

Solvents for Liquid Chromatography



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LC solvents of FUJIFILM Wako Pure Chemical Corporation

As various chromatograph detectors become more improved, the quality demanded in the mobile phase (solvent) has become higher and more diversified. We have a lineup of solvents for high-performance liquid chromatograph (HPLC) that can be used in LC analysis in general, solvents for high-purity LC/MS, and solvents for QToFMS, which is suitable for ultrahigh sensitivity MS analysis. We also offer optimal solvents for use in GPC, and solvents that can be used for Japanese Pharmacopoeia tests.

List of testing requirement for LC solvents

The proof test items vary even for the same solvent, depending on the detector in which it is expected to be used or the application.

The solvents under each standard have-passed the testing requirement that are suited to the “expected applications,” in addition to the quality test as chemical substances.

Grade	Requirement				
HPLC	Absorbance	Gradient test	Fluorescence test		
LC/MS	Absorbance	Gradient test	Fluorescence test	Particles	Suitability for LC/MS analysis
QToFMS	Absorbance	Gradient test*	Fluorescence test	Particles	Suitability for QToFMS analysis
GPC	Absorbance	Gradient test	Suitability for GPC analysis		
the JP General Tests	JP method	USP-NF method	EP method		

*The gradient test for QToFMS was conducted as a QToFMS-compatible test.

Description of testing requirement

Absorbance	A test to confirm that the peak height that interferes with the analysis is lower than a certain standard level at a specific wavelength.
Gradient test	A test to confirm that the fluctuation of the baseline is lower than the standard level when it is used in gradient elution.
Fluorescence test	A test that compares the quantity of impurities with fluorescence that cause the background noise or deterioration in detection sensitivity when it is used in fluorescence measurement with the reference sample by the fluorescence intensity.
Particles	A test to confirm the number of particles that may affect the column life.
Suitability for LC/MS analysis	A test to confirm that the background noise is suppressed to a low level when it is used in analysis using a mass spectrometer.
Suitability for QToFMS analysis	A test to confirm that the baseline fluctuation is lower than the standard level by connecting a column to UHPLC and conducting gradient measurement using QToFMS.
Suitability for GPC analysis	A test to confirm the absorbance after heating with consideration of solvent discoloration caused by heating during polymer dissolution and analysis.

for High Performance Liquid Chromatography (HPLC)

Absorbance

Gradient test

Fluorescence
test

We offer various solvents of quality appropriate for use in high-performance liquid chromatograph.

Product list (Solvents for HPLC)

Product Number	Product Name	Package Size
014-08681	Acetone	1 L
010-08683		3 L
019-08631	Acetonitrile	1 L
015-08633		3 L
025-06691	Benzene	1 L
023-10801	1-Butanol	1 L
024-12771	<i>t</i> -Butyl Methyl Ether	1 L
033-08631	Chloroform	1 L
039-08633		3 L
031-20531	Chloroform, Amylene added	1 L
037-20533		3 L
033-08511	Cyclohexane	1 L
039-08513		3 L
042-16691	1,4-Dioxane	1 L
046-18671	<i>o</i> -Dichlorobenzene	1 L
042-20621	<i>N,N</i> -Dimethylformamide	1 L
048-20623		3 L
046-16971	Distilled Water	1 L
042-16973		3 L
136-06751	Dichloromethane	1 L
132-06753		3 L
056-03341	Ethanol (99.5)	1 L
052-03343		3 L
057-03371	Ethyl Acetate	1 L
053-03373		3 L
085-06991	1,1,1,3,3,3-Hexafluoro-2-propanol	100 mL
087-06995		500 mL
084-03421	Hexane	1 L
080-03423		3 L
085-03691	Heptane	1 L
138-06473	Methanol	1 L
132-06471		3 L
162-13461	1-Propanol	1 L
165-09161	2-Propanol	1 L
161-09163		3 L
200-19391	Tetrahydrofuran, with Stabilizer	1 L
206-19393		3 L
209-06811	Tetrahydrofuran, Stabilizer Free	1 L
205-06813		3 L
207-06731	2,2,4-Trimethylpentane	1 L
209-06791	Toluene	1 L

for LC/MS

Absorbance

Gradient test

Fluorescence
test

Particles

Suitability for
LC/MS analysis

These are dedicated solvents for LC/MS for which LC/MS compatibility has been confirmed. They are also recommended for ultrahigh-performance liquid chromatograph (UHPLC), as they are guaranteed for particles.

