UV 254nm-400nm	-	-	<= 0.005	-	-
UV Cut Off	-	190	190	189	-
Fluorescence (quinine)	<= 0.5ppb @254 nm <= 0.5ppb @365 nm	<= 0.3 ppb @450nm <= 1.0 ppb @Emission Max	<= 0.3 ppb @450nm <= 1.0 ppb @Emission Max	<= 0.3 ppb	<= 1.0 ppb
HPLC Gradient					
210 nm	<= 1mAU	-	<= 5 mAU	<= 2 mAU	Pass @ 205 / 254nm
215 nm	-	<= 5 mAU	-	-	-
254 nm	<= 0.2 mAU	<= 1 mAU	<= 5 mAU	<= 0.3 mAU	-
Baseline Rise	<= 12 mAU	-	-	-	-

Table V - Methanol Specifications

	SA · CHROMASOLV Plus	B&J Brand	BAKER ANALYZED™ HPLC	EMD OmniSolv	Fisher Optima
GC Purity	>=99.9%	>=99.9%	>=99.8% (H2O Corrected)	>=99.9%	>=99.9%
GC - ECD	<= 10 ng / L Standard	<= 10 ng / L Standard	-	-	<= 10 ng / L Standard
Residue	<= 2 mg/L	<= 1 mg/L	<= 1 mg/L	<= 1 mg/L	<= 1 mg/L
Water (KF)	<= 0.05%	<= 0.05%	<= .05%	<= .05%	<= .07%
Carbonyl Compounds (%)	0.001	-	0.001	-	Pass
Titration Acid	<= 0.3 ueq / g	-	<= 0.3 ueq / g	<= 0.3 ueq / g	<= 0.3 ueq / g
Titration Base	<= 0.2 ueq / g	-	<= 0.1 ueq / g	<= 0.2 ueq / g	<= 0.2 ueq / g
Optical Properties					
UV 205nm	<= 1.0	-	-	<= 0.8	<= 1.0
UV 210nm	<= 0.8	-	-	<= 0.25	-
UV 220nm	<= 0.2	-	-	<= 0.10	<= 0.23
UV 225nm	-	-	<= 0.15	-	-
UV 230nm	<= 0.1	-	-	<= 0.03	<= 0.11
UV 250nm	<= 0.02	-	-	<= 0.01	-
UV 254nm	-	-	-	-	<= 0.01
UV 300nm	-	-	-	-	-
UV 400nm	<= 0.005	-	-	<= 0.005	-
UV 254nm-400nm	-	-	<= 0.01	-	-
UV Cut Off	-	205	205	203 nm	-
Fluorescence (quinine)	-	<= 0.3 ppb @450nm	<= 0.3 ppb @450nm	<= 0.25 ppb	<= 1.0 ppb
Fluorescence (quinine)	-	-	<= 1.0 ppb @Emission Maxima	-	-
HPLC Gradient					
210 nm	-	-	-	-	Pass @ 214 nm / 254 nm
220 nm	-	<= 5 mAU	-	-	-
235 nm	-	-	-	<= 1 mAU	-
254 nm	<= 5 mAU	<= 1 mAU	<= 2 mAU	<= 1 mAU	-

Table VI - Water Specifications

	SA - CHROMASOLV Plus	B & J Brand HPLC Certified	BAKER ANALYZED™ HPLC	EMD Omnisolv	Fisher Optima
Residue	<= 3 mg/L	<= 3 mg/L	<= 2 mg/L	<= 1mg/L	<= 1mg/L
UV Cut - Off	-	190 nm	-	-	-
Microbial Contamination	-	Epifluorescence Microscopy	-	-	-
Filter Test	-	-	Pass	Pass	-
Conductance	-	<= 2 uOhm	-	<= 2 uOhm	-
TOC	-	<= 50ppb	-	<= 5ppb	-
Optical Properties					
UV 190 nm	-	-	-	<= 0.01	-
UV 200 nm	-	-	-	<= 0.01	<= 0.01
UV 210 nm	-	-	-	<= 0.01	-
UV 220 nm	-	-	-	<= 0.01	-
UV 230 nm	-	-	-	<= 0.01	-
UV 240 nm	-	-	-	<= 0.01	-
UV 250 nm	-	-	-	<= 0.005	-
UV 254 nm	-	-	-	-	<= 0.005
UV 280 nm	-	-	-	<= 0.005	-
UV 300 nm	-	-	-	-	<= 0.005
UV 400 nm	-	-	-	-	<= 0.005
Fluorescence (quinine)	<= 1 ppb @254nm	-	<= 0.1 ppb @450nm	<= 0.1 ppb	-
Fluorescence (quinine)	<= 1 ppb @365	-	= 0.2 ppb @Emission Maxima	-	-
HPLC Gradient					
200 nm	-	<= 15 mAU	-	-	Pass Test @ 205 and 254nm
210 nm	<= 5 mAU	-	-	<= 1 mAU	-
254 nm	<= 1 mAU	-	<= 1 mAU	<= 0.1 mAU	-
Ion Chromatography					
Cl ⁻	<= 10ppb	-	-	-	-
F ⁻	<= 10ppb	-	-	-	-
NO ₃ ⁻	<= 100ppb	-	-	-	-
SO ₄ ⁻²	<= 100ppb	-	-	-	-

