

Chemical Stockroom Handbook

Essentials & Storage Guidelines



Reliability.
Purity.
Certainty.

Introduction

Chemicals from Thermo Fisher Scientific brands meet the requirements of various tests and applications. Choose from Thermo Scientific™, Fisher Chemical™, Fisher BioReagents™, Acros™ Organics, Alfa Aesar™ and Maybridge™ brands in a range of sizes — from convenient off-the-shelf products to high-volume solvent delivery systems. Should you require something different, Specialized Chemical Services can create a custom solution to meet your unique needs.

As a chemical stockroom manager, you're concerned with safe chemical storage and handling, a responsibility that extends beyond the storeroom walls to lab personnel, building staff, campus residents and the environment. This guide of safety resources provides technical specifications, storage guidelines, chemical compatibility charts, and other recommendations to support the many research and teaching projects in your facility.

Table of Contents

Introduction	2	Reading our Chemical Label	13
Periodic Table of the Elements	2	FisherLOCK™ Solvent Caps	14
Fisher Chemical Purity Grades	3	Fisher Chemical Products in the Safe-Cote™ Bottles	15
Fisher Chemical Stockroom Essentials	4-5	EcoSafPak™ Packaging	16
Fisher BioReagents Purity Grades	6	Chemical Storage and Handling Recommendations	17
Fisher BioReagents Stockroom Essentials	7-8	Chemical Incompatibilities by Hazard Class	17
Acros Organics Stockroom Essentials.....	9-10	Chemical Incompatibilities by Chemical	18
Specialized Chemical Solutions	11	Chemical Resistance and Physical Properties of Plastics.....	19
Chemical Classification and Labeling	12	Chemical Resistance of Labware Materials	20-21

Periodic Table of the Elements

KEY TO TABLE

- Symbol — H — Atomic Number
- Atomic Weight — 1.008 — Melting Point (°C)
- Element Name — Hydrogen — Boiling Point (°C)
- Critical Point (°C)
- Alkali Metals
- Alkaline Earth Metals
- Transition Elements
- Non-metals
- Other Metals
- Halogens
- Inert Gases
- Lanthanide Series
- Actinide Series
- Aa — Solid
- Aa — Gas
- Aa — Liquid
- Aa — Synthetically Prepared

Fisher Chemical: Purity Grades for Every Application

Grade	Definition	Application
Optima™ UHPLC/MS	Solvents qualified for UHPLC/MS; Meets tight specifications for signal-to-noise ratios, metal contamination, gradient suitability and UV-absorbing contaminants. Submicron filtered and packaged in borosilicate glass bottles.	Ideal mobile phase for UHPLC/MS applications in pharmaceutical, biotechnology, clinical, environmental and food safety industries.
Optima LC/MS	Solvents that meet the purity requirements for LC/MS and UHPLC. Analyzed for 17 metal to ppb levels; UV-absorbing contaminants measured from 200 to 400nm; submicron filtered.	Ideal mobile phase for LC/MS and UHPLC/UV applications in pharmaceutical, biotechnology, clinical, environmental and food safety industries.
Optima	Acids and solvents of extremely high purity (to ppt and ppm levels, respectively). Lots are analyzed by ICP/MS for more than 55 metals; actual lot specifications may vary from published levels.	HPLC, GC, plasma/ICP, spectrophotometry, and pesticide residue analysis
HPLC	Solvents processed and submicron filtered for HPLC instruments; meet ACS specifications.	HPLC and spectrophotometry procedures
GC Resolv	Solvents for gas chromatography with purity to ppb levels; meet ACS specifications and limits for the Contract Laboratory Program Target Compound List.	Gas Chromatography (GC)
Pesticide	Solvents for pesticide residue analysis; meet or exceed ACS pesticide testing standards.	GC with electron capture detector (ECD), pesticide residue analysis
Environmental Grade	Solvents for HPLC analysis, trace-organic analysis, and environmental testing; cleanroom packaged in pre-cleaned glass bottles.	HPLC, trace-organic analysis, environmental testing.
Certified ACS Plus	Acids that meet or exceed the latest ACS specifications and are tested for more than 16 metals.	Analytical applications with tighter metal specifications
Certified ACS	Reagent chemicals that meet or exceed the latest ACS Specifications.	Analytical applications requiring tight specifications
Certified	Reagent chemicals that meet published maximum impurity limits.	General analytical procedures
Spectranalyzed	Solvents for spectrophotometric analysis; meet or exceed latest ACS specifications.	Ultraviolet and visible wavelength (UV-Vis) spectrophotometry
Plasma Grade	Solvents processed for use with plasma/ICP instruments and with impurity levels in ppt; packaged in acid-cleaned PE bottles.	Plasma/ICP, environmental testing, trace-metal analysis
TraceMetal	Acids processed for low metal contamination (in the ppm to ppb range). Lots are analyzed by ICP/MS for more than 55 metals; actual lot specifications may vary from published levels.	Sample digestion for ICP analysis
USP/NF/FCC/EP/BP/JP	Reagent chemicals that meet or surpass specifications of the United States Pharmacopeia (USP), the National Formulary (NF), the Food Chemicals Codex (FCC), the European Pharmacopeia (EP), the British Pharmacopeia (BP), and/or the Japanese Pharmacopeia (JP).	Food and drug laboratories, biological testing
Histology	Solvents and products that have been filtered and prepared for tissue processing and histology laboratory use.	Tissue processing, clinical or histology procedures
Biotechnology	Solvents and reagents that have been specially purified and assayed for biotechnology applications.	Electrophoresis, molecular biology, sequencing, and synthesis
Scintanalyzed	Solvents, fluors, and prepared mixtures for liquid scintillation counting.	Liquid scintillation counting
Electronic	Solvents processed to contain low metal levels; meet Semiconductor Equipment and Materials Institute (SEMI) requirements.	Electronics and circuit board manufacturing
Laboratory, Technical and Reagent	Chemicals of reasonable purity for situations where no official standard for quality or impurity levels exist.	Manufacturing and general laboratory use

Fisher Chemical Stockroom Essentials

Delivering Reliability, Purity and Certainty

- All chemicals are manufactured in FDA-licensed, ISO 9001:2008-certified facilities
- Rigorous quality assurance and testing procedures throughout the production process for lot-to-lot consistency
- Optima™ and HPLC-grade solvents are sealed with FisherLOCK™ Tamper Evident Caps, can be packaged in Safe-Cote™ bottles to prevent spills, and all arrive in EcoSafPak™ (100% recyclable) shipping containers

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Optima UHPLC/MS Grade: Highest-purity solvents; ideal mobile phase for UHPLC/MS

Description	Pack Size	Fisher Scientific Cat. No.
Acetonitrile	1L	A9561
Methanol	1L	A4581
Water	1L	W81

Optima LC/MS Grade: Ultra-high-purity solvents; ideal mobile phase for LC/MS and UHPLC/UV

Description	Pack Size	Fisher Scientific Cat. No.
2-Propanol	4L	A4614
Acetonitrile	4L	A9554
Methanol	4L	A4564
Water	4L	W64

Optima Grade: Ultra-high purity for reliable analysis and cost savings

Description	Pack Size	Fisher Scientific Cat. No.
2-Propanol	4L	A4644
Acetonitrile	4L	A9964
Hexanes	4L	H3034
Methanol	4L	A4544
Methylene Chloride	4L	D1514

HPLC Grade: Meet ACS specifications

Description	Pack Size	Fisher Scientific Cat. No.
Acetone	4L	A9494
Acetonitrile	4L	A9984
Hexanes	4L	H3024
Methanol	4L	A4524
Water	4L	W54

Histology Grade: Available in environmentally friendly F-Style poly bottles that maximize bench and shelf space

Description	Pack Size	Fisher Scientific Cat. No.
Acetone	1 gal.	A16F-1GAL
Acetone	20L	A16S20
Alcohol, Reagent	1 gal.	A962F-1GAL
Ethanol, Anhydrous	4L	A405P4†
Formaldehyde Solution	20L	SF9620
Methanol	4L	A433P4
Xylenes	1 gal.	X3-F1GAL

†Products might not be available in all regions. Contact your local sales representative for details. Other sizes, blends, and reagents may be available.

Fisher Chemical Essentials (Contd.)