A glass bottle with special treatment to suppress the elution of impurities is used as the container*.

*Patent No. WO/2005/047884

Point for high recommendation 1

The cap material for LC/MS solvents was changed from aluminum to a special resin.

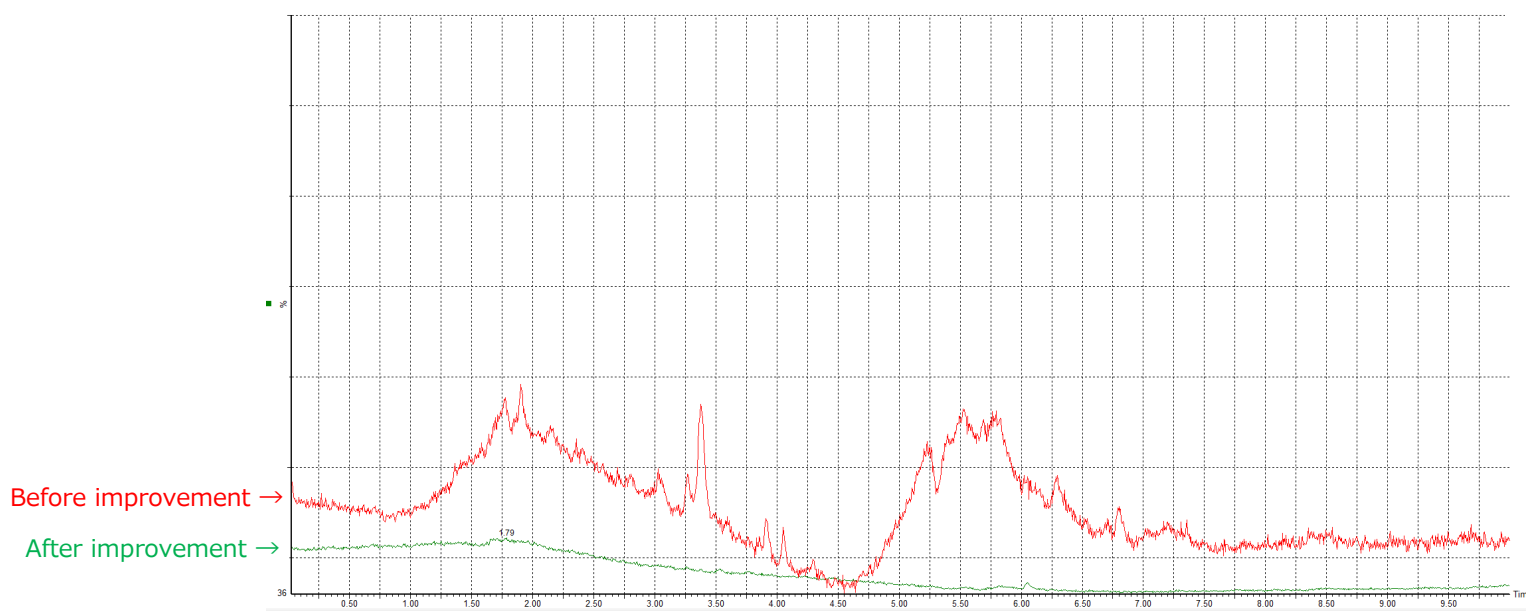


While the conventional aluminum caps posed a risk of aluminum dust adhering to the bottle mouth and contaminating the solvent, the new resin cap has no dust generation or component elution from the material. It maintains the high-quality state of the solvent.

Point for high recommendation 2

The quality was improved further by a review on the manufacturing method. The baseline is suppressed at an even lower level compared to the conventional products.

