Green Chemistry

Alternative Solvents and Products

ROTH for Future

Green Chemistry

They are indispensable in the world of chemistry, they are an essential part of chemical reactions, solutions and formulations: solvents. Solvents range from polar to non-polar, from protic to aprotic and from slightly to highly volatile; in short, there are perfect properties for every application. And like chemistry itself, solvents are in a constant process of development. Particularly when it comes to the introduction of sustainable and environmentally friendly techniques and processes in chemical development, solvents have no need to hide, because here, too, a rethink is taking place.
New findings mean that many a conventional solvent no longer looks as harmless as it once did. And so there is a whole range of alternative solvents that are, for example, less toxic to humans and the environment, save resources during production or come from naturally renewable raw materials - the Green Solvents. We at Carl Roth also take the responsibility for more sustainability very seriously and offer you a wide range of Green Solvents in our product portfolio. Grouped together under the **SOLVAGREEN®** brand, you will find our products in the web shop.
Our product specialists are available to advise you with our expertise, so that you too can find an alternative that is suitable for your application.

More sustainable and environmentally friendly products are becoming increasingly important in the chemical industry. Carl ROTH offers a variety of products which are classified as less hazardous or are made from renewable raw materials. The solvents that are relevant to these principles are grouped together in the SOLVAGREEN® brand at Carl ROTH.

The 12 principles of Green Chemistry were summarised in by Paul Anastas – as consultant at the EPA (*Environmental Protection Agency*) – and John C. Warner as follows:

1. Avoid waste
2. Atom-efficient syntheses and reactions
3. Safer chemical synthesis
4. Development and use of safer substances and minimisation of their toxicity
5. Safer solvents and additives
6. Perform processes as energy efficient as possible at room temperature and atmospheric pressure
7. Give preference to renewable resources
8. Shorter synthesis routes
9. Catalysts instead of stoichiometric reagents
10. Naturally degradable products
11. Real-time monitoring of waste prevention
12. Basic risk avoidance in chemical processes

Lit.: *Green Chemistry Pocket Guide - The 12 Principles of Green Chemistry www.acs.org/greenchemistry*

If you have any questions about Green Chemicals, please write to us at chemicals@carlroth.com, we will be happy to help you!

SOLVAGREEN® – our Brand for Alternative Solvents

Green Solvents

The sustainable products listed below serve as substitutes for environmentally hazardous and harmful reagents and help minimize risk. Sustainability is also achieved through the use of renewable resources or environmentally compatible manufacturing and recycling processes.

Products from renewable raw materials

Product name	Brand/Purity	Basic material	Pack.	Art. No.	Pack Qty.
Bioethanol	SOLVAGREEN® 96 %, Ph. Eur.	Wheat	glass	**6724.1**	1 l
				6724.2	2.5 l
			plastic	**6724.3**	2.5 l
				6724.4	5 l
				6724.5	10 l
				6724.6	25 l
	SOLVAGREEN® 96 %, denatured	Wheat	plastic	**6726.1**	1 l
				6726.2	2.5 l
				6726.3	5 l
				6726.4	10 l
				6726.5	25 l
	SOLVAGREEN® 70 %	plants	plastic	**1Y4H.1**	1 l
				1Y4H.2	2.5 l
				1Y4H.3	5 l
				1Y4H.4	10 l
				1Y4H.5	25 l
	SOLVAGREEN® 70 %, denatured	plants	plastic	**1Y4K.1**	1 l
				1Y4K.2	2.5 l
				1Y4K.3	5 l
				1Y4K.4	10 l
				1Y4K.5	25 l
Glycerol	SOLVAGREEN® ≥98 %, anhydrous, Ph. Eur.	Plants	glass	**7530.7**	100 ml
			plastic	**7530.1**	1 l
				7530.4	2.5 l
				7530.5	5 l
				7530.2	10 l
				7530.6	25 l
	SOLVAGREEN® ≥98 %, Ph. Eur., palm-free	Plants, palm-free	plastic	**1YP1.1**	500 ml
				1YP1.2	1 l
				1YP1.3	2.5 l
				1YP1.4	5 l
				1YP1.5	10 l
				1YP1.6	25 l
	SOLVAGREEN® ~86 %, Ph. Eur., extra pure	Plants	glass	**7533.6**	100 ml
			plastic	**7533.1**	1 l
				7533.3	2.5 l
				7533.4	5 l
				7533.2	10 l
				7533.5	25 l
	SOLVAGREEN® ~86 %, for synthesis, palm-free	Plants, palm-free	plastic	**1T4E.1**	1 l
				1T4E.2	2.5 l
				1T4E.3	5 l
				1T4E.4	10 l
				1T4E.5	25 l
Succinic acid	≥99 %, for synthesis, made from renewable raw material	Corn	plastic	**1N1L.1**	250 g
				1N1L.2	1 kg
				1N1L.3	2.5 kg
				1N1L.4	5 kg

For safety information and additional data, see our current catalogue or at www.carlroth.com

SOLVAGREEN® – our Brand for Alternative Solvents

Bioethanol

Our bioethanol is manufactured by fermentation of wheat or plants followed by distillation and rectification.

Advantages:

- Made from controlled organic cultivation in accordance with EU organic farming regulation 834/2007
- Made from wheat for artcle no. 6724 and 6726
- Made from plants for article no. 1Y4H and 1Y4K
- Non-synthetically manufactured ethanol
- Suitable for synthesis and other laboratory applications

Denaturated using a non-organic denaturant **(Art. No. 6726 and 1Y4K)**

Products made from recycled material

Dimethyl sulphoxide (DMSO)

SOLVAGREEN® ≥99,0 %, for synthesis, recycled material

C_2H_6OS · M 78,13 g/mol
WGK 1

Note: Product may crystallise.
It can be liquefied by heating in a water bath to max. 40 °C.