ACS Grade

Description	Pack Size	Fisher Scientific Cat. No.
2-Propanol, Certified ACS Plus	4L	A4164
2-Propanol, Certified ACS Plus	500mL	A416500
Acetic Acid, glacial, Certified ACS	500mL	A38500
Acetone, Certified ACS	20L	A1820
Acetone, Certified ACS	4L	A184
Acetone, Certified ACS	500mL	A18500
Chloroform, approx. 0.75% ethanol as preservative, Certified ACS	4L	C2984
Chloroform, approx. 0.75% ethanol as preservative, Certified ACS	500mL	C298500
Ethyl acetate, Certified ACS	4L	E1454
Ethyl acetate, Certified ACS	20L	E14520
Ethyl acetate, HPLC, also meets ACS specifications	4L	E1954
Ethyl ether, anhydrous, BHT stabilized, Certified ACS	1L	E1381
Ethyl ether, anhydrous, BHT stabilized, Certified ACS	4L	E1384
Hexanes, Certified ACS	20L	H29220
Hexanes, Certified ACS	4L	H2924
Hydrochloric acid, Certified ACS Plus	500mL	A144500
Hydrogen peroxide, 30%, Certified ACS	100mL	H325100†
Hydrogen peroxide, 30%, Certified ACS	500mL	H325500
Methanol, Certified ACS	4L	A412SK4
Methanol, Certified ACS	4L	A412P4
Methanol, Certified ACS	1L	A4121
Methanol, Certified ACS	4L	A4124
Methanol, Certified ACS	500mL	A412500
Methylene chloride, stabilized, Certified ACS	4L	D374
Methylene chloride, stabilized, Certified ACS	20L	D3720
Methylene chloride, stabilized, HPLC, also meets ACS specifications	4L	D1434
Sodium chloride, crystalline, Certified ACS	3kg	S2713
Sodium chloride, crystalline, Certified ACS	500g	S271500
Sodium hydroxide, pellets, Certified ACS	500g	S318500

Certified

Description	Pack Size	Fisher Scientific Cat. No.
Buffer solution, pH 7.00, color-coded yellow	500mL	SB107500
Buffer solution, pH 10.00, color-coded blue	500mL	SB115500
Buffer solution, pH 4.00, color-coded red	500mL	SB101500

Laboratory Grade

Description	Pack Size	Fisher Scientific Cat. No.
Total Ionic Strength Adjustment Buffer (TISAB II)	20L	SB17520
Iodine (Iodine-Iodide) Solution, 0.1 N	4L	SI864
Methanol	4L	A4114
Perchloric Acid Solution, 0.1 N	4L	SP3394
Potassium Iodide Solution 10% w/v	20L	SP24220

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Fisher BioReagents: Purity Grades for Every Application

Grade	Definition
Analytical	Reagents suitable for use in analytical procedures.
Certified	Reagent chemicals for which the purity standard is established by the Fisher Chemical™ team. Purity is guaranteed to meet published maximum limits of impurities.
Certified ACS	Reagent chemicals that meet or exceed the latest ACS specifications.
Certified ACS Plus	Acids which meet or exceed the latest ACS specifications, and analyzed for more than 16 metals.
DNA	Reagents suitable for use in molecular biology applications involving the manipulation of DNA. Tested for specific contaminants such as DNase and protease.
DNA Synthesis	Reagents suitable for use with automated DNA synthesis instrumentation.
Electrophoresis	Material used specifically for electrophoresis applications.
Genetic Analysis	Material that is specially prepared for various molecular cloning applications. Tested for specific contaminants such as DNase and RNase.
HPLC	Solvents manufactured specifically for use with HPLC instruments. Meet all ACS specifications. Submicron filtered.
IEF Grade	Material suitable for use with isoelectric focusing of proteins.
Islet Isolation	Material suitable for isolation of pancreatic islets.
Molecular Biology	Reagents suitable for use in molecular biology applications. Tested for specific contaminants such as nucleases and bacteria where appropriate.
Molecular Genetics	Reagent chemicals that have been specifically purified and assayed for molecular genetics applications.
PCR	Material suitable for use in polymerase chain reaction (PCR).
Peptide Synthesis	Designates reagents suitable for use with protein synthesis instrumentation.
Protein Electrophoresis	Material used specifically for protein electrophoresis applications.
Sequencing	Material designed for use with automated DNA or protein sequencing equipment.
Tissue Culture	Materials of superior quality where there are no published standards, and that are suitable for use in Tissue Culture applications.

Fisher BioReagents Stockroom Essentials Vital Reagents for Life Sciences

- High-purity products that meet stringent industry specifications and application requirements
- Pre-qualified for dedicated applications; eliminate the need for redundant testing
- Designed for a wide range of molecular biology, protein chemistry, cell biology and microbiology applications

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Immunodetection

Description	Pack	Storage Condition	Fisher Scientific Cat. No.
Bovine serum albumin, fraction V, cold-ethanol precipitated	100g	RT	BP1605100

Fisher BioReagents Essentials (Contd.)

Core Bioreagents

Description and Grade	Pack	Storage Condition	Fisher Scientific Cat. No.
Bovine serum albumin, fraction V, heat shock treated, suitable for immunological studies	100g	RT	BP1600100
Dimethyl sulfoxide	100mL	RT	BP231100
Ethanol, molecular biology	4L	RT	BP28184†
Ethylenediamine tetraacetic acid, disodium salt dihydrate, crystalline powder, electrophoresis	500g	RT	BP120500
Formamide, molecular biology	500mL	4°C	BP227500
Formamide	100mL	4°C	BP228100
Glycerol, molecular biology	1L	RT	BP2291
Glycerol, molecular biology	4L	RT	BP2294
Isopropanol, molecular biology	500mL	RT	BP2618500
Ethanol Solution, 70%, molecular biology	500mL	RT	BP8201500
Ethanol Solution, 70%, molecular biology	1L	RT	BP82011
Ethanol Solution, 70%, molecular biology	4L	RT	BP82014
Ethanol Solution, 96%, molecular biology	500mL	RT	BP8202500
Ethanol Solution, 96%, molecular biology	1L	RT	BP82021
Ethanol Solution, 96%, molecular biology	4L	RT	BP82024
Phosphate Buffered Saline (PBS) Tablets	100g	RT	BP2944100
Phosphate buffered saline, 10X powder concentrate	2 x 1L	RT	BP6651
Phosphate buffered saline, 10X solution	1L	RT	BP3991
Phosphate buffered saline, 10X solution	500mL	RT	BP399500
Sodium chloride (dry basis), >99.5%	1kg	RT	BP3581
Sodium chloride (dry basis), >99.5%	2.5kg	RT	BP358212
Sodium dodecyl sulfate, electrophoresis	500g	RT	BP166500
Tris base, white crystals or crystalline powder, molecular biology	1kg	RT	BP1521
Tris base, white crystals or crystalline powder, molecular biology	5kg	RT	BP1525
Tris base, white crystals or crystalline powder, molecular biology	500g	RT	BP152500
Tris buffered saline, 10X solution, pH 7.4, molecular biology	1L	RT	BP24711
Tween 20	100mL	RT	BP337100
Tween 20	500mL	RT	BP337500
Water, molecular biology	1L	RT	BP28191
Water, DNA	1L	RT	BP24701
Water, for RNA work, DEPC-treated and nuclease-free, molecular biology	1L	RT	BP5611
Water, nuclease free	100mL	RT	BP2484100
Water, nuclease free	50mL	RT	BP248450

†Products might not be available in all regions. Contact your local sales representative for details. Other sizes, blends, and reagents may be available.

Fisher BioReagents (Contd.)

Protein and Nucleic Acid Electrophoresis

Description and Grade	Pack	Storage Condition	Fisher Scientific Cat. No.
Agarose, broad separation range for DNA/RNA, genetic analysis	100g	RT	BP1356100
Agarose, low-EEO/multi-purpose, molecular biology	100g	RT	BP160100
Agarose, low-EEO/multi-purpose, molecular biology	500g	RT	BP160500
Dithiothreitol white crystals or powder, electrophoresis	5g	RT	BP1725
Dithiothreitol white crystals or powder, electrophoresis	25g	RT	BP17225
Ethidium bromide, 1% solution, molecular biology	10mL	RT	BP130210
MES, fine white crystals	100g	RT	BP300100
Methanol, peroxide-free, sequencing	4L	RT	BP11054
Sodium Dodecyl Sulfate (SDS), micropellets	100g	RT	BP8200100
Sodium Dodecyl Sulfate (SDS), micropellets	500g	RT	BP8200500
Sodium Dodecyl Sulfate (SDS), micropellets	5kg	RT	BP82005
TEMED, Electrophoresis	20g	RT	BP15020
Tris-Borate-EDTA, 10X solution, electrophoresis	1L	RT	BP13331