Comparison of baselines for acetonitrile (comparison of our products)



Example of product specifications (acetonitrile)

REQUIREMENT		SPECIFICATION
Assay (%)		min. 99.9
Density (20°C) [g/mL]		0.780~0.783
Refractive index n_D^{20}		1.343~1.346
Water [%]		max. 0.03
Residue after evaporation [%]		max. 0.001
Acidity (as CH ₃ COOH) [%]		max. 0.001
Ammonium (NH ₄) [ppm]		max. 0.3
Peroxides (as H ₂ O ₂) [ppm]		max. 5
Substances reducing permanganate (as O)		to pass test
Gradient test		to pass test
Particles (0.5µm or more) [number of particles per mL]		max. 100
Absorbance	200nm	max. 0.04以下
	210nm	max. 0.03以下
	220nm	max. 0.02以下
	230nm	max. 0.01以下
	240nm	max. 0.005以下
Fluorescence test		to pass test
Suitability for LC/MS analysis		to pass test

Product list (Solvents for LC/MS)

Product Number	Product Name	Package Size
012-19851	Acetonitrile	1 L
018-19853		3 L
050-09221	Ethanol (99.5)	1 L
056-09223		3 L
062-04721	0.1vol% Formic Acid-Acetonitrile	1 L
068-04723		3 L
138-14521	Methanol	1 L
134-14523		3 L
168-25531	2-Propanol	1 L
164-25533		3 L
214-01301	Ultrapure Water	1 L
210-01303		3 L

Product list (Mobile phase additives for LC/MS)

Product Number	Product Name	Package Size
014-20063	Acetic Acid	1 mL×5A
018-20061		50 mL
063-04533	Formic Acid (abt. 99%)	1 mL×5A
067-04531		50 mL

for high-resolution MS (for QTofMS)

Absorbance

Gradient test*

Fluorescence
test

Particles

Suitability for
QTofMS analysis

*The gradient test for QTofMS was conducted as a QTofMS-compatible test.

Since a high-performance liquid chromatograph-mass spectrometer (LC-MS) has excellent characteristics, including the width of the scope of measuring objects and selectivity, it has become popular in a wide range of fields. Mass spectrometers with higher sensitivity and resolution have become popularized these days, and they are applied in research of metabolomics, proteomics, etc.

This product is a high-purity solvent optimal for measurements using high-sensitivity and high-resolution MS



✓ Testing requirement for compatibility with QTofMS

- A wide mass range by full scan is guaranteed. (mass range: 50–3000)
- Quality assurance with utilization of multivariate analysis-principal component analysis.

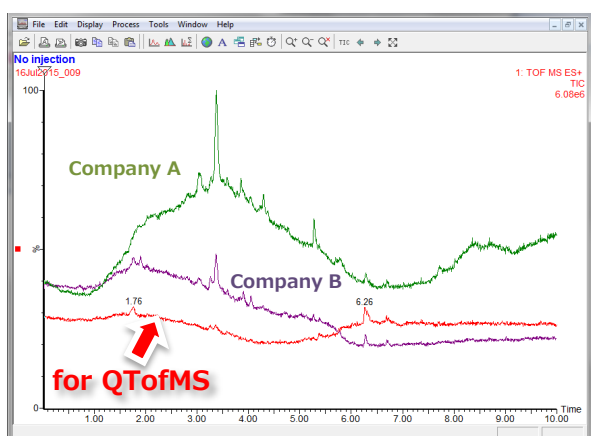
✓ Gradient measurement by column connection (UHPLC measurement)

✓ Particle assurance

✓ Content and container that ensure that the solvent can be used in high-purity conditions at any time

- 500 mL or 1 L content optimal for using up
- Glass bottles with special treatment that suppresses the elution of impurities are used (Patent No. WO/2005/047884)

Low background noise



Comparison of background noise between our solvent for QTofMS and LC/MS solvents of other companies (Companies A and B)

We reviewed the manufacturing processes from various points so that it can be used in high-performance MS.