Art. No.	Pack Qty.	Pack.
1P1T.1	1 l	glass
1P1T.2	2.5 l	glass
1P1T.3	5 l	plastic

SOLVAGREEN® alternative solvents

Alternative products for environmentally hazardous and harmful reagents

Product name	Brand/Purity	General application	Synonymous	Pack.	Art. No.	Pack Qty.
Acetic acid *iso*-propyl ester	SOLVAGREEN® ≥99 %, for synthesis	Alternative for dichloromethane	Isopropyl acetate	glass	**1A9C.1**	1 l
					1A9C.2	2.5 l
Acetic acid *n*-propyl ester	SOLVAGREEN® ≥99,5 %, for synthesis	Alternative for MEK (mixture 40:60 with acetone)	*n*-Propyl acetat, *n*-Propyl ethanoate	plastic	**1A9A.1**	1 l
					1A9A.2	2.5 l
Acetyltributylcitrate	≥99 %, for synthesis	Alternative for plasticisers in PVC, especially DEHP, DBP, DOP and DINP	Tributyl-2-acetylcitrate, TBAC, ATBC	plastic	**23TX.1**	100 ml
					23TX.2	250 ml
					23TX.3	500 ml
					23TX.4	1 l
Adipic acid dimethyl ester	SOLVAGREEN® ≥99 %, for synthesis	Alternative for acetone, benzene, toluene, dichloromethane.	DBE-6, Dimethyl adipate, Hexanedioic acid dimethyl ester	plastic	**23X8.1**	100 ml
					23X8.2	250 ml
					23X8.3	500 ml
					23X8.4	1 l
tert-Amyl methyl ether	SOLVAGREEN® ≥99 %, for synthesis	Alternative for diethyl ether, tBME/MTBE, THF, 1,4-Dioxane	Methoxypentane™, 2-Methoxy-2-methylbutane, TAME	glass	**1A92.1**	100 ml
					1A92.2	250 ml
				plastic	**1A92.3**	1 l
					1A92.4	2.5 l
					1A92.5	10 l
Anisole	SOLVAGREEN® ≥99 %, for synthesis	Alternative for chlorobenzene, toluene	Methoxybenzene	glass	**4417.1**	100 ml
					4417.2	500 ml
					4417.3	1 l
					4417.4	2.5 l
N-Butyl-2-pyrrolidone (NBP)	≥99,5 %, for synthesis	Dipolar aprotic solvent. Alternative for NMP, NEP, DMSO	1-Butyl-2-pyrrolidone, 1-Butyl-2-pyrrolidinone, NBP, TamiSolve™ NxG	plastic	**1E8A.1**	100 ml
					1E8A.2	500 ml
					1E8A.3	1 l
					1E8A.4	2.5 l
Cyclopentyl methyl ether	SOLVAGREEN® ≥99 %, extra pure	Alternative for diethyl ether, tBME/MTBE, THF.	CPME, Methoxycyclopentane	glass	**7763.1**	250 ml
					7763.2	500 ml
					7763.3	1 l
					7763.4	2.5 l
Dibasic ester	SOLVAGREEN® ≥99 %, pure	Alternative for acetone, benzene, toluene, dichloromethane.	DBE	plastic	**7973.1**	1 l
					7973.2	2.5 l
					7973.3	5 l
Diethyl carbonate	SOLVAGREEN® ≥99,9 %	Alternative for DMF, phosgene.	DEC, Ethyl carbonate, Carbonic acid diethyl ester	glass	**2627.1**	100 ml
					2627.2	500 ml
					2627.3	1 l
					2627.4	2.5 l
Dihydrolevoglucosenone	SOLVAGREEN® ≥98,5 %, for synthesis	Dipolar aprotic solvent. Alternative for NMP, NEP, DMF, DMAC, DMSO	Cyrene™, H_2-LGO, (1S,5R)-6,8-Dioxabicyclo[3.2.1]octanon-4-one	plastic	**1E89.1**	100 ml
					1E89.2	500 ml
					1E89.3	1 l
Dimethyl carbonate	SOLVAGREEN® ≥99,8 %	Alternative for DMF, phosgene.	DMC, Carbonic acid dimethyl ester, Methyl carbonate	glass	**2625.1**	100 ml
					2625.2	500 ml
					2625.3	1 l
					2625.4	2.5 l
N,N-Dimethyl lactamid	SOLVAGREEN® ≥98 %, for synthesis	Alternative for NMP, NEP, DMAc, DMF, NFM	Agnique® AMD 3L, 2-Hydroxy *N,N*-dimethyl propanamide	glass	**22L0.1**	100 ml
				plastic	**22L0.2**	1 l
					22L0.3	2.5 l
					22L0.4	5 l
					22L0.5	10 l
					22L0.6	25 l
N,N'-Dimethylpropylene urea	SOLVAGREEN® ≥99 %, for synthesis	Polar aprotic solvent, alternative for DMF and hexamethylphosphoramide (HMPA).	1,3-Dimethyl-3,4,5,6-tetrahydro-2(1*H*)-pyrimidinone, DMPU, *N,N'*-Dimethyl-*N,N'*-trimethylene urea	glass	**0662.1**	25 ml
					0662.2	100 ml
					0662.3	500 ml
Diphenyl carbonate	SOLVAGREEN® ≥99 %	Alternative for DMF, phosgene.	DPC, Carbonic acid diphenyl ester, Phenyl carbonate	plastic	**2626.1**	100 g
					2626.2	500 g
					2626.3	1 kg
Glutaric acid dimethyl ester	SOLVAGREEN® ≥98 %, for synthesis	Alternative for acetone, benzene, toluene, dichloromethane.	DBE-5, Dimethyl glutarate, Dimethyl pentanedioate	plastic	**23X7.1**	100 ml
					23X7.2	250 ml
					23X7.3	500 ml
					23X7.4	1 l
3-Methoxy-3-methyl-1-butanol	SOLVAGREEN® ≥99 %, for synthesis	Alternative for glycol ethers, e.g. Ethylene glycol, Propylene glycol, Butylene glycol, Dipropylene glycol methyl ether/DPM	MMB	glass	**1PKN.1**	100 ml
					1PKN.2	500 ml
					1PKN.3	1 l
					1PKN.4	2.5 l
2-Methyltetrahydrofuran	SOLVAGREEN® ≥99 %, extra pure	Alternative for THF, dichloromethane, DMSO, tBME/MTBE.	Methyl-THF, Me-THF	glass	**6845.1**	250 ml
					6845.2	500 ml
					6845.3	1 l
					6845.4	2.5 l
				PE/steel	**6845.5**	10 l

SOLVAGREEN® alternative solvents

Alternative products for environmentally hazardous and harmful reagents

Product name	Brand/Purity	General application	Synonymous	Pack.	Art. No.	Pack Qty.
Methyltetrahydropyran	SOLVAGREEN® ≥99 %, for synthesis	Alternative for Diethyl ether, tBME/MTBE, THF	MTHP	glass	**1PKY.1**	100 ml
					1PKY.2	500 ml
					1PKY.3	1 l
					1PKY.4	2.5 l
N-Octyl-2-pyrrolidone (NOP)	SOLVAGREEN® ≥99 %, for synthesis	Alternative for NMP, NEP.	NOP, 1-Octyl-2-pyrrolidone	glass	**0358.1**	100 ml
				plastic	**0358.2**	500 ml
					0358.3	1 l
					0358.4	2.5 l
Propylene carbonate	SOLVAGREEN® ≥99,7 %, for synthesis	Alternative for acetone, DMF, chlorinated solvents.	(±)-1,2-Propylene carbonate, 1,2-Propanediol cyclic carbonate	glass	**5022.2**	100 ml
					5022.1	250 ml
					5022.3	1 l
					5022.4	2.5 l
Succinic acid dimethyl ester	SOLVAGREEN® ≥99 %, for synthesis	Alternative for acetone, benzene, toluene, dichloromethane.	Dimethyl succinate, DBE-4	plastic	**23X6.1**	100 ml
					23X6.2	250 ml
					23X6.3	500 ml
					23X6.4	1 l

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Characteristics of some alternative products