Cell and Tissue Culture

Description and Grade	Pack	Storage Condition	Fisher Scientific Cat. No.
2XTY Broth, granulated	500g	RT	BP9743500
2XTY Broth, granulated	2kg	RT	BP97432
2XTY Broth, granulated	5kg	RT	BP97435
Agar	500g	RT	BP1423500
Agar, granulated	500g	RT	BP9744500
Agar, granulated	2kg	RT	BP97442
Agar, granulated	5kg	RT	BP97445
Ampicillin Sodium Salt, crystalline powder	5g	4°C	BP17605
Ampicillin Sodium Salt, crystalline powder	25g	4°C	BP176025
CellPURE* PBS 10X, cell culture	4L	RT	BP29404
D-Sucrose, molecular biology	1kg	RT	BP2201
Glycine, white crystals or crystalline powder	1kg	RT	BP3811
Glycine, white crystals or crystalline powder	5kg	RT	BP3815
Glycine, white crystals or crystalline powder	500g	RT	BP381500
Isopropyl-8-D-thiogalactopyranoside, dioxane-free	1g	4°C	BP17551
Kanamycin Sulfate, white powder	5g	RT	BP9065
LB Agar, Miller, Granulated	500g	RT	BP9724500
LB Agar, Miller, Granulated	2kg	RT	BP97242
LB Agar, Miller, Granulated	500g	RT	BP1425500
LB Broth, Miller, Granulated	2kg	RT	BP97232
LB Broth, Miller	500g	RT	BP9723500
LB Broth, Miller	5kg	RT	BP97235
LB Broth, Lennox	500g	RT	BP9722500
LB Broth, Lennox, powder	500g	RT	BP1427500
LB Agar, Lennox, granulated	500g	RT	BP9745500
LB Agar, Lennox, granulated	2Kkg	RT	BP97452
LB Broth, Miller, powder	500g	RT	BP1426500
LB Broth, Miller, powder	2kg	RT	BP14262
Puromycin Dihydrochloride	100mg	RT	BP2956100
Rapamycin	1mg	RT	BP29631
SOB Broth, capsules	500g	RT	BP9737500
Tryptone	500g	RT	BP1421500
Tryptone, granulated	2kg	RT	BP97262
Tryptone, granulated	500g	RT	BP9726500
Vancomycin	1g	RT	BP29581
Water, Microbial Cell Culture	500mL	RT	BP2820500
Yeast Extract	500g	RT	BP1422500
Yeast Extract, Granulated	2kg	RT	BP97272
Yeast Extract, Granulated	500g	RT	BP9727500 [†]

[†]Products might not be available in all regions. Contact your local sales representative for details. Other sizes, blends, and reagents may be available.

Acros Organics Stockroom Essentials

Off-the-Shelf Products Backed by Expertise

As a leading supplier of fine chemicals, the Acros Organics™ brand continues to expand its selection of products for organic, medicinal, analytical and biological chemicals.

AcroSeal™ packaging for moisture-sensitive reagents and organometallic compounds features:

- Multi-layer septa retains physical integrity, reseals even the most aggressive solvent/reagent and enables multiple puncture points
- Quadrant-style cap for a tight, tamper-evident seal between septum and bottle

We offer a 25mL size of our industry-leading AcroSeal™ packaging for small, research-scale quantities of extra-dry solvents. Each bottle is designed for your convenience and packed using our new septum to ensure optimum performance in your moisture-sensitive work.



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AcroSeal

Description and Grade	Purity	Quantity	Packaging	Fisher Scientific Cat. No.
Acetonitrile, anhydrous	99.9%, Extra Dry	1L	Amber Glass	AC610220010
Chloroform, anhydrous	Extra Dry	100mL	Amber Glass	AC610281000
Dichloromethane, anhydrous	Extra Dry	1L	Amber Glass	AC610300010 [†]
Dichloromethane, anhydrous	Extra Dry	100mL	Amber Glass	AC610931000
Dichloromethane, stabilized, anhydrous	99.9%, Extra Dry	4 X 25mL	Amber Glass	AC448371000
Methanol, anhydrous	99.8%, Extra Dry	1L	Amber Glass	AC610400010 [†]
Methanol, anhydrous	99.8%, Extra Dry	100mL	Amber Glass	AC610981000
Methyl Sulfoxide, anhydrous	99.7%, Extra Dry	1L	Amber Glass	AC610420010
Methyl Sulfoxide, anhydrous	99.7%, Extra Dry	100mL	Amber Glass	AC610971000
N,N-Dimethylformamide, anhydrous	99.8%, Extra Dry	1L	Amber Glass	AC610320010
N,N-Dimethylformamide, anhydrous	99.8%, Extra Dry	100mL	Amber Glass	AC610941000
Tetrahydrofuran, anhydrous	99.9%, Extra Dry	1L	Amber Glass	AC610450010
Tetrahydrofuran, anhydrous	99.9%, Extra Dry	100mL	Amber Glass	AC610921000
Tetrahydrofuran, stabilized, anhydrous	99.9%, Extra Dry	1L	Amber Glass	AC610900010
Tetrahydrofuran, stabilized, anhydrous	99.9%, Extra Dry	100mL	Amber Glass	AC610911000 [†]
Tetrahydrofuran, stabilized, anhydrous	99.85%, Extra Dry	4 X 25mL	Amber Glass	AC448361000
Toluene, anhydrous	99.8%, Extra Dry	1L	Amber Glass	AC610460010
Toluene, anhydrous	99.8%, Extra Dry	100mL	Amber Glass	AC610951000

Deuterated Solvents

Description and Grade	Purity	Quantity	Packaging	Fisher Scientific Cat. No.
Chloroform-d, 99.6+ atom % D	For NMR	100mL	Amber Glass	AC174881000
Chloroform-d, 99.8+ atom % D, contains 0.03 v/v% TMS	For NMR	100mL	Amber Glass	AC209561000
Chloroform-d, 99.8 atom % D, contains 1 v/v% TMS	For NMR	100mL	Amber Glass	AC166261000
Chloroform-d, 99.8 atom % D, contains 1 v/v% TMS	For NMR	50mL	Amber Glass	AC166260500
Chloroform-d, 99.8 atom % D	For NMR	100mL	Amber Glass	AC166251000
Chloroform-d, 99.8 atom % D	For NMR	50mL	Amber Glass	AC166250500
Deuterium Oxide, 99.8 atom % D	For NMR	100mL	Amber Glass	AC166301000
Methanol-d4, 99.8 atom % D	For NMR	10 x 0.75mL	Ampules	AC320750075
Methyl Sulfoxide-d6, 99.5+ atom % D	For NMR	10g	Amber Glass	AC321290100
Methyl Sulfoxide-d6, 99.9+ atom % D	For NMR	10 x 0.75mL	Ampules	AC320770075

[†]Products might not be available in all regions. Contact your local sales representative for details. Other sizes, blends, and reagents may be available.

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Acros Organics Essentials (Contd.)

Ethanol

Description and Grade	Quantity	Packaging	Fisher Scientific Cat. No.
Ethanol, absolute, 200 proof, ACS	4L	Amber Glass	AC615090040 [†]
Ethanol, 190 proof, for spectroscopy, ACS	4L	Amber Glass	AC615110040 [†]
Ethanol, 190 proof, for spectroscopy, ACS	1L	Amber Glass	AC615110010 [†]
Ethanol, absolute, 200 proof, ACS	500mL	Amber Glass	AC615095000 [†]
Ethanol, absolute, 200 proof, ACS	1L	Amber Glass	AC615090010 [†]
Ethanol, absolute, 200 proof, ACS	2L	Amber Glass	AC615090020 [†]
Ethanol, anhydrous, 200 proof	100mL	Amber Glass	AC615101000 [†]
Ethanol, anhydrous, 200 proof	2L	Amber Glass	AC615100020 [†]
Ethanol, denatured, for HPLC	4L	Amber Glass	AC611050040

Organometallic and Reactive

Description and Grade	Quantity	Packaging	Fisher Scientific Cat. No.
Boron Trichloride, 1M solution in methylene chloride, stabilized	100mL	Amber Glass, AcroSeal	AC176681000
Diisobutylaluminium Hydride, 1M solution in hexane	100mL	Amber Glass, AcroSeal	AC183791000
Diisobutylaluminium Hydride, 20% wt. solution in toluene, 1.2M	100mL	Amber Glass, AcroSeal	AC201081000
Lithium Aluminium Hydride, 1M solution in THF	100mL	Amber Glass, AcroSeal	AC199491000
Lithium Diisopropylamide, 2M solution in THF/n-heptane/ethylbenzene	100mL	Amber Glass, AcroSeal	AC268831000
Methyl lithium, 1.6M solution in diethyl ether (± 5% w/v)	100mL	Amber Glass, AcroSeal	AC188751000
n-Butyllithium, 1.6M solution in hexanes	100mL	Amber Glass, AcroSeal	AC181271000
n-Butyllithium, 1.6M solution in hexanes	800mL	Amber Glass, AcroSeal	AC181278000
n-Butyllithium, 2.5M solution in hexanes	100mL	Amber Glass, AcroSeal	AC213351000
n-Butyllithium, 2.5M solution in hexanes	800mL	Amber Glass, AcroSeal	AC213358000
sec-Butyllithium, 1.3M solution in cyclohexane/hexane (92/8)	100mL	Amber Glass, AcroSeal	AC187541000
tert-Butyllithium, 1.6M solution in pentane	100mL	Amber Glass, AcroSeal	AC181281000 [†]

[†]Products might not be available in all regions. Contact your local sales representative for details. Other sizes, blends, and reagents may be available.