This product showed a lower background noise compared to the LC/MS solvents of other companies (Companies A and B) in quality confirmation using QTofMS.

[Total ion chromatogram]

Green : Company A
Purple : Company B
Red : for QTofMS (Fujifilm Wako)

Small packaging for usability

Once opened, solvents become contaminated due to entry of air in laboratory, etc. To prevent contamination after opening, this product comes in 500 mL or 1 L content that can be used up.



These are the chromatograms **immediately after opening (green)** and **1 week after opening (red)**. Since it is highly likely that the increase in background noise would cause adverse effects on the measurement results in high-performance mass spectrometers, it is recommended that the mobile phase is used up each time.

Product list (for QTofMS)

Product Number	Product Name	Package Size
018-26225	Acetonitrile	500 mL
016-26221		1 L
130-18545	Methanol	500 mL
138-18541		1 L
164-27515	2-Propanol	500 mL
212-01601	Ultrapure Water	1 L

Conditions and equipment for data acquisition

Conditions for data acquisition

HPLC	ACQUITY UPLC H-Class (Waters)
Column	Wakopak® Ultra C18-2, 2.1mmφ×50mm
Column temperature	40°C±0.3°C
Eluate	Acetonitrile : Water [Gradient]
Detector	UV 210nm
Mass Spectrometer	Time-of-Flight Mass Spectrometer (Waters Xevo G2-XS)
Ionization	ESI
Mass Range	<i>m/z</i> 50~3000
Polarity	positive



Waters Xevo G2-XS

for GPC

Absorbance

Gradient test

Suitability for
GPC analysis

GPC solvents are solvents for which it has been confirmed that there is no coloring under heating for polymer dissolution or analysis. They are also guaranteed moisture, peroxides, non-volatile substances or the less changes in refractive index or ultraviolet absorption caused by impurities. This grades are optimal for preparation of GPC eluents.

Example of product specifications (1,1,1,3,3,3-Hexafluoro-2-propanol)

REQUIREMENT		SPECIFICATION
Appearance		Colorless clear liquid
Density (20°C) (g/mL)		1.617-1.624
Absorbance	200 nm	max. 0.05
	220 nm	max. 0.03
	240 nm	max. 0.02
	254-400 nm	max. 0.01
Suitability for GPC test		to pass test
Water (%)		max. 0.03
Residue after evaporation (%)		max. 0.001
Acidity (as HF) (%)		max. 0.001
Peroxides (as H ₂ O ₂) (ppm)		max. 5
Assay (cGC) (%)		min. 99.5

Product list (for GPC)

Product Number	Product Name	Package Size
036-24481	Chloroform	1 L
032-24483		3 L
039-24493	Chloroform, Amylene added	3 L
043-33841	o-Dichlorobenzene	1 L
049-33843		3 L
045-33921	N,N-Dimethylacetamide	1 L
041-33923		3 L
046-33831	N,N-Dimethylformamide	1 L
042-33833		3 L
048-33911	Dimethyl Sulfoxide	1 L
044-33913		3 L
082-10311	1,1,1,3,3,3-Hexafluoro-2-propanol	100 mL
084-10315		500 mL
134-18521	1-Methyl-2-pyrrolidone	1 L
130-18523		3 L
205-20071	Tetrahydrofuran, Stabilizer Free	1 L
201-20073		3 L
209-20091	Tetrahydrofuran, with Stabilizer	1 L
205-20093		3 L

for the Japanese Pharmacopoeia General Tests

JP method

USP-NF method

EP method

The solvents for the Japanese Pharmacopoeia general tests (liquid chromatography) are HPLC solvents for which compliance with the Japanese Pharmacopoeia (JP) reagent standards, the United States Pharmacopoeia (USP) reagent standards, and the European Pharmacopoeia (EP) reagent standards is guaranteed, and for which some testing requirement of our company's own have been added.