Properties	Art. No.	Melting point [°C]	Boiling point [°C]	Flash point [°C]	Vapour pressure [Pa]	Density [g/cm³]	Solubility in water [g/l]	Surface tension [mN/m]	Kinematic viscosity [mm²/s] or [cSt]	Dynamic viscosity [cP] or [mPas]
Acetic acid iso-propyl ester	1A9C	–73,4	88,6	5	6100	0,872	31	n.a.	0,776	0,53
Acetic acid n-propyl ester	1A9A	–93	101,3	11,8	3300	0,89	18,9	n.a.	0,6517	0,58
tert-Amyl methyl ether (TAME)	1A92	<–20	87,3	–18	9100	0,77	10,4	71,3	0,6	n.a.
N-Butyl-2-pyrrolidone (NBP)	1E8A	<–75	240	108	13	0,958	n.a.	67,31	4,489	4,3
Cyclopentyl methyl ether (CPME)	7763	<–140	107	–1	n.a.	0,86	n.a.	65,1	0,675	0,5805
Diacetone alcohol	3546	–47	150	58,5	1100	0,93	n.a.	n.a.	3,426	3,22
Dibasic ester (DBE)	7973	–55	195	99	9,4	1,09	40,5	67,3	2,615	2,85
Diethyl carbonate	2627	–43	126	25	1400	0,98	19	n.a.	0,86	0,84
Dihydrolevoglucosenone (Cyrene™)	1E89	<–20	227	108	28	1,25	n.a.	72,5	11,6	14,5
Dimethyl carbonate	2625	n.a.	90	16,7	5700	1,07	110	n.a.	0,59	0,63
N,N'-Dimethylpropylene urea (DMPU)	0662	–24	246	121	2	1,06	1000	n.a.	n.a.	3,4
Diphenyl carbonate	2626	76	300	168	0,014	1,272	0,00013	n.a.	n.a.	n.a.
2-Methyltetrahydrofuran (Me-THF)	6845	–136	78	–12	13600	0,8552	150	n.a.	n.a.	n.a.
N-Octyl-2-pyrrolidone (NOP)	0358	–26	297	142	0,08	0,92	1	n.a.	9,1	8,4
Propylene carbonate	5022	–49	241	119	4	1,21	240	n.a.	2,314	2,8

SOLVAGREEN® alternative solvents

SOLVAGREEN® – Green Solvents

Acetals

Acetals are made from an alcohol and an aldehyde. They form a chemical family with linear or cyclic structures that are stable in neutral and basic environments. Due to their high solvency, acetals are often used as solvents. The various fields of application include the replacement of more dangerous solvents, use in cleaners or in synthesis.

Carl ROTH offers you a wide range of acetals with different properties. For each of our SOLVAGREEN® acetals it is indicated for which solvent it is suitable as an alternative. All acetals are easily miscible with organic solvents and most surfactants. The water miscibility, on the other hand, varies and depends strongly on the structure of the acetals. The acetals can also be used as an additive to normal, classic solvents.

Product name	Brand/Purity	General application	Pack.	Art. No.	Pack Qty.
Butylal	SOLVAGREEN® ≥99 %, for synthesis	Alternative for D-limonene, cyclic hydrocarbons, perchloroethylene.	glass	**0796.1**	100 ml
				0796.2	500 ml
				0796.3	1 l
				0796.4	2.5 l
1,3-Dioxolane	SOLVAGREEN® ≥90 %, for synthesis	Alternative for NMP, NEP, glycols, aromatics.	glass	**0447.1**	100 ml
				0447.2	500 ml
				0447.3	1 l
				0447.4	2.5 l
Ethylal	SOLVAGREEN® ≥99,5 %, for synthesis	Alternative for ethanol, MEK, aromatics, butyl acetate.	glass	**0787.1**	100 ml
				0787.2	500 ml
				0787.3	1 l
				0787.4	2.5 l
2-Ethylhexylal	SOLVAGREEN® ≥99 %, for synthesis	Alternative for toluene, xylene.	glass	**0797.1**	100 ml
				0797.2	500 ml
				0797.3	1 l
				0797.4	2.5 l
Glycerol Formal	SOLVAGREEN® ≥99 %, for synthesis	Solvent for many applications, completely miscible with water.	glass	**0798.1**	100 ml
				0798.2	500 ml
				0798.3	1 l
				0798.4	2.5 l
Methylal	SOLVAGREEN® ≥99,9 %, for synthesis	Acetal and protecting group. Alternative for dichloromethane, acetone, MEK.	glass	**3154.1**	100 ml
				3154.2	500 ml
				3154.3	1 l
				3154.4	2.5 l
	SOLVAGREEN® ≥99,5 %, for synthesis	Acetal and protecting group. Alternative for dichloromethane, acetone, MEK.	glass	**0783.1**	100 ml
				0783.2	500 ml
				0783.3	1 l
				0783.4	2.5 l
Propylal	SOLVAGREEN® ≥99 %, for synthesis	Alternative for aromatics.	glass	**0795.1**	100 ml
				0795.2	500 ml
				0795.3	1 l
				0795.4	2.5 l
Tetraoxaundecane	SOLVAGREEN® ≥99 %, for synthesis	Alternative for NMP, NEP, glycols, aromatics.	glass	**0786.1**	100 ml
				0786.2	500 ml
				0786.3	1 l
				0786.4	2.5 l

For safety information and additional data, see our current catalogue or at www.carlroth.com

Tip:

Not every alternative solvent is suitable for every application. Carl ROTH offers you a wide range of alternative solvents to address the most diverse solvent problems.

SOLVAGREEN® alternative solvents

Characteristics of the acetals

Characteristic	Butylal	1,3-Dioxolane	Ethylal	2-Ethyl hexylal	Glycerol Formal	Methylal	Propylal	Tetraoxaundecane (TOU)
Art. No.	0796	0447	0787	0797	0798	3154, 0783	0795	0786
Melting point [°C]	–59.4	–26.4	–66.5	<–65	<–50	–104.8	–97.3	<–65
Boiling point [°C]	182.5	76	88	290	193.9	42.3	137.4	201.5
Flash point [°C]	62.2	<2.5	–7	142	99	–30.5	26	88
Kauri butanol value with resins 4938	62	>218	92	31	n.d.	101	73	>200
Surface tension [mN/m] (25 °C)	25.2	34.3	21.62	25.2	n.a.	21.2	23.43	31.5
Kinematic viscosity [mm²/s]	Jan 18	0.553	0.507	Sep 42	n.d.	0.371	0.77	1.532
Dynamic viscosity [cP] (25 °C)	0.90	0.59	0.42	n.a.	n.d.	0.32	0.64	Jan 52
Solubility in water [g/l]	0.2225	fully miscible	70	not soluble	fully miscible	330	3.65	fully miscible
Polarity	3.43	7.85	4.67	3.30	11.99	6.01	3.95	6.09
Evaporation rate diethyl ether = 1	n.d.	Mrz 60	3	none	n.d.	1.36	14	n.d.
Evaporation rate butyl acetate = 1	5.54	0.29	0.25	none	n.d.	0.11	1.25	17.38