The Fisherbrand Collection

Fisherbrand™ products bring quality, reliability and value to your lab. With a portfolio of over 10,000 products in 126 product categories and more than 100 years of experience in serving the scientific community, you can trust Fisher Scientific™ team to have the products you need, when you need them.

Fisherbrand Glassware

The Fisherbrand reusable glassware portfolio includes beakers, graduated cylinders, volumetric flasks, Erlenmeyer flasks, boiling flasks, filter flasks, funnels, media bottles and test tubes. All products meet ASTM™ specifications and come in a variety of sizes to support daily use in every laboratory.

Top-selling Fisherbrand glassware catalog numbers:

- FB100-250 (beaker)
- FB201-250 (round-bottom flask)



Visit fishersci.com/fisherbrand to see the complete portfolio of Fisherbrand products, including balances, hotplates, pipets, scoops, spatulas, vials, weigh dishes and more.

Fisher Chemical Specialized Chemical Services

From Discovery to Production



Whether you are engaged in initial research or scaling up to full production, save time and resources through our Custom Services and Solutions:

- 1. Semi-Bulk and Bulk Chemical Service:** Through our extensive supply-chain network, we can secure and manage the supply of semi-bulk and bulk volume products using either internal manufacturing or select partners worldwide
 - **High-Volume Solvent Delivery Systems**
 - **FisherPak:** Environmentally friendly, reusable Fisher Chemical 316 stainless-steel container is pressurized with an inert gas to deliver the solvent, so the system remains closed and the solvent remains pure for virtually unlimited applications, thus enhancing safety and improving productivity within your lab when handling large quantities of solvent
 - **BasicPak:** This Fisher Chemical returnable, reusable drum is made from high-grade 304 stainless steel. This system is designed to deliver inert gas safely to the drum with 7-15psig without contamination.
 - **DelPak:** DelPak combines the strength and durability of steel with the chemical compatibility of polyethylene.
 - **NowPak I:** The inner liner is constructed with an inert fluorocarbon polymer that is compatible with all high purity solvents. The inner liner collapses around the dip tube during dispensing, which prevents air from entering the system.
 - **NowPak II:** The NowPak II precleaned liner technology is offered in a pressurizable, stainless-steel overpack. The system permits ultra-clean chemical dispensing without direct contact of the chemical with the drive gas. Drive gas pressure is applied to the outside of the liner, minimizing gas entrainment or micro-bubble formation.
- 2. Multicompendial, Enhanced Traceability and Documentation:** Offering the proper paperwork that verifies the product, re-packaging and distributing sites, and regulatory information needed
- 3. Special Testing:** Our extensive in-house laboratory, QC capabilities and utilization of accredited external partners allows us to respond quickly to specific quality control testing at your request
- 4. Custom Batch Size Packaging and Labeling:** Our products are available in a wide variety of innovative packaging options designed for safety, environmental protection, convenient handling and storage and preservation of product integrity, while complying with all relevant regulations
- 5. Tailored Solvents and Solvent Blends:** Our experience in manufacturing, processing and testing high-purity solvents enables customization of solvents to your specifications
- 6. Special Solutions:** Special aqueous or non-aqueous solutions can be expertly manufactured to your exact requirements

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What is GHS?









GHS = Globally Harmonized System of Classification and Labeling

- The GHS was created by the United Nations to create a single chemical classification system to communicate information to workers around the globe. The U.S. Occupational Safety and Health Administration (OSHA) revised its Hazard Communication Standard (HCS) to align with the GHS.

What's New?

The GHS pictograms on the labels have been updated. Each black-and-white drawing inside a red diamond border is used to identify a different type of hazard.



<p>GHS01 Exploding Bombs = Explosive, self reactive; heating may cause fire or explosion</p> 	<p>GHS02 Flame = Flammable, chemicals can catch fire easily and burst into flames</p> 	<p>GHS03 Flame Over Circle = Oxidizing, can react with other materials causing them to burn or explode</p> 
<p>GHS04 Gas cylinder = Gas under pressure: chemical can explode, rocket or harm health if the cylinder is heated, ruptured or leaking</p> 	<p>GHS05 Corrosion = Corrosive: may cause skin corrosion/ burns; eye damage; eat away clothing, working surfaces, and/or metals</p> 	<p>GHS06 Skull and Crossbones = Toxic: highly poisonous material; can cause immediate and possibly serious health problems</p> 
<p>GHS07 Exclamation Mark = Other Hazard: irritant (skin and eye), skin sensitizer, acute toxicity, narcotic effects, respiratory track irritant, harmful if swallowed, toxic if inhaled</p> 		<p>GHS08 Health Hazard = Specific health hazard including Carcinogenic; Mutagenic; Toxic for Reproduction: may cause asthma or damage to specific organs of the body</p> 

The GHS affects all of us, and the Fisher Scientific™ team has you covered. Training programs and materials, resources and products that comply with the new requirements are conveniently accessible right here.

For more information, go to: fishersci.com/ghs

What's On the Label? Safety Guidelines!

- The bar code is an alphanumeric code widely used by industry for inventory and tracking control. This "three-of-nine" code meets the Health Industry Bar Code (HIBC) Supplier Labeling Standard as prepared by the Health Industry Business Communication Council (HIBCC).
- This area contains the appropriate precautionary signal word (DANGER, WARNING, etc.) and highlights the potential health hazards, both acute and chronic, of the product.
- QR Codes on Label:** Many chemicals include a QR code on the label to quickly access safety and technical information. Scan the QR code with your smartphone to find the Safety Data Sheet (SDS) or a lot-specific Certificate of Analysis for the product. Visit fishersci.com/QR or fishersci.ca/QR to see a complete list of products that are labeled with a QR code.
- The Maximum Limits of Impurities are indicated.
- The full Product Name and Purity Grade are listed.
- ChemAlert Guide:** The five color codes match the rims of the FisherLOCK caps; they are described below.
- GHS Pictogram** - Each symbol (a black-and-white drawing inside a red diamond border) identifies a different type of hazard.
- DOT Information - This includes the UN/NA (United Nations/North America) numerical designation for the transportation hazard and the proper Shipping Name as required by the U.S. Department of Transportation (DOT).
- Product Composition: Details about the product and its Chemical Abstract Service (CAS) Registry Number appear in this area of the label.
- Package Size:** The amount of material per unit.
- The catalog number is shown for identification and reference.
- Lot Number**
- The address and telephone number of the manufacturer is listed.
- Name and logo of the brand.
- Chemical formula.

NOTE: ChemAlert is an instant reference only. It should be supplemented by reading the rest of the label (which provides detailed instructions in the event of accidental exposure, spill or fire, and applicable OSHA, DOT, GHS, ANSI™ data), the appropriate SDS, CoFA, and standard references.

ChemAlert storage code guidelines match the bottom rim of our Fisherlock caps

- R Red:** Flammable. Store in area segregated for flammable reagents.
- B Blue:** Health hazard. Toxic if inhaled, ingested or absorbed through skin. Store in secure area.
- Y Yellow:** Reactive and oxidizing reagents. May react violently with air, water or other substances. Store away from flammable and combustible materials.
- W White:** Corrosive. May harm skin, eyes or mucous membranes. Store away from red-, yellow- and blue-coded reagents.
- G Gray:** Presents no more than moderate hazard in any of the categories above. For general chemical storage.

EXCEPTION: Reagent incompatible with other reagents of the same color. Store separately.

FisherLOCK Closures

Lock in Quality and Safety

Fisher Chemical™ and Fisher BioReagents™ FisherLOCK caps place a patented tamper-evident secure seal applied during manufacturing to our amber glass bottles that holds the bottle's lips and preserves integrity of the chemical.

- **Easy release:** The outer shell of the cap is designed to make it effortless to open and readily reseal
- The **tamper-evident** interior ring is visible from various angles and offers resistance until the bottle is initially opened, ensuring product integrity without the drawbacks and complications of plastic seals
- **Color-coded bands** at the bottom of the cap match ChemAlert storage codes for easy hazard identification



Exclusive color-coded design provides storage guidelines

Red (R): Flammable. Store in area segregated for flammable reagents.

Blue (B): Health hazard. Toxic if inhaled, ingested or absorbed through skin. Store in secure area.