As seen in Tables IV - VI, most vendor specifications for a particular solvent are very similar. It should be noted that, for many of the tests, direct comparison is often difficult due to variation in experimental method. Significant specification differences of the materials tested here are noted below.

Acetonitrile:

- J.T. Baker and EMD do not perform GC / ECD - based pesticide residue testing
- QC residue data for Sigma-Aldrich material (Table VII) is indistinguishable from the competition
- Water specification for EMD material (0.02%) is higher than other vendors (.01%)
- Sigma-Aldrich material utilizes a baseline rise specification not offered by other vendors

Methanol:

- J.T. Baker and EMD material do not utilize GC / ECD - based pesticide residue testing
- QC residue data for Sigma-Aldrich material (Table VIII) is indistinguishable from the competition
- Burdick and Jackson and EMD do not perform carbonyl compound testing
- Sigma-Aldrich material does not currently report fluorescence data for their material - this specification will be added in the near future

Water:

- QC residue data for Sigma-Aldrich material (Table IX) is indistinguishable from the competition
- Burdick and Jackson and Fisher do not perform any fluorescence testing of this material
- Burdick and Jackson performs TOC, conductance testing and epifluorescence microscopy
- For these materials, Sigma-Aldrich is the only major vendor currently performing IC - based anion testing

Lot Specific Quality Testing Comparison

Due to differences in testing methods and QC specifications, the best way to evaluate materials from multiple vendors is to apply identical testing methods to each solvent product. For this study, competitive materials discussed above were evaluated via the QC panel applicable to the comparable CHROMASOLV® Plus listing.

In Tables VII - IX, failing results are highlighted in yellow and, for several of the competitive solvents evaluated, at least one test met with a failing result. Since the competitive evaluation data was collected by Sigma-Aldrich QC and not by a third party laboratory, competitive materials are listed in generic fashion. This data demonstrates the ability of Sigma-Aldrich to deliver solvents of a quality that meets or exceeds that of alternative vendors.

Table VII - Acetonitrile QC Results

QC Test	CHROMASOLV Plus Specification	Suppliers				CHROMASOLV Plus		
		A	B	C	D	16189MD	07737TD	01851KD
GC Purity	>= 99.9%	99.96	99.96	99.99	99.96	99.96	99.97	99.98
GC - ECD Residue	<= 10 ng / L Standard	Pass	Pass	Pass	Fail	Pass	Pass	Pass
Water (KF)	<= 2 mg/L	0.8	1.8	1.2	1.4	1	0.6	1
Free Acid	<= 0.01%	0.006	0.002	0.001	0.002	0.0004	0.0004	0.0005
Free Base	<= 0.001% (as Acetic Acid) <= 0.0001% (as NH3)	0.0006	0.0012	0.0015	0.0012	0.00096	0.001	0.0011
		Pass	0.00007	0.00005	0.00009	0.00009	0.00009	0.00009
Optical Properties								
UV 195nm	<= 0.1	0.092	0.072	0.069	0.076	0.091	0.087	Pass
UV 200nm	<= 0.02	0.023	0.018	0.018	0.016	0.021	0.018	Pass
UV 228nm	<= 0.005	0.005	0.008	0.007	0.007	0.005	0.003	Pass
Fluorescence (quinine)	<= 0.5ppb @254 nm	0.46	0.46	0.45	1.13	0.533	0.38	0.37
	<= 0.5ppb @365 nm	0.1	0.07	0.13	0.79	0.032	<.01	0.149
HPLC Gradient								
210 nm	<= 1mAU	1	1	0.21	6.4	0.4	0.6	0.4
254 nm	<= 0.2 mAU	0.1	0.1	0.2	0.8	0.2	0.2	None
Baseline Rise	<= 12 mAU	11.7	12	12	20.4	11.2	11.1	10.8