Solubility of some polymers with acetals

Resin/ polymer dissolves in	dissolves in the following acetals
Polyvinyl chloride (PVC)	Dioxolan
Styrene Butadiene Styrene (SBS)	all
Styrene Ethylene Butadiene Styrene (SEBS)	Ethylal, Butylal, 2-Ethylhexylal, Methylal, Dioxolan
Styrene Ethylene Propylene Styrene (SEPS)	Methylal, Ethylal, Butylal, 2-Ethylhexylal
Cellulose acetate butyrate (CAB)	Dioxolan, TOU, Methylal, Ethylal
Rosin ester	all
Hydrocarbon resin	all
Polyester resin	Dioxolane, TOU, Methylal, Ethylal
Methyl methacrylate copolymer (MMA)	Methylal, Ethylal, Dioxolan
Isobutyl methacrylate (iBMA)	Methylal, Ethylal, Dioxolan
MMA/BMA	All except 2-ethylhexylal
Alkyd resin	All except dioxolane
Polyurethane	Dioxolane, TOU, Methylal
Epoxy resin	Dioxolane, Methylal, TOU
Phenolic resin	all
Polyvinyl butyral (PVB)	Dioxolane, methylal
Silicones	Methylal, Ethylal, Propylal, Butylal, 2-Ethylhexylal
Latex	TOU, Butylal

General assistance in selecting a classic solvent

Due to the toxicity and other harmful properties of classical solvents, they have been evaluated by various companies. Here is a summary of the results with a subdivision into preferred use for solvents that are less dangerous, useable solvents and solvents that should be avoided.
This list is exemplary and does not claim to be complete.

use preferably	usable	avoid use
Acetone	Acetonitrile	Benzene
1-Butanol	*tert*-Butyl methyl ether (TBME)	Dichloroethane
2-Butanol	Cyclopentyl methyl ether (CPME)	Dichloromethane
tert-Butanol	Cyclohexane	Diethyl ether
Dimethyl carbonate (DMC)	Dimethyl sulphoxide (DMSO)	Di-isopropyl ether
Ethyl acetate (EE)	Acetic acid	1,2-Dimethoxyethane
Acetic acid isopropyl ester	Acetic acid methyl ester	Dimethylacetamide (DMA)
Acetic acid *n*-propyl ester	Ethylene glycol	Dimethylformamide (DMF)
Ethanol	Heptane	1,4-Dioxane
Ionic liquids	Isooctane	Hexane
Methanol	Methylcyclohexane	*N*-Methylpyrrolidone (NMP)
1-Propanol	2-methyl-tetrahydrofuran (Me-THF)	Pentane
2-Propanol (IPA)	Tetrahydrofuran (THF)	Pyridine
Water	Toluene	Trichloromethane
	Xylene	

Ionic Liquids

Ionic Liquids

Ionic liquids are salts which are available in a liquid state over a wide temperature range. Ionic liquids are composed of organic cations and organic or inorganic anions. Due to their fully ionic structure, they display a variety of interesting properties.

- Negligible vapor pressure
- Excellent chemical and thermal stability
- Low-melting with melting point under 100 °C
- High solubility to a wide range of substances and biopolymers
- Uncomplicated and safe handling compared to conventional solvents
- More environmentally friendly alternative to volatile, ecologically problematic organic solvents

Product name	Purity	Synonymous	Art. No.	Pack Qty.
1-Butyl-3-methyl-imidazolium chloride (BMIM Cl)	≥99 %	BMIM Cl	**2010.1**	25 g
			2010.2	100 g
1-Butyl-3-methyl-imidazolium hexafluorophosphate (BMIM PF_6)	≥99 %	BIMI PF_6	**2012.1**	25 g
			2012.2	100 g
1-Butyl-3-methyl-imidazolium tetrafluoroborate (BMIM BF_4)	>99 %	BMIM BF_4	**2014.1**	25 g
			2014.2	100 g
1-Butyl-3-methyl-imidazolium-trifluoromethanesulphonate (BMIM OTf)	≥99 %	BMIM triflate, BMIM OTf	**2015.1**	25 g
			2015.2	100 g
1-Butyl-1-methyl-pyrrolidinium-bis-(trifluoromethylsulphonyl)-imide (BMPyrr BTA)	≥99 %	BMPyrr TFSI, BMPyrr NTf_2, BMPyrr BTA	**2021.1**	25 g
			2021.2	100 g
1-Butyl-1-methyl-pyrrolidinium dicyanamide (BMPyrr DCA)	≥98 %	BMPyrr $N(CN)_2$, BMPyrr DCA	**2022.1**	25 g
			2022.2	100 g
Butyl-trimethyl-ammonium-bis-(trifluoromethylsulphonyl)-imide (N1114 BTA)	≥99 %	N1114 BTA	**2025.1**	25 g
			2025.2	100 g
Choline-dihydrogenphosphate (Choline DHP)	≥98 %	Choline DHP, Choline DHP	**2028.1**	25 g
			2028.2	100 g
Ethylammonium nitrate (EAN)	≥97 %	EAN	**2035.1**	25 g
			2035.2	100 g
1-Ethyl-3-methyl-imidazolium bromide (EMIM Br)	≥99 %	EMIM Br	**2037.1**	25 g
			2037.2	100 g
1-Ethyl-3-methyl-imidazolium dicyanamide (EMIM DCA)	≥98 %	EMIM $N(CN)_2$, EMIM DCA	**2053.1**	25 g
			2053.2	100 g
1-Ethyl-3-methyl-imidazolium ethylsulfate (EMIM $EtOSO_3$)	≥98 %	EMIM $EtSO_4$, EMIM $EtOSO_3$	**2054.1**	25 g
			2054.2	100 g
1-Ethyl-3-methyl-imidazolium methanesulfonate (EMIM OMs)	≥99 %	EMIM $MeSO_3$, EMIM mesylate, EMIM OMs	**2056.1**	25 g
			2056.2	100 g
1-Ethyl-3-methyl-imidazolium thiocyanate (EMIM SCN)	≥98 %	EMIM SCN	**2059.1**	25 g
			2059.2	100 g
1-Ethyl-3-methyl-imidazolium-trifluoromethansulphonate (EMIM OTf)	≥99 %	EMIM triflate, EMIM OTf	**2062.1**	25 g
			2062.2	100 g
1-Hexyl-3-methyl-imidazolium chloride (HMIM Cl)	≥98 %	HMIM Cl	**2064.1**	25 g
			2064.2	100 g
1-Hexyl-3-methyl-imidazolium-hexafluorophosphate (HMIM PF_6)	≥99 %	HMIM PF_6	**2069.1**	25 g
			2069.2	100 g
1-Hexyl-3-methyl-imidazolium tetrafluoroborate (HMIM BF_4)	≥99 %	HMIM BF_4	**2070.1**	25 g
			2070.2	100 g
1-Methyl-3-octyl-imidazolium-hexafluorophosphate (OMIM PF_6)	>99 %	OMIM PF_6	**2076.1**	25 g
			2076.2	100 g
1-Methyl-3-octyl-imidazolium-tetrafluoroborate (OMIM BF_4)	>99 %	OMIM BF_4	**2081.1**	25 g
			2081.2	100 g
1-Methyl-3-propyl-imidazolium-iodide (PMIM I)	≥98 %	PMIM I	**2091.1**	25 g
			2091.2	100 g
1-Methyl-1-propyl-piperidinium-bis-(trifluoromethylsulphonyl)-imide (PMPip BTA)	≥99 %	PMPip BTA	**2095.1**	25 g
			2095.2	100 g
Triethylsulfonium-bis-(trifluoromethylsulphonyl)-imide (S222 BTA)	≥99 %	S222 BTA	**2096.1**	25 g
			2096.2	100 g

For safety information and additional data, see our current catalogue or at www.carlroth.com

Ionic Liquids

Ionic liquids from Proionic

Carl Roth offers you selected high-purity ionic liquids from proionic for research and development that are normally only available on an industrial scale. Through a special manufacturing process, the high-purity Ionic Liquids can be produced sustainably and with respect for the environment.