Yellow (Y): Reactive and oxidizing reagents. May react violently with air, water or other substances. Store away from flammable and combustible materials.

White (W): Corrosive. May harm skin, eyes, or mucous membranes. Store away from red-, yellow- and blue-coded reagents.

Gray (G): Presents no more than moderate hazard in any of the categories above. For general chemical storage.

EXCEPTION: Reagent incompatible with other reagents of the same color bar. Store separately.

The FisherLOCK Cap LOCKS IN quality, safety, reliability and convenience:

QUALITY

- Provides a tight, tamper-evident, secure seal
- Eliminates polyethylene glycol contamination that can occur with a plastic overseal

SAFETY

- Caps are designed to resist back-off during transport, reducing risk of leakage
- Color-coded rings indicate storage requirements and hazard categories and enhance proper recognition, handling and storage — even before the bottle is removed from the case

RELIABILITY

- Rigorously tested for chemical compatibility
- Bottle threads are unchanged, allowing attachment of the opened bottle to standard equipment

CONVENIENCE

- Cap design facilitates correct initial torque application during manufacturing, thus eliminating caps that may be hard to open
- Larger ridges on the exterior of the cap make it easier to open
- Caps readily reseal after initial opening



Fisher Chemical Safe-Cote Bottles Safely Serving Science

Description	Grade	Size	Cat. No.
1-Butanol	HPLC/ACS	1L	A383SK-1
1-Butanol	HPLC/ACS	4L	A383SK-4
2-Propanol	Certified ACS Plus	4L	A416SK-4
2-Propanol	HPLC/ACS	1L	A451SK-1
2-Propanol	HPLC/ACS	4L	A451SK-4
2-Propanol	Optima	4L	A464SK-4
Acetone	Certified ACS	4L	A18SK-4
Acetone	HPLC	1L	A949SK-1
Acetone	HPLC/ACS	4L	A949SK-4
Acetone	Optima/ACS	4L	A929SK-4
Acetonitrile	HPLC/ACS	1L	A998SK-1
Acetonitrile	HPLC/ACS	4L	A998SK-4
Acetonitrile	Optima/ACS	4L	A996SK-4
Chloroform	HPLC/ACS	4L	C606SK-4
Chloroform	Certified ACS	4L	C298SK-4
Chloroform	HPLC/ACS	1L	C606SK-1
Chloroform	Spectranalyzed	4L	C574SK-4
Chloroform with Pentene	HPLC/ACS	1L	C607SK-1
Chloroform with Pentene	HPLC/ACS	4L	C607SK-4
Cyclohexane	HPLC/ACS	1L	C620SK-1
Cyclohexane	HPLC/ACS	4L	C620SK-4
Ethyl Acetate	HPLC/ACS	1L	E195SK-1
Ethyl Acetate	HPLC/ACS	4L	E195SK-4
Ethyl Acetate	Certified ACS	4L	E145SK-4
Ethyl Acetate	Optima	4L	E196SK-4
Ethyl Alcohol	Denatured	4L	A407SK-4
Heptane	HPLC	1L	H350SK-1
Heptane	HPLC	4L	H350SK-4
Hexane	HPLC	1L	H302SK-1
Hexane	HPLC	4L	H302SK-4
Hexane	Optima/ACS	4L	H303SK-4
Hexane	Certified ACS	4L	H292SK-4
Isooctane	HPLC/ACS	1L	O296SK-1
Isooctane	HPLC/ACS	4L	O296SK-4
Methanol	Certified ACS	4L	A412SK-4
Methanol	HPLC/ACS	1L	A452SK-1
Methanol	HPLC/ACS	4L	A452SK-4
Methanol	Optima/ACS	4L	A454SK-4
Methanol	Scintanalyzed/ACS	4L	A408SK-4

These Fisher Chemical products are protected by Safe-Cote PVC bottles that provide the purity of glass and most of the benefits of plastic for storing and dispensing chemicals. If they break, glass fragments and liquids are more likely to remain trapped.

- Innovative safety bottle with FisherLOCK tamper-evident cap
- Convenient storing and dispensing
- Packaged in the 100% recyclable Styrofoam-free EcoSafPak



Description	Grade	Size	Cat. No.
Methylene Chloride	HPLC	1L	D150SK-1
Methylene Chloride	HPLC	4L	D150SK-4
Methylene Chloride	HPLC/ACS	1L	D143SK-1
Methylene Chloride	Certified ACS	4L	D37SK-4
Methylene Chloride	HPLC/ACS	4L	D143SK-4
Methylene Chloride	Optima	4L	D151SK-4
Methylene Chloride with Cyclohexene	HPLC/ACS	4L	D138SK-4
n-Butyl Chloride	HPLC	4L	B429SK-4
n-Hexane, 95%	Optima/ACS	4L	H306SK-4
Pentane	HPLC	1L	P399SK-1
Pentane	HPLC	4L	P399SK-4
Petroleum Ether	Certified ACS	4L	E139SK-4
Petroleum Ether	Optima/ACS	4L	E120SK-4
Tetrahydrofuran	Certified	4L	T397SK-4
Tetrahydrofuran	HPLC/ACS	1L	T425SK-1
Tetrahydrofuran	HPLC/ACS	4L	T425SK-4
Tetrahydrofuran	Optima/ACS	4L	T427SK-4
Toluene	Certified ACS	4L	T324SK-4
Toluene	HPLC/ACS	1L	T290SK-1
Toluene	HPLC/ACS	4L	T290SK-4
Toluene	Optima	4L	T291SK-4
Toluene	Scintanalyzed/ACS	4L	T313SK-4
Water	HPLC	1L	W5SK-1
Water	HPLC	4L	W5SK-4
Water	Optima	4L	W7SK-4
Xylenes	Certified ACS	4L	X5SK-4

*Products might not be available in all regions. Contact your local sales representative for details.

Watch our video at fishersci.com/safecote to see the difference.

Safer, Smarter, Eco-Friendly Packaging

Many of your favorite chemicals, including Safe-Cote™ glass bottles, are delivered in (Styrofoam™ free) EcoSafPak™ packaging manufactured by an SFI-certified manufacturer, including:

- 500mL bottles (single, 2-packs or cases of 6)
- 1L bottles
- 2 × 1L bottles
- 6 × 1L bottles
- 2.5L bottles
- 4L bottles (1, 2 or 4-packs)
- 2 × 4L bottles
- 4 × 4L bottles



The EcoSafPak is manufactured by an SFI-certified manufacturer.

The Sustainable Forestry Initiative™ (SFI) program:

- Based on the premise that responsible environmental behavior and sound business decisions can co-exist
- A comprehensive system of principles, objectives, and performance measures developed by professional foresters, conservationists, and scientists
- Promotes the perpetual growth and harvest of trees with the long-term protection of wildlife, plants, soil, and water

SFI's Nine Objectives:

- Sustainable forestry
- Responsible practices
- Reforestation and productive capacity
- Forest health and productivity
- Long-term forest and soil productivity
- Protection of water resources
- Protection of special sites and biological diversity
- Legal compliance
- Continual improvement

EcoSafPak packaging minimizes the use of non-recyclable material through the use of the revolutionary Hexacomb design inserts.

The Hexacomb is:

- Fully recyclable
- Sturdy and durable
- Versatile

Improved safety and handling:

- EcoSafPak is the only package of its kind to pass the most demanding ISTA (International Safe Transport Association) "3A" test, consisting of:
 - 17 drops to simulate real-world parcel shipment handling
 - Shock testing
 - Vibration testing
- Corrugated material is shock absorbing
- Greater stability in the frame of the box
- Staggered handholds for ease of transport

Chemical Storage/Handling Recommendations

Chemical Incompatibility

Chemicals should react in the lab, not in the stockroom. The inadvertent mixing of inventory can produce toxic vapors or gases and lead to fire or explosion. Stay safe in the storeroom — adhere to the following prescribed precautions and consult the chemical compatibility tables that follow for dangerous combinations. For product-specific information, refer to the Safety Data Sheet (SDS).