Table VIII - Methanol QC Results

QC Test	CHROMASOLV Plus Specification	Suppliers				CHROMASOLV Plus		
		A	B	C	D	00557MD	00744TD	92507TD
GC Purity	>=99.9%	99.99	99.99	99.98	99.97	99.98	99.99	99.99
GC - ECD Residue	<= 10 ng / L Standard	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Water (KF)	<= 2 mg/L	0.9mg/L	1.4 mg/L	9 mg/L	0.8 mg/L	<1mg/L	<1mg/L	1.2mg/L
Carbonyl Compounds (%)	<= 0.05%	0.002	0.015	0.001	0.001	0.002	0.002	0.0016
Titration	0.001	Fail	Pass	Pass	Pass	Pass	Pass	Pass
Titration	<= 0.3 ueq / g	0.1	0.27	0.13	0.13	0.1	0.2	0.1
Titration	<= 0.2 ueq / g	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Optical Properties								
UV 205nm	<= 1.0	0.837	0.854	0.819	0.789	0.406	0.503	0.739
UV 210nm	<= 0.8	0.455	0.469	0.431	0.411	0.175	0.185	0.402
UV 220nm	<= 0.2	0.208	0.219	0.194	0.187	0.046	0.064	0.188
UV 230nm	<= 0.1	0.092	0.1	0.088	0.087	0.02	0.033	0.088
UV 250nm	<= 0.02	0.011	0.02	0.012	0.016	0.009	0.019	0.016
UV 400nm	<= 0.005	0.004	0.002	0.001	0	0.005	0.001	0.002
HPLC Gradient								
HPLC @ 254 nm	<= 5 mAU	1.25	1.04	0.92	0.58	2.72	1.19	2.51

Table IX - Water QC Results

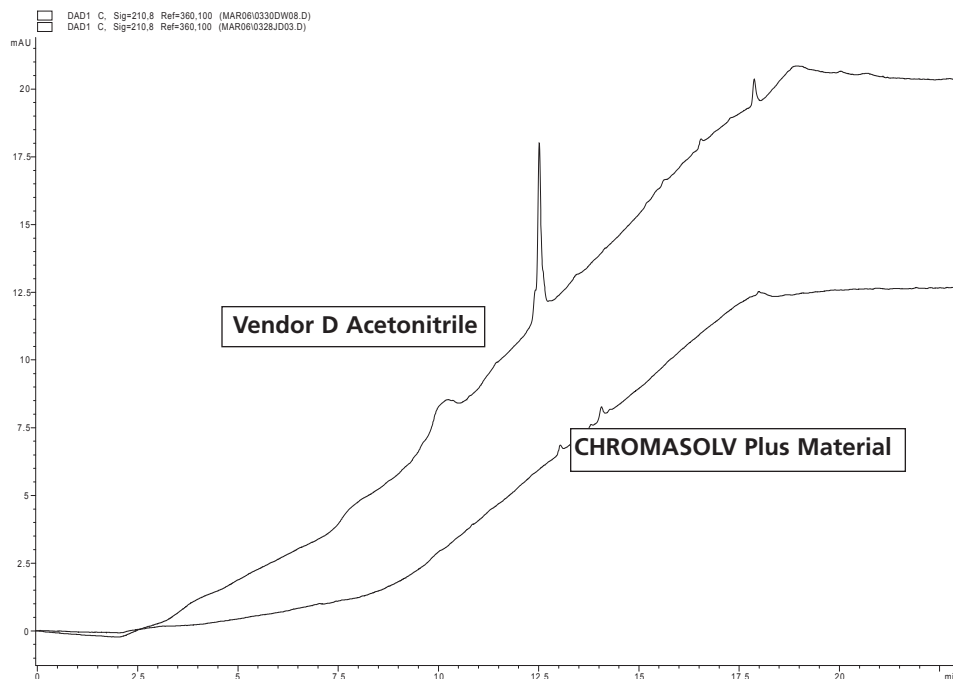
QC Test	CHROMASOLV Plus Specification	Suppliers				CHROMASOLV Plus		
		A	B	C	D	00449PD	02360PD	90220TD
Residue	<= 3 ppm	3.0	10.0	2.0	2.0	1.0	2.5	1.5
Fluorescence (quinine)	<= 1 ppb @254nm	<0.01	0.48	0.164	0.168	0.15	0.145	0.0865
Fluorescence (quinine)	<= 1 ppb @365	<0.01	0.34	<0.01	<0.01	0.1	0.095	0.382
HPLC Gradient								
HPLC (210 nm)	<= 5 mAU	2.61	6.71	0.32	3.02	2.68	3.145	2.75
HPLC (254 nm)	<= 1 mAU	0.79	0.65	0.45	0.38	0.67	0.725	0.575
Ion Chromatography								
Cl ⁻	<= 10ppb	Pass	Pass	Pass	Pass	Pass	Pass	Pass
F ⁻	<= 10ppb	Fail	Fail	Pass	Pass	Pass	Pass	Pass
NO ₃ ⁻	<= 100ppb	Pass	Pass	Pass	Pass	Pass	Pass	Pass
SO ₄ ⁻²	<= 100ppb	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Competitive Evaluation Summary