Product name	Purity	Pack.	Art. No.	Pack Qty.
1-Butyl-1-methyl-pyrrolidinium bis(fluorosulfonyl)imide (BMPyrr FSI)	≥99,9 %, Electronic Grade	glass	**20N5.1**	10 g
			20N5.2	50 g
1-Butyl-1-methyl-pyrrolidinium bis(trifluoromethylsulfonyl)imide (BMPyrr TFSI)	≥99,9 %, Electronic Grade	glass	**20N6.1**	10 g
			20N6.2	50 g
1-Ethyl-3-methyl-imidazolium acetate (EMIM OAc)	≥98 %, purum	glass	**20N9.1**	25 g
			20N9.2	100 g
1-Ethyl-3-methyl-imidazolium bis(fluorosulfonyl)imide (EMIM FSI)	≥99,9 %, Electronic Grade	glass	**20NC.1**	10 g
			20NC.2	50 g
1-Ethyl-3-methyl-imidazolium bis(trifluoromethylsulfonyl)imide (EMIM TFSI)	≥99,9 %, Electronic Grade	glass	**20N7.1**	10 g
			20N7.2	50 g
1-Ethyl-3-methyl-imidazolium octanoate (EMIM OOc)	≥98 %, purum	glass	**20N8.1**	25 g
			20N8.2	100 g
1-Ethyl-3-methyl-imidazolium tetrafluoroborate (EMIM BF_4)	≥99,9 %, Electronic Grade	glass	**20NA.1**	10 g
			20NA.2	50 g

For safety information and additional data, see our current catalogue or at www.carlroth.com

Chemical and physical properties of ionic liquids:

Art. No.	Ionic liquid	Short name	Density	Melting point (°C)	Viscosity (cP)	Conductivity (mS/cm)	Thermal stability / pyrolysis
2010	1-Butyl-3-methyl-imidazolium-chloride	BMIM Cl	n. e.	65	n. e.	n. e.	approx. 200 °C*
2012	1-Butyl-3-methyl-imidazolium-hexafluorophosphate	BMIM PF_6	1,372 (23 °C)	–8	267,1 (25 °C)	1,373 (20 °C)	approx. 200 °C, with water hydrolysis under HF formation*
2014	1-Butyl-3-methyl-imidazolium-tetrafluoroborate	BMIM BF_4	1,205 (22 °C)	–75	103,5 (25 °C)	3,145 (20 °C)	approx. 200 °C, with water hydrolysis under HF formation*
2015	1-Butyl-3-methyl-imidazolium-trifluoromethanesulphonate	BMIM OTf	1,299 (24 °C)	16	80 (25 °C)	3,049 (20 °C)	<250 °C*
2021	1-Butyl-1-methyl-pyrrolidinium-bis-(trifluoromethylsulphonyl)-imide	BMPyrr BTA	1,395 (23 °C)	–18	94,4 (20 °C)	2,12 (20 °C)	<250 °C*
2022	1-Butyl-1-methyl-pyrrolidinium-dicyanamide	BMPyrr DCA	1,023 (20 °C)	–55	46,4 (20 °C)	10,83 (30 °C)	<80 °C / >80 °C discolouration*
2025	Butyl-trimethyl-ammonium-bis-(trifluoromethylsulphonyl)-imide	N1114 BTA	1,395 (24 °C)	7	106 (21 °C)	2,861 (30 °C)	<250 °C*
2028	Choline-dihydrogenphosphate	Choline DHP	n. e.	190	n. e.	n. e.	n. e.
2035	Ethylammonium-nitrate	EAN	1,209 (26 °C)	9	36,5 (25 °C)	25,36 (30 °C)	n. e.
2037	1-Ethyl-3-methyl-imidazolium-bromide	EMIM Br	n. e.	91	n. e.	n. e.	approx. 200 °C*
2053	1-Ethyl-3-methyl-imidazolium-dicyanamide	EMIM DCA	1,101 (26 °C)	–21	16,8 (21 °C)	25,3 (21 °C)	<80 °C / >80 °C discolouration*
2054	1-Ethyl-3-methyl-imidazolium-ethylsulphate	EMIM $EtSO_4$	1,241 (24 °C)	n. e.	94,2 (25 °C)	5,560 (30 °C)	n. e.
2056	1-Ethyl-3-methyl-imidazolium-methanesulphonate	EMIM OMs	1,242 (23 °C)	n. e.	134,5 (25 °C)	3,693 (30 °C)	<250 °C*
2059	1-Ethyl-3-methyl-imidazolium-thiocyanate	EMIM SCN	1,119 (25 °C)	–6	24,7 (20 °C)	17,87 (20 °C)	<80 °C / >80 °C discolouration*
2062	1-Ethyl-3-methyl-imidazolium-trifluoromethansulphonate	EMIM OTf	1,386 (25 °C)	–9	39,8 (25 °C)	9,842 (30 °C)	<250 °C*
2064	1-Hexyl-3-methyl-imidazolium chloride	HMIM Cl	1,041 (26 °C)	–75	3302 (35 °C)	0,076 (30 °C)	<200 °C*
2069	1-Hexyl-3-methyl-imidazolium-hexafluorophosphate	HMIM PF_6	1,298 (23 °C)	–61	464,7 (25 °C)	0,076 (30 °C)	<200 °C, with water hydrolysis under HF formation*
2070	1-Hexyl-3-methyl-imidazolium-tetrafluoroborate	HMIM BF_4	1,148 (24 °C)	–82	288,3 (20 °C)	1,176 (20 °C)	<200 °C, with water hydrolysis under HF formation*
2076	1-Methyl-3-octyl-imidazolium-hexafluorophosphate	OMIM PF_6	1,237 (24 °C)	–70	608,3 (25 °C)	0,444 (30 °C)	<200 °C, with water hydrolysis under HF formation*
2081	1-Methyl-3-octyl-imidazolium-tetrafluoroborate	OMIM BF_4	1,106 (19 °C)	–81	760,3 (20 °C)	1,266 (30 °C)	<200 °C, with water hydrolysis under HF formation*
2091	1-Methyl-3-propyl-imidazolium-iodide	PMIM I	1,542 (24 °C)	n. e.	1385 (20 °C)	0,958 (30 °C)	n. e.
2095	1-Methyl-1-propyl-piperidinium-bis-(trifluoromethylsulphonyl)- imide	PMPip BTA	1,413 (23 °C)	9	175,5 (25 °C)	2,124 (30 °C)	approx. 250 °C*
2096	Triethylsulfonium-bis-(trifluoromethylsulphonyl)-imide	S222 BTA	1,462 (24 °C)	n. e.	38,9 (20 °C)	5,12 (25 °C)	n. e.