General Guidelines

- Protect eyes and skin: basic personal protective equipment includes lab safety glasses with side shields, lab coats and close-toed shoes
- Safely space shelves and racks to accommodate the upright removal of the largest chemical container; prevent tipping and dripping with adequate clearance
- Identify and substitute safer chemical alternatives
- Keep hazardous materials away from heat and direct sunlight to prevent the degradation of chemicals and deterioration of storage containers and labels
- Do not store hazardous materials (except cleaners) under sinks
- Avoid chemical stockpiling; buy hazardous materials only as needed
- Limit the storage of hazardous materials inside fume hoods
- Conduct periodic cleanouts to minimize accumulation of chemicals
- Keep all food (including gum), beverages, tobacco and open cosmetics outside the work area

Acids and Bases

Isolate acids:

- From reactive metals, including sodium, potassium and magnesium
- From sodium cyanide, iron sulfide, calcium carbide and other compounds that can react to produce toxic fumes/gases

- Acetic acid in a flammable storage locker; store inorganic acids in acid storage cabinets
- Store acids and bases in air-tight containers with snug-fitting caps; avoid loose lids or glass stoppers; use vented caps when necessary to prevent over-pressurization
- Keep piranha etch and aqua regia in a fume hood at all times
- Use non-aluminum drip trays for aqueous sodium and potassium hydroxide solutions; isolate nitric acid when utilizing secondary containment
- Use bottle carriers to safely move containers of acid and base solutions
- When diluting an acid, add the acid slowly to the water. DO NOT add water to an acid.

Flammable and Combustible Liquids

- Store flammable and combustible liquids away from oxidizers and heat producers
- Place flammable and combustible liquids in excess of 10 gallons (per room) in approved flammable storage cabinets (under the hood or stand-alone); limit liquids in secondary containers (e.g., squeeze bottles) to 10 gallons or less
- Follow OSHA regulations for safe storage: 60 gallons of Class I and/or Class II liquids or 120 gallons of Class III liquids per cabinet; Class I liquids cannot be stored in a basement or pit without an approved ventilation system
- Use only approved and well-labeled refrigerators and freezers for storing flammable liquids; never store lunch with science

Incompatibilities by Hazard Class

X indicates incompatibility between two chemical product groups. Incompatible products should not be stored in close proximity.

	Acids, Inorganic	Acids, Oxidizing	Acids, Organic	Alkalis (Bases)	Oxidizers	Poisons, Inorganic	Poisons, Organic	Water-Reactives	Organic Solvents
Acids, Inorganic			X	X		X	X	X	X
Acids, Oxidizing			X	X		X	X	X	X
Acids, Organic	X	X		X	X	X	X	X	
Alkalis (Bases)	X	X	X				X	X	X
Oxidizers			X				X	X	X
Poisons, Inorganic	X	X	X				X	X	X
Poisons, Organic	X	X	X	X	X	X			
Water-Reactives	X	X	X	X	X	X			
Organic Solvents	X	X		X	X	X			

Chemical Incompatibilities

Chemical	Store Separately From
Acetic acid	Chromic acid, nitric acid, perchloric acid, peroxides, permanganates and other oxidizers
Acetone	Concentrated nitric and sulfuric acid mixtures, and strong bases
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Alkali metals	Water, carbon tetrachloride or other chlorinated hydrocarbons, carbon dioxide, halogens
Ammonia, anhydrous	Mercury, chlorine, calcium hypochlorite, iodine, bromine, hydrofluoric acid
Ammonium nitrate	Acids, metal powders, flammable liquids, chlorates, nitrites, sulfur, finely divided organic or combustible materials
Aniline	Nitric acid, hydrogen peroxide
Arsenic materials	Any reducing agent
Azides	Acids
Bromine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, turpentine, benzene, finely divided metals
Calcium oxide	Water
Carbon (activated)	Calcium hypochlorite, all oxidizing agents
Carbon tetrachloride	Sodium
Chlorates	Ammonium salts, acids, metal powders, sulfur, finely divided organic or combustible materials
Chromic acid and chromium trioxide	Acetic acid, naphthalene, camphor, glycerol, glycerin, turpentine, alcohol, flammable liquids in general
Chlorine	Same as Bromine
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Copper	Acetylene, hydrogen peroxide
Cumene hydroperoxide	Acids, organic or inorganic
Cyanides	Acids
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Hydrocarbons	Fluorine, chlorine, bromine, chromic acid, sodium peroxide
Hydrocyanic acid	Acids
Hydrofluoric acid	Ammonia, aqueous or anhydrous bases and silica
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, alcohols, acetone, organic materials, aniline, nitromethane, flammable liquids
Hydrogen sulfide	Fuming nitric acid, other acids, oxidizing gases, acetylene, ammonia (aqueous or anhydrous), hydrogen
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Mercury	Acetylene, fulminic acid, ammonia
Nitrates	Sulfuric acid
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, copper, brass, any heavy metals
Nitrites	Acids
Nitroparaffins	Inorganic bases, amines
Oxalic acid	Silver, mercury
Oxygen	Oils, grease, hydrogen; flammable liquids, solids, or gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease and oils
Peroxides, organic	Acids (organic or mineral), avoid friction, store cold
Phosphorus (white)	Air, oxygen, alkalis, reducing agents
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate and perchlorate	Sulfuric and other acids, alkali metals, magnesium and calcium
Potassium permanganate	Glycerin, ethylene glycol, benzaldehyde, sulfuric acid
Selenides	Reducing agents
Silver	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid
Sodium	Carbon tetrachloride, carbon dioxide, water
Sodium nitrite	Ammonium nitrate and other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric Acid	Potassium chlorate, potassium perchlorate, potassium permanganate (or compounds with similar light metals: sodium, lithium, etc.)
Tellurides	Reducing agents

(From Manufacturing Chemists' Association, Guide for Safety in the Chemical Laboratory, pp. 215–217, Van Nostrand)

All Plastics Are Not Created Equal

Choosing either glass or plastic for chemical storage is somewhat intuitive, but selecting a compatible plastic is another story.

Plastic labware is made from a variety of polymers — polyethylene (low and high density), polypropylene, PVC, etc. — and each possesses unique and varying resistance to the laundry list of chemicals. To maintain the integrity of both the chemicals and their containers while staying safe, please consult the following chemical resistance tables.

Chemical Resistance and Physical Properties of Plastics

Resin Codes

ECTFE:	Ethylene-chlorotrifluoroethylene copolymer	PFA:	Perfluoroalkoxy
ETFE:	Ethylenetetrafluoroethylene	PMMA:	Polymethyl methacrylate
FEP:	Fluorinated ethylene propylene	PMP:	Polymethylpentene
FLPE:	Fluorinated high-density polyethylene	PP:	Polypropylene
FLPP:	Fluorinated polypropylene	PS:	Polystyrene
HDPE:	High-density polyethylene	PSF:	Polysulfone
LDPE:	Low-density polyethylene	PTFE:	Polytetrafluoroethylene
NYL:	Nylon (polyamide)	PUR:	Polyurethane
PPCO:	Polypropylene copolymer	PVC:	Polyvinyl chloride
PC:	Polycarbonate	PVDF:	Polyvinylidene fluoride
PETG:	Polyethylene terephthalate copolyester	TPE:	Thermoplastic elastomer
PK:	Polyketone	XLPE:	Cross-linked high-density polyethylene

Do not store strong oxidizing agents in plastic labware except if made of FEP, PFA or PTFE. Other plastics will become brittle after prolonged exposure.

Do not place plastic labware directly in a flame or on a hotplate unless specified.

Use these charts as a reference only. They are recommendations, not guarantees, of fitness for particular uses. Test materials under actual conditions before using them for your applications.

Chemical Resistance Summary

Classes of substances; temperature 68°F (20°C)	ECTFE/ETFE	FEP/PTFE/PFA	FLPE	HDPE/XLPE	LDPE	NYL	PC	PETG	PK	PMMA	PMP	PP/PPCO	PS	PSF	PUR	PVC	PVDF	TPE [†]
Acids, weak or dilute	E	E	E	E	E	F	E	E	E	G	E	E	E	E	G	E	E	E
Acids [‡] , strong or concentrated	G	E	E	E	E	N	N	N	G	N	E	E	F	G	F	E	E	F
Alcohols, aliphatic	E	E	E	E	E	N	G	E	G	N	E	E	E	G	F	E	E	E
Aldehydes	E	E	G	G	G	F	F	N	E	G	G	G	N	F	G	N	E	N
Bases	E	E	F	E	E	F	N	N	G	F	E	E	E	E	N	E	E	E
Esters	E	E	E	G	G	E	N	N	E	N	G	G	N	N	N	N	G	N
Hydrocarbons, aliphatic	E	E	E	G	F	E	F	E	E	G	F	G	N	G	E	E	E	N
Hydrocarbons, aromatic	E	E	E	G	F	E	N	N	E	N	F	F	N	N	N	N	E	N
Hydrocarbons, halogenated	E	E	G	F	N	G	N	N	E	N	N	F	N	N	N	N	N	N
Ketones	G	E	E	G	G	E	N	N	E	N	F	G	N	N	N	N	N	N
Oxidizing agents, strong	F	E	F	F	F	N	N	N	G	N	F	F	N	G	N	G	G	N

[†] For oxidizing acids, see table entry "Oxidizing agents, strong." [‡] TPE gaskets

E — No damage after 30 days of constant exposure.

G — Little or no damage after 30 days of constant exposure.