Acetonitrile:

- HPLC gradient testing results were very comparable for all materials - internal and external
- Vendor B and Vendor C material exceeded at least one of the UV - VIS specifications
- Water levels as measured by Karl Fischer methods were lower overall in SA material relative to competitors
- Vendor D material failed multiple tests related to optical properties and chromatographic performance (See HPLC Trace Below)

Vendor D HPLC Data @ 210nm





Methanol:

- Vendor A material failed carbonyl testing
- Vendor C material had very high residue test result relative to other materials

Water:

- Vendor B material failed HPLC testing @ 210nm
- Vendor A and Vendor B material each exceeded F- specification (≥ 10 ppb)

Frequently Asked Questions

Q: Which of the Sigma-Aldrich products most closely resembles a product such as the J.T. Baker LC-MS grade?

A: The information presented above primarily focused on traditional HPLC solvents offered by Sigma Aldrich. Riedel de Haen - a member of the Sigma-Aldrich family of companies - offers the LC - MS CHROMASOLV® solvent line produced with the needs of the LC - MS user in mind. This grade offers all of the specifications applicable to our CHROMASOLV® Plus line as well as LC - MS suitability testing and ICP - based trace metal testing to control contamination that might interfere with electrospray or APCI ionization methods. However, CHROMASOLV Plus is suitable for some LC-MS applications.

Q: What has Sigma-Aldrich done recently to further improve solvent quality?

A: In 2005, we made several changes to our solvent packaging and filling processes to further improve product quality.

- Solvent bottle cap material changed from Bakelite to polypropylene which does not generate particulate via low - level fracturing during bottle tightening / opening.
- Our amber glass bottles are now fluorine - treated to minimize levels of alkali metals leached from interior surfaces. High levels of these contaminants can interfere with a variety of analytical methods - particularly LC / MS - based assays.
- Sigma-Aldrich is now performing a bottle pre - rinse of select materials prior to filling which will further reduce potential packaging - related contamination.

In addition, all solvent specifications are currently being reviewed to ensure that all Sigma-Aldrich QC testing meets or exceeds industry standards

Frequently Asked Questions (cont'd)

Q: Which Sigma-Aldrich solvent grade is appropriate for my application?

A: Selecting a solvent grade for a particular application requires balancing the quality demands of a particular assay with the ubiquitous need for cost - effective operations. The [Solvent Applications Guide](#) below will help guide users to a product that most effectively meets their needs.

Analytical Applications			
Application	Primary Grade	Secondary Grade	Related Products
Capillary GC	Capillary GC	Pesticide Residue A.C.S	SLB Columns Equity Columns
Flash Chromatography	A.C.S	CHROMASOLV® HPLC	VersaFlash Purification
GC-ECD	Capillary GC	Pesticide Residue	SLB Columns
GC-FID	Capillary GC	Pesticide Residue	SLB Columns
GC-Mass Spectrometry	Capillary GC	Pesticide Residue	SLB Columns
Gel Permeation	CHROMASOLV® HPLC	CHROMASOLV® Plus CHROMASOLV® Gradient A.C.S	
HPLC	CHROMASOLV® Plus	CHROMASOLV® Gradient CHROMASOLV® HPLC CHROMASOLV® Mobile Phase Blends	Ascentis Columns Discovery Columns Whatman Mini-Uniprep Filters VerSA-Flow & NOWPak HPLC Dispensing Systems
LC Mass Spectrometry	CHROMASOLV® LC-MS	CHROMASOLV® Plus CHROMASOLV® Gradient CHROMASOLV® HPLC CHROMASOLV® Mobile Phase Blends	Ascentis Columns LC-MS Blends
Size Exclusion	CHROMASOLV® Plus	CHROMASOLV® Gradient CHROMASOLV® HPLC A.C.S	Discovery SPE
Solid Phase Extraction	CHROMASOLV® Plus CHROMASOLV® HPLC	CHROMASOLV® Gradient	Discovery SPE
Spectrophotometry	Spectrophotometric	CHROMASOLV® Plus CHROMASOLV® Gradient CHROMASOLV® HPLC Pesticide Residue A.C.S	Spectroscopy
NMR	NMR		NMR Tubes & Cleaners Stable Isotopes Aldrich Spectral Viewer