*Experience values, not guaranteed / n.e. = not evaluated

Ionic Liquids

Solubility of ionic liquids:

Art. No.	Ionic liquid	Short name	Water	Isopropanol	Acetone	Acetonitrile	Toluene	Heptane
2010	1-Butyl-3-methyl-imidazolium-chloride	BMIM Cl	Y	Y	Y	Y	N	N
2012	1-Butyl-3-methyl-imidazolium-hexafluorophosphate	BMIM PF_6	N	N	Y	Y	N	N
2014	1-Butyl-3-methyl-imidazolium-tetrafluoroborate	BMIM BF_4	Y	N	Y	Y	N	N
2015	1-Butyl-3-methyl-imidazolium-trifluoromethanesulphonate	BMIM OTf	Y	Y	Y	Y	N	N
2021	1-Butyl-1-methyl-pyrrolidinium-bis-(trifluoromethylsulphonyl)-imide	BMPyrr BTA	N	Y	Y	Y	N	N
2022	1-Butyl-1-methyl-pyrrolidinium-dicyanamide	BMPyrr DCA	Y	Y	Y	Y	N	N
2025	Butyl-trimethyl-ammonium-bis-(trifluoromethylsulphonyl)-imide	N1114 BTA	N	Y	Y	Y	N	N
2028	Choline-dihydrogenphosphate	Choline DHP	Y	N	N	N	N	N
2035	Ethylammonium-nitrate	EAN	Y	Y	Y	Y	N	N
2037	1-Ethyl-3-methyl-imidazolium-bromide	EMIM Br	Y	Y	N	Y	N	N
2053	1-Ethyl-3-methyl-imidazolium-dicyanamide	EMIM DCA	Y	Y	Y	Y	N	N
2054	1-Ethyl-3-methyl-imidazolium-ethylsulphate	EMIM $EtSO_4$	Y	Y	Y	Y	N	N
2056	1-Ethyl-3-methyl-imidazolium-methanesulphonate	EMIM OMs	Y	Y	Y	Y	Y	N
2059	1-Ethyl-3-methyl-imidazolium-thiocyanate	EMIM SCN	Y	Y	Y	Y	N	N
2062	1-Ethyl-3-methyl-imidazolium-trifluoromethansulphonate	EMIM OTf	Y	Y	Y	Y	T	N
2064	1-Hexyl-3-methyl-imidazolium chloride	HMIM Cl	Y	Y	Y	Y	N	N
2069	1-Hexyl-3-methyl-imidazolium-hexafluorophosphate	HMIM PF_6	N	N	Y	Y	N	N
2070	1-Hexyl-3-methyl-imidazolium-tetrafluoroborate	HMIM BF_4	N	Y	Y	Y	N	N
2076	1-Methyl-3-octyl-imidazolium-hexafluorophosphate	OMIM PF_6	N	N	Y	Y	Y	N
2081	1-Methyl-3-octyl-imidazolium-tetrafluoroborate	OMIM BF_4	N	Y	Y	Y	N	N
2091	1-Methyl-3-propyl-imidazolium-iodide	PMIM I	Y	Y	Y	Y	N	N
2095	1-Methyl-1-propyl-piperidinium-bis-(trifluoromethylsulphonyl)- imide	PMPip BTA	N	Y	Y	Y	T	N
2096	Triethylsulfonium-bis-(trifluoromethylsulphonyl)-imide	S222 BTA	N	N	Y	Y	N	N

Y = miscibel / N = non miscibel / T = partially miscibel

Tip:

Not every alternative solvent is suitable for every application. Carl ROTH offers you a wide range of alternative solvents to address the most diverse solvent problems.

Alternatives for Histological Applications

ready-to-use

Decalcifier soft

SOLVAGREEN® ready-to-use, for histology

Decalcifier solution on base of EDTA.
Used for gentle decalcification of bones and other calcified tissues. The solution is also suitable for immunological applications.

The solution contains 25 % EDTA.

The process of decalcification takes more time than acid decalcification (see Decalcifier standard, Art. No. 6483), e.g. bone biopsies need approx. 3–4 days. The procedure can be accelerated by using a magnetic stirrer.
The decalcification takes place in a weakly basic milieu. Nucleic acids and enzymes are not affected; therefore, the solution is also suitable for immunological applications.

Sustainability

Decalcifier solution on base of EDTA
UN no. 1824 · ADR 8 III · WGK 2

Danger H290-H314-H373

Not a medical device / Not an IVD product

Art. No.	Pack Qty.	Pack.
6484.1	500 ml	glass
6484.2	1 l	glass
6484.3	2.5 l	plastic
6484.4	5 l	plastic

ready-to-use

ROTI®Histofix ECO Plus

SOLVAGREEN® ready-to-use, formalin-free

For fixing of histological and immunochemical specimens. Formalin substitute.
ROTI®Histofix ECO Plus is a ready-to-use, aqueous solution on the basis of hexamethylene tetramine. The solution has similar good fixation properties like formaldehyde, but is, unlike formaldehyde, classified as non-toxic.

- Formaldehyde-free, non-toxic fixative
- Good fixation properties
- pH 4,5–5,0
- No denaturing effect, e.g. shrinkage or crosslinking
- Adequate substitute for formaldehyde

The original morphology of the tissue is preserved during the fixation process. The protein molecules are cross-linked in a reversible way, their structures are preserved.
That is especially important for antigen-antibody reactions. Samples are – in contrast to other fixative media – free of artefacts such as shrinkage of tissue or irreversible protein crosslinking. The solution is therefore ideal for immunohistochemistry. All conventional staining processes can be carried out following fixation.

ROTI®Histofix ECO Plus is provided with a fragrance for better identification (<1ppm).

Storage temperature: +15 to +25 °C
Transport temperature: ambient temp.
WGK 1

Warning H317

Formalin-free, non-toxic solution. For fixing of histological specimens. Pleasantly aromatic odour. Formalin substitute.

Not a medical device / Not an IVD product

Art. No.	Pack Qty.	Pack.
8907.1	500 ml	plastic
8907.2	2.5 l	plastic
8907.3	5 l	plastic

Xylol Alternatives

Xylene Alternatives

- Adequate replacement for xylene
- Miscible with IPA, butanol, ethanol
- Application as clearing agent and dewaxing medium

ROTI®Histol on base of limonene

The alternative solvent for histology and cytology. Excellent for all histological hand work. Replaces clearing agents like xylene or toluol without the need for changing working procedures.

ready-to-use

ROTICLEAR® on the Basis of Aliphatic Hydrocarbons

The alternative product for use in histology and cytology. ROTICLEAR® is a special formulation to replace toluene, xylene and trichloromethane. Excellent for dewaxing histological sections.

ready-to-use

ROTI®Histol

ready-to-use, for histology

Clearing agent on the basis of limonene. For dewaxing of histological sections. Alternative product for xylene.