F — Some effect after seven days of constant exposure. Depending on the plastic, the effect may be cracking, crazing, loss of strength or discoloration. Solvents may cause softening, swelling and permeation losses with PPCO, PP, PMP, LDPE and HDPE; the solvent effects on these materials are normally reversible.

N — Not recommended for continuous use. Immediate damage may occur. Depending on the plastic, the effect will be severe cracking, crazing, loss of strength, discoloration, deformation, dissolution or permeation loss.

Superior Poly Packaging for Fisher Chemical TraceMetal Acids and Bases

Select Fisher Chemical™ TraceMetal™ grade acids and bases are available in poly bottles. Constructed with a high-density polyethylene — made from a proprietary resin — the innovative bottles provide up to 80% less metallic extractables (vs. glass).

Packaging Advantages

- Poly bottles are lighter, easier to handle and less likely to break during transport
- FisherLOCK™ tamper-evident caps safeguard chemicals; drip lip feature prevents spills when pouring
- 100% recyclable package reduces waste and all-poly bottle facilitates disposal (no PVC coating to be removed)
- Poly bottles occupy less space than glass bottles and enable better storage space utilization in the lab



Place your order today!

Fisher Scientific U.S.: 1-800-766-7000 | fishersci.com/chemicals

Fisher Scientific Canada: 1-800-234-7437 | fishersci.ca/chemicals

Chemical Resistance of Labware Materials

How to Use This Chart

Use This Chart as a General Guide

Only. Test each chemical before storing in labware. The first letter of each pair represents the resistance rating at 20°C; the second at 50°C.

E — No damage after 30 days of constant exposure.

G — Little or no damage after 30 days of constant exposure.

F — Some effect after 7 days of constant exposure. Depending on the material, the effect may be cracking, crazing, loss of strength or discoloration. Solvents may cause softening, swelling, and permeation losses with PA, PP, PMP, LDPE and HDPE; the solvent effects on these materials are normally reversible.

N — Not recommended for continuous use. Immediate damage may occur. Depending on the material, the effect will be severe cracking, crazing, loss of strength, discoloration, deformation, dissolution or permeation loss.

Effects of Chemicals on Plastic Labware

Chemicals may affect the weight, strength, color, dimensions, flexibility and surface appearance of plastic labware. The basic models of interaction that cause these changes are:

(1) chemical attack on the polymer chain, with resultant reduction in physical properties, including oxidation; reaction of functional groups in or on the chain; and depolymerization

(2) physical change, including absorption of solvents, resulting in softening and swelling of the plastic; permeation of solvent through the plastic; or dissolution in a solvent

(3) stress-cracking from the interaction of a “stress-cracking agent” with molded-in or external stresses

The reactive combination of compounds of two or more classes may cause a synergistic or undesirable chemical effect. Other factors affecting chemical resistance include: temperature, pressure, internal or external stresses (such as centrifugation), and length of exposure to and concentration of the chemical.

As temperature increases, resistance to attack decreases.

Warning!

Do not store strong oxidizing agents in plastic containers except those made of FEP, PFA or PTFE. Other plastics will become brittle after prolonged exposure.