Example of product label

Indicates the expiration date

Indicates the guaranteed items

Conforms to Reag.JP for LC, Reag.USP, Reag.EP

Conforms to Reag.JP for LC, Reag.USP, Reag.EP

Reagent 試薬 019-21691 Acetonitrile アセトニトリル 1L

Example of product specifications (Acetonitrile)

REQUIREMENT	JP method (*added requirement by us)	USP-NF method	EP method
Description	Colorless clear liquid	Colorless clear liquid	Colorless clear liquid
Color (APHA)	-	max. 10	-
Density	0.780 - 0.783 g/ml*	-	Sp. Gr. (20/20°C) about 0.78
Refractive n_D^{20}	1.343~1.346*	-	about 1.344
Absorbance	-	-	-
190 nm	-	max. 1.00	-
200 nm	max. 0.07 (0.05)*	-	max. 0.10
210 nm	max. 0.046 (0.03)*	-	-
220 nm	max. 0.027 (0.02)*	max. 0.05	-
230 nm	max. 0.014 (0.01)*	-	-
240 nm	max. 0.009 (0.005)*	-	-
254 nm	-	max. 0.01	-
250-280 nm	-	max. 0.01	-
255-420 nm	-	-	max. 0.01
240-800 nm	-	-	max. 0.01
Gradient test	to pass test*	to pass test	-
Residue after evaporation	0.001 %*	0.005%以下	-
Titration acid	Acidity 0.001 %*	8 μ eq/g以下	-
Titration base	-	0.6 μ eq/g以下	-
Water	max. 0.05 %*	0.003	-
pH (100g/L)	-	-	Neutral to litmus paper
Distillation range (80-82 °C)	-	-	min. 95 %
Ammonium (NH ₄)	0.3 ppm*	-	-
Peroxides (H ₂ O ₂)	5 ppm*	-	-
Substances reducing permanganate	to pass test*	-	-
Fluorescence test	to pass test*	-	-
Assay	min. 99.8 %*	min. 99.5 %	min. 99.9 %

Product list (Solvents for the Japanese Pharmacopoeia General Tests)

Product Number	Product Name	Package Size
019-21691	Acetonitrile	1 L
015-21693		3 L
019-21696		3 L×2
085-08711	Hexane	1 L
081-08713		3 L
136-15661	Methanol	1 L
132-15663		3 L
136-15666		3 L×2
206-20981	Tetrahydrofuran, Stabilizer Free	1 L

Protective Jacket Dedicated to Gallon Glass bottle

GalloTect™

GalloTect™ is a protective jacket dedicated to gallon glass bottle. FUJIFILM Wako has developed GalloTect™ with the desire to add safety to daily testing and research activities, based on user feedback such as "when lifted the gallon glass bottle, it smashed and cracked."



Body material : Polypropylene (PP)
SIZE (mm) : W 175×D 175×H 231.5

✓ Carry out solvent resistance test with 11 kinds of solvents!

Solvent resistance of body material has been confirmed for a week with various solvents.

Tested solvents: Acetone, Acetonitrile, Benzyl Alcohol, 1-Butanol, DMF, DMSO, Ethanol, Glycerin, Methanol, 2-Propanol, Water

✓ A durability test was performed with a 10 kg weight!

Weight test was performed at 10 kg for 1 hour.

✓ The lid was opened and closed 200 times to confirm that there is no loosening!

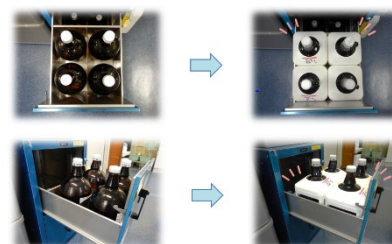
✓ All-plastics not requiring waste separation!

A resin rivet was adopted for the screw portion.

When discarding, a troublesome separation is not necessary!

✓ Just fit your reagent shelf!

We focused on the design and eliminated the bulkiness thoroughly. The conventional reagent shelf can be stored gallon glass bottle with GalloTect™.



How to use

1. Place the gallon bottle and set the lid.



2. Turn the lid in the direction of the arrow until you hear a click.



3. Complete



Product Number	Product Name	Package Size
293-36321	Gallo Tect™	1