ROTI®Histol is a natural product, manufactured from untreated orange peel. It consists of 96–98 % limonene, a terpene with a characteristic odour of lemon or orange and can be mixed with IPA, butanol, ethanol and all standard embedding media. **No harmful vapours!**

ROTI®Histol replaces current clearing agents without the need for changing working procedures. The tissue samples are treated particularly gently – they remain smooth and do not become brittle.
ROTI®Histol is particularly suitable for histological work by hand which usually exposes the user to solvent vapours in high concentrations.
ROTI®Histol produces excellent results with **ROTI®Histokitt** mounting medium **(Art. No. 6638)** and special paraffins such as ROTI®Plast (Art. No. 6642).

Please contact us for your free sample!

Sustainability
Natural product manufactured from untreated orange peel.

UN no. 2319 · ADR 3 III · WGK 2

Danger H226-H304-H315-H317-H411

Art. No.	Pack Qty.	Pack.
6640.1	1 l	glass
6640.4	2.5 l	glass
6640.5	5 l	aluminium
6640.2	10 l	tinplate
6640.6	25 l	tinplate

ROTICLEAR®

ROTICLEAR® ready-to-use, for histology

Clearing agent of aliphatic hydrocarbons, practically free from aromatic compounds. For dewaxing of histological sections. Alternative product for xylene.

ROTICLEAR® consists of a mixture of aliphatic hydrocarbons with only little own odour. It is **practically free from aromatic compounds** (≤0,01 %) and can be mixed with IPA, butanol, ethanol and acetone.

ROTICLEAR® can be used like xylene. The absorption capacity for paraffin is even better than that known for xylene. Therefore, water baths for removing the paraffin need not be changed so frequently. Due to a short evaporation period, ROTICLEAR® enables fast and effective working. It can also be used in automates without any problems.
ROTICLEAR® produces excellent results with the mounting medium **ROTI®Mount (Art. No. HP68)**. After clearing with ROTICLEAR® the sample can be embedded in ROTI®Mount immediately.

Please contact us for your free sample!

UN no. 3295 · ADR 3 III · WGK 3

Danger H226-H304-H336-H412-EUH066

Art. No.	Pack Qty.	Pack.
A538.1	1 l	glass
A538.5	2.5 l	glass
A538.6	5 l	aluminium
A538.2	10 l	tinplate
A538.3	25 l	tinplate
A538.4	200 l	barrel

Non-Toxic Fluorescent Staining of Nucleic Acids in Gels

Non-toxic and non-carcinogenic staining reagents for fluorescent staining of nucleic acids in agarose and polyacrylamide gels. Highly sensitive and applicable just like ethidium bromide.

The **ROTI®GelStain** dyes are added to the gel solution and the running buffer.

The fluorescent dye **SYBR®Green** is added directly to the loading buffer.

The **ROTI®Load DNAstain SYBR®Green** solutions already contain the dye and are thus ready-to-use loading buffers. All dyes can be excited by UV light and blue light. Resulting signals may be detected by ethidium bromide broadband photo filters.

SYBR® Green DNA Dye Solutions

ready-to-use

Addition to gel solution and running buffer

The solutions contain the fluorescent dye SYBR® Green I:

- **SYBR®Green DNA Dye** – dye solution for direct addition to the loading buffer.
- **ROTI®Load DNAstain SYBR®Green 1-3** – ready-to-use loading buffers with SYBR® Green I.

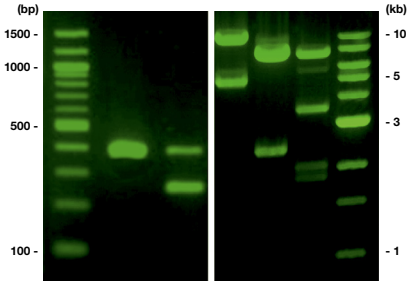
Excitation maximum (bound to DNA): 254 nm and 495 nm
Emission maximum (bound to DNA): 521 nm

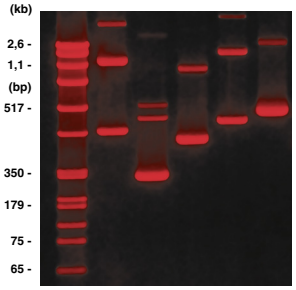
Product name	Usable for	Sensitivity	Packaging	Pack.	Art. No.	Pack Qty.
ROTI®Load DNAstain 1 SYBR® Green	DNA fragments >500 bp	0,01 ng/band	1 x 1.8 ml	plastic	**1CN5.1**	1.8 ml
			5 x 1.8 ml		**1CN5.2**	9.0 ml
ROTI®Load DNAstain 2 SYBR® Green	DNA fragments 100-2000 bp	0,01 ng/band	1 x 1.8 ml	plastic	**1CN6.1**	1.8 ml
			5 x 1.8 ml		**1CN6.2**	9.0 ml
ROTI®Load DNAstain 3 SYBR® Green	DNA fragments <500 bp	0,01 ng/band	1 x 1.8 ml	plastic	**1CN7.1**	1.8 ml
			5 x 1.8 ml		**1CN7.2**	9.0 ml
SYBR® Green DNA dye	double-stranded nucleic acid	0,01 ng/band	1 x 1.8 ml	plastic	**1CN2.1**	1.8 ml
			5 x 1.8 ml		**1CN2.2**	9.0 ml

ROTI®GelStain Dyes

Addition to gel solution and running buffer

The ROTI®GelStain dyes emit a bright red or green fluorescence after excitation. They are compatible with all common down-stream applications.





Product name	Usable for	Sensitivity	Colour	Packaging	Pack.	Art. No.	Pack Qty.
ROTI®GelStain	dsDNA, ssDNA, RNA	0,2 ng/band	fluorescent/green	1 x 1 ml	plastic	**3865.1**	1 ml
				5 x 1 ml		**3865.2**	5 ml
ROTI®GelStain Red Eco	Electrophoresis	0,1 ng/band	fluorescent/red	1 x 1 ml	plastic	**223C.1**	1 ml
				5 x 1 ml		**223C.2**	5 ml

For safety information and additional data, see our current catalogue or at www.carlroth.com

ROTI®Fair Reagents

Highly pure reagents and buffer mixes in pouches or as tablets.

A tablet or the contents of a pouch is simply dissolved in the appropriate amount of water – and the desired solution is ready. By adjusting the amount of water, the concentration can easily be varied and a higher concentrated stock solution, for example, can be prepared.

- **Easy to use** – simply dissolve the contents of a bag or tablet in water.
- **Time saving** – no need to weigh reagents or adjust pH.
- **Practical** – dry reagents for direct use eliminate the need to prepare stock solutions that have been stored for long periods.
- **Reliable** – our stringent quality control ensures high batch consistency.