CHEMICAL	LDPE	HDPE	PP/PPCO	PMP	FEP/PTE/PFA	ECTFE/ETFE	PC	PVC	PSF	PVDF	PS	NYL	Stainless Steel	Glass	Ceramic
Acetaldehyde	GN	GF	GN	GN	EE	GF	FN	GN	NN	EE	NN	EG	EE	EE	EE
Acetamide, sat.	EE	EE	EE	EE	EE	EE	NN	NN	NN	—	EE	EE	EE	EE	EE
Acetic acid, 5%	EE	EE	EE	EE	EE	EE	EG	EE	EE	EE	EG	FN	EE	EE	EE
Acetic acid, 50%	EE	EE	EE	EE	EE	EG	EG	EG	EE	GG	NN	EE	EE	EE	EE
Acetone	NN	NN	EE	EE	GF	NN	NN	NN	NN	NN	NN	EE	EE	EE	EE
Acetonitrile	EE	EE	FN	FN	EE	EE	NN	NN	NN	EE	NN	EE	EG	EE	EE
Acrylonitrile	EE	EE	FN	FN	EE	EG	NN	NN	NN	GF	NN	EG	EG	EE	EE
Adipic acid	EG	EE	EE	EE	EE	EE	EG	GG	—	EE	EE	EF	EG	EE	EE
Alanine	EE	EE	EE	EE	EE	EE	NN	NN	NN	—	EE	EG	—	—	—
Allyl alcohol	EE	EE	EG	EG	EE	GF	GF	GF	—	GF	NN	EE	EG	EG	—
Aluminum hydroxide	EE	EE	EG	EG	EE	FN	EG	GG	EE	GG	EE	EE	NN	EE	EE
Aluminum salts	EE	EE	EE	EE	EE	EG	EE	EE	EE	GG	NN	GG	EE	EE	EE
Amino acids	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EG	—	—	—
Ammonia	EE	EE	EE	EE	EE	NN	EG	GF	EE	GF	FF	EE	EE	EE	EE
Ammonium acetate, sat.	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EG	EG	EE	EE
Ammonium glycolate	EG	EE	EG	EG	EE	GF	EE	GG	EE	EE	GG	—	—	—	—
Ammonium hydroxide, 5%	EE	EE	EE	EE	EE	FN	EE	GG	EE	EF	GF	EE	EE	EE	EE
Ammonium hydroxide, 30%	EG	EE	EG	EG	EE	NN	EG	GG	EE	GF	FN	EE	EE	EE	EE
Ammonium oxalate	EG	EE	EG	EG	EE	EE	EE	EE	EE	EE	GF	EE	EE	EE	EE
Ammonium salts	EE	EE	EE	EE	EE	EG	EG	EE	EE	GG	NN	EE	EE	EE	EE
n-Amyl acetate	GF	EG	GF	GF	EE	NN	NN	NN	EE	NN	EE	EE	EE	EG	—
Amyl chloride	NN	FN	NN	NN	EE	NN	NN	NN	EE	NN	EG	EG	EE	EE	EE
Aniline	EG	EG	GF	GF	EE	GN	FN	NN	FN	NN	GF	EG	EE	EE	EE
Benzaldehyde	EG	EE	EG	EG	EE	FN	NN	FF	EE	NN	EG	GG	EE	EE	EE
Benzene	FN	NN	GF	GF	EE	GN	NN	NN	EE	NN	EE	GG	EE	EE	EE
Benzoic acid, sat.	EE	EE	EG	EG	EE	EG	EG	FF	EE	GG	NN	EG	EE	EE	EE
Benzyl acetate	EG	EE	EG	EG	EE	FN	NN	NN	—	NN	EG	GG	EE	EE	EE
Benzyl alcohol	NN	FN	NN	NN	EE	NN	GF	NN	EE	NN	NN	GG	EE	EE	EE
Bromine	NN	FN	NN	NN	EE	FN	GN	NN	EE	NN	NN	EE	EG	GG	—
Bromobenzene	NN	FN	NN	NN	EE	GN	NN	NN	EE	NN	EG	GG	GG	GG	—
Bromoform	NN	NN	NN	NN	EE	GF	NN	NN	NN	EE	NN	FF	GG	EE	EE
Butadiene	NN	FN	NN	NN	EE	NN	FN	NN	EE	NN	FF	GG	EE	EE	EE
n-Butyl acetate	GF	EG	GF	GF	EE	GN	NN	NN	EE	NN	EE	GG	EE	EE	EE
n-Butyl alcohol	EE	EE	EE	EG	EE	EG	GF	GF	EE	EG	NN	EE	EE	EE	EE
sec-Butyl alcohol	EG	EE	EG	EG	EE	GF	GG	GF	EE	GG	NN	EE	EE	EE	EE
tert-Butyl alcohol	EG	EE	EG	EG	EE	GF	EG	GF	EE	EE	NN	EE	EE	EE	EE
Butyric acid	NN	FN	NN	NN	EE	FN	GN	GG	EE	NN	FN	GG	EE	EE	EE
Calcium hydroxide, conc.	EE	EE	EE	EE	EE	NN	EE	GG	EE	GG	NN	GG	NN	EE	EE
Calcium hypochlorite, sat.	EE	EE	EE	EE	EE	FN	GF	EE	EE	GF	NN	EE	EE	EE	EE
Carbazole	EE	EE	EE	EE	EE	EE	NN	NN	—	EE	EE	—	—	—	—
Carbon disulfide	NN	NN	NN	NN	EE	FN	NN	NN	EE	NN	EG	EE	EE	EE	EE
Carbon tetrachloride	FN	GF	GF	NN	EE	EE	GN	FN	EE	NN	EE	GG	EE	EE	EE
Cedarwood oil	NN	FN	NN	NN	EE	EG	GF	FN	FF	EE	NN	EG	—	—	—
Cellosolve acetate	EG	EE	EG	EG	EE	FN	FN	EG	NN	EE	GG	EE	EE	EE	EE
Chlorine, 10% in air	GN	EF	GN	GN	EE	EG	EE	NN	EE	FN	NN	FF	EE	EE	EE
Chlorine, 10% (moist)	GN	GF	FN	GN	EE	GF	EG	NN	EE	NN	NN	FF	EE	EE	EE
Chloroacetic acid	EE	EE	EG	EG	EE	FN	FN	NN	—	GN	NN	GG	EE	EE	EE
p-Chloroacetophenone	EE	EE	EE	EE	EE	NN	NN	NN	—	NN	EG	—	—	—	—
Chloroform	FN	FN	GF	NN	EE	GF	NN	NN	EE	NN	FF	EE	EE	EE	EE
Chromic acid, 10%	EE	EE	EE	EE	EE	GF	EG	NN	EE	EE	NN	GG	EE	EE	EE
Chromic acid, 50%	EE	EE	GF	GF	EE	FN	FN	NN	EG	FF	NN	FF	EE	EE	NN
Cinnamon oil	NN	FN	NN	NN	EE	EG	GF	NN	FF	—	NN	GF	EE	—	—
Citric acid, 10%	EE	EE	EE	EE	EE	EG	GG	EE	EE	EG	NN	GG	EE	EE	EE
Cresol	NN	FN	GF	NN	EE	EG	NN	NN	EE	NN	NN	EE	EE	EE	EE
Cyclohexane	FN	FN	FN	NN	EE	EG	EG	GF	NN	EE	NN	EE	EE	EE	EE
DeCalin	GF	EG	GF	FN	EE	EE	GN	EG	NN	—	NN	EE	—	—	—
o-Dichlorobenzene	FN	FF	FN	FN	EE	FN	NN	NN	EE	NN	EG	GG	EE	EE	EE
p-Dichlorobenzene	FN	GF	GF	GF	EE	FN	NN	NN	EE	NN	EG	GG	EE	EE	EE
Diethyl benzene	NN	FN	NN	NN	EE	EG	FN	NN	NN	—	NN	EE	GG	EE	EE
Diethyl ether	NN	FN	NN	NN	EE	EG	FN	NN	NN	EG	NN	EE	GG	EE	EE
Diethyl ketone	NN	NN	GG	GF	EE	GF	NN	NN	NN	NN	EE	GG	EE	EE	EE
Diethyl malonate	EE	EE	EE	EE	EE	FN	GN	FF	EG	NN	EE	—	—	—	—
Diethylene glycol	EE	EE	EE	EE	EE	GF	FN	GG	EE	GG	EE	EE	EE	EE	EE
Diethylene glycol ethyl ether	EE	EE	EE	EE	EE	FN	FN	FF	—	NN	EE	EE	EE	EE	EE
Dimethyl formamide	EE	EE	EE	EE	EE	GG	NN	FN	NN	NN	GN	GF	EE	EE	EE
Dimethylsulfoxide	EE	EE	EE	EE	EE	GG	NN	NN	NN	—	EG	EE	EE	EE	EE
1,4-Dioxane	GF	GG	GF	GF	EE	GF	FN	GF	NN	NN	FN	GF	GG	EE	EE
Dipropylene glycol	EE	EE	EE	EE	EE	GF	GF	GG	—	EE	EE	—	—	—	—
Ether	NN	FN	NN	NN	EE	EG	NN	FN	NN	EG	NN	EE	EE	EE	EE
Ethyl acetate	EE	EE	EE	EE	EE	EE	NN	NN	NN	NN	EE	GG	EE	EE	EE
Ethyl alcohol (absolute)	EG	EE	EG	EG	EE	EE	EG	EG	EE	FN	NN	EE	EE	EE	EE
Ethyl alcohol, 40%	EG	EE	EG	EG	EE	EE	EG	EE	EG	FN	NN	EE	EE	EE	EE
Ethyl benzene	FN	GF	FN	FN	EE	GF	NN	NN	NN	—	NN	EE	GG	—	—
Ethyl benzoate	FF	GG	GF	GF	EE	EG	NN	NN	NN	NN	NN	EE	—	—	—
Ethyl butyrate	GN	GF	GN	FN	EE	EG	NN	NN	NN	NN	NN	EE	EG	—	—
Ethyl chloride, liquid	FN	FF	FN	FN	EE	EE	NN	NN	NN	EE	NN	GF	EE	EE	EE
Ethyl cyanoacetate	EE	EE	EE	EE	EE	FN	FN	FF	NN	GN	GF	—	—	—	—
Ethyl lactate	EE	EE	EE	EE	EE	FN	FN	FF	NN	FN	EG	—	—	—	—
Ethylene chloride	GN	GF	FN	NN	EE	EE	NN	NN	NN	EE	NN	EG	GG	EE	EE
Ethylene glycol	EE	EE	EE	EE	EE	GF	EE	EE	EE	EE	EE	GG	EE	EE	EE
Ethylene glycol methyl ether	EE	EE	EE	EE	EE	FN	FN	FF	—	NN	EE	—	—	—	—
Ethylene oxide	FF	GF	FF	FN	EE	EE	FN	FN	EE	EE	NN	EE	GG	EE	EE
Fluorides	EE	EE	EE	EE	EE	EE	EE	EE	EE	GG	EE	—	—	—	—
Fluorine	FN	GN	FN	FN	EG	GF	EG	NN	—	NN	NN	EG	EE	—	—
Formaldehyde, 10%	EE	EE	EE	EE	EE	EG	GF	GF	EE	FN	GF	EE	EE	EE	EE

Chemical Resistance of Labware Materials (contd.)

CHEMICAL	LDPE	HDPE	PP/PPCO	PMP	FEP/PTE/PFA	ECTFE/ETFE	PC	PVC	PSF	PVDF	PS	NYL	Stainless Steel	Glass	Ceramic
Formaldehyde, 40%	EG	EE	EG	EG	EE	EE	EG	GF	GF	EE	NN	GF	EE	EE	EE
Formic acid, 3%	EG	EE	EG	EG	EE	EE	EG	GF	GG	EE	EG	NN	GG	EE	EE
Formic acid, 50%	EG	EE	EG	EG	EE	EE	EG	GF	GG	EE	FF	NN	GG	EE	EE
Formic acid, 98 to 100%	EG	EE	EG	EF	EE	EE	EF	FN	FF	EE	FF	NN	GG	EE	EE
Freon® TF	EG	EG	EG	FN	EE	EG	GF	GF	EG	EE	FN	—	EE	EE	EE
Fuel oil	FN	GF	EG	GF	EE	EE	EG	EE	EG	EE	NN	EE	EE	EE	EE
Gasoline	FN	GG	GF	GF	EE	EE	FF	GN	FF	EE	NN	EE	EE	EE	EE
Glacial acetic acid	EG	EE	EG	EG	EE	EE	NN	EG	FN	EG	NN	NN	EG	EE	EE
Glycerine	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE
n-Heptane	FN	GF	FF	FF	EE	EE	EG	GF	EG	EE	NN	EE	EE	EE	EE
Hexane	NN	GF	GF	FN	EE	EE	FN	GN	EG	EE	NN	EE	EE	EE	EE
Hydrochloric acid, 1 to 5%	EE	EE	EE	EG	EE	EE	EE	EE	EE	EE	NN	NN	EE	EE	EE
Hydrochloric acid, 20%	EE	EE	EE	EG	EE	EE	EG	EE	EE	EE	NN	NN	EE	EE	EE
Hydrochloric acid, 35%	EE	EE	EG	EG	EE	EE	NN	GF	EE	EE	FF	NN	NN	EE	EE
Hydrofluoric acid, 4%	EG	EE	EG	EG	EE	EE	GF	GF	GF	EE	NN	NN	NN	—	—
Hydrofluoric acid, 48%	EE	EE	EE	EE	EE	EE	NN	GF	FN	EE	NN	NN	NN	NN	NN
Hydrogen peroxide, 3%	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EG	NN	GG	EE	EG
Hydrogen peroxide, 30%	EG	EE	EG	EG	EE	EE	EE	EE	EE	EE	EG	NN	GG	EE	EG
Hydrogen peroxide, 90%	EG	EE	EG	EG	EE	EE	EG	EE	E-	EG	NN	GG	EE	EG	—
Isobutyl alcohol	EE	EE	EE	EG	EE	EE	EG	EG	EE	EE	GG	NN	EE	EE	EE
Isopropyl acetate	GF	EG	GF	GF	EE	EG	NN	NN	NN	—					



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