Product name	Buffer/solution	Use	Batch quantity	End conc.	pH value	Art. No.	Pack Qty.
ROTI®Fair BBS	Borate Buffered Saline	Coating of ELISA plates and blocking supplement.	500 ml/tablet	1x	8,2 ±0,05	**1005.1**	100 unit(s)
ROTI®Fair BSC	Buffered Sodium Citrate	Buffer solution for isolation of blood cells	100 ml/pouch	0.109 M / 3.2 %		**1011.1**	10 unit(s)
	Buffered Sodium Citrate	Buffer solution for isolation of blood cells	1000 ml/pouch	0.109 M / 3.2 %		**1026.1**	5 unit(s)
ROTI®Fair 0.5M EDTA	Ethylenediamine tetraacetic acid solution	For preparation of bioanalytical solutions, anticoagulant	500 ml/pouch	0,5 M	8,0 ±0,05	**1031.1**	5 unit(s)
ROTI®Fair 20% Glucose	D(+)-Glucose solution	For preparation of nutrient media	1000 ml/pouch	20 %		**1030.1**	5 unit(s)
ROTI®Fair Glycine 3.0	Glycine solution	For preparation of buffer solutions with acidic pH and elution buffer in affinity chromatography	1000 ml/pouch	0.1 M	3,0 ±0,05	**1032.1**	10 unit(s)
ROTI®Fair HBS	HEPES Buffered Saline	General buffer base and for calcium phosphate mediated transfection	500 ml/tablet	1x	7,4 ±0,05	**1033.1**	12 unit(s)
ROTI®Fair 1M KCl	potassium chloride solution	For preparation of salt solutions and buffer concoctions	1000 ml/pouch	1 M		**1034.1**	10 unit(s)
ROTI®Fair 3M KCl	Potassium chloride solution	For preparation of salt solutions and buffer concoctions	1000 ml/pouch	3 M		**1035.1**	5 unit(s)
ROTI®Fair 0.9 % NaCl	Sodium chloride solution	For preparation of salt solutions and buffer concoctions	100 ml/tablet	0,9 %		**1053.1**	100 unit(s)
	Sodium chloride solution	For preparation of salt solutions and buffer concoctions	1000 ml/tablet	0,9 %		**1067.1**	10 unit(s)
						1067.2	100 unit(s)
ROTI®Fair 3M NaCl	sodium chloride solution	For preparation of salt solutions and buffer concoctions	1000 ml/pouch	3 M		**1071.1**	5 unit(s)
ROTI®Fair 5M NaCl	sodium chloride solution	For preparation of salt solutions and buffer concoctions	1000 ml/pouch	5 M		**1079.1**	5 unit(s)
ROTI®Fair 0.02M Na-Phosphate 7.0	sodium phosphate solution	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	0,02 M	7,0 ±0,05	**1090.1**	10 unit(s)
	sodium phosphate solution	General solution for assays in molecular biology and biochemistry	5000 ml/pouch	0,02 M	7,0 ±0,05	**1094.1**	10 unit(s)
ROTI®Fair 1M Na-Phosphate 6.5	sodium phosphate solution	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	1 M	6,5 ±0,05	**1095.1**	10 unit(s)
ROTI®Fair 1M Na-Phosphate 7.2	Sodium phosphate solution	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	1 M	7,2 ±0,05	**1097.1**	10 unit(s)
ROTI®Fair PBS 7.2	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	1000 ml/tablet	1x	7,2 ±0,05	**1106.1**	10 unit(s)
						1106.2	100 unit(s)
ROTI®Fair PBS 7.4	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	100 ml/tablet	1x	7,4 ±0,05	**1107.1**	100 unit(s)
	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	200 ml/tablet	1x	7,4 ±0,05	**1108.1**	100 unit(s)
	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	500 ml/tablet	1x	7,4 ±0,05	**1111.1**	12 unit(s)
						1111.2	100 unit(s)
	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	1000 ml/tablet	1x	7,4 ±0,05	**1112.1**	10 unit(s)
						1112.2	100 unit(s)
	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	10 l/pouch	1x	7,4 ±0,05	**1101.1**	1 unit(s)
	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	50 l/pouch	1x	7,4 ±0,05	**1103.1**	1 unit(s)
	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	100 l/pouch	1x	7,4 ±0,05	**1104.1**	1 unit(s)
ROTI®Fair 10x PBS 7.4	Phosphate Buffered Saline	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	10x	7,4 ±0,05	**1105.1**	5 unit(s)

ROTI®Fair Reagents

Product name	Buffer/solution	Use	Batch quantity	End conc.	pH value	Art. No.	Pack Qty.
ROTI®Fair PBS potassium-free 7.4	Phosphate Buffered Saline, potassium-free	Potassium-free, general solution for assays in molecular biology and biochemistry	1000 ml/tablet	1x	7,4 ±0,05	**1113.1**	10 unit(s)
						1113.2	100 unit(s)
	Phosphate Buffered Saline, potassium-free, high-phosphate	Potassium-free, high-phosphate general solution for assays in molecular biology and biochemistry	1000 ml/tablet	1x	7,4 ±0,05	**1114.1**	100 unit(s)
ROTI®Fair PBST 7.4	Phosphate Buffered Saline/Tween	General solution for assays in molecular biology and biochemistry	500 ml/tablet	1x	7,4 ±0,05	**1115.1**	12 unit(s)
						1115.2	100 unit(s)
	Phosphate Buffered Saline/Tween	General solution for assays in molecular biology and biochemistry	1000 ml/tablet	1x	7,4 ±0,05	**1116.1**	10 unit(s)
						1116.2	100 unit(s)
ROTI®Fair pNPP 5mg	pNPP (tablet), p-Nitro-phenyl phosphate	Substrate solution for alkaline phosphatase	5 mg/tablet	1 mg/ml		**1117.1**	24 unit(s)
ROTI®Fair pNPP 20mg	pNPP (tablet), p-Nitro-phenyl phosphate	Substrate solution for alkaline phosphatase	20 mg/tablet	1 mg/ml		**1128.1**	24 unit(s)
ROTI®Fair SDS-PAGE	Tris-glycine-SDS buffer	Buffer for protein electrophoresis	1000 ml/pouch	1x	8,3 ±0,05	**1249.1**	10 unit(s)
	Tris-glycine-SDS buffer	Buffer for protein electrophoresis	5000 ml/pouch	1x	8,3 ±0,05	**1250.1**	10 unit(s)
ROTI®Fair 20x SSC	Sodium sodium citrate buffer	Buffer solution for Southern- and Northern transfer	1000 ml/pouch	20x	7,0 ±0,05	**1232.1**	5 unit(s)
ROTI®Fair SSPE	Sodium sodium phosphate EDTA buffer	Buffer solution for DNA- and RNA hybridisation	200 ml/tablet	1x	7,4 ±0,05	**1233.1**	100 unit(s)
ROTI®Fair 50x TAE	Tris acetate EDTA buffer	Buffer solution for DNA electrophoresis	500 ml/pouch	50x	8,3 ±0,05	**1234.1**	5 unit(s)
	Tris acetate EDTA buffer	Buffer solution for DNA electrophoresis	1000 ml/pouch	50x	8,3 ±0,05	**1240.1**	5 unit(s)
ROTI®Fair 1x TBE	Tris acetate EDTA buffer	Buffer solution for DNA electrophoresis	1000 ml/pouch	1x	8,3 ±0,05	**1241.1**	10 unit(s)
ROTI®Fair 5x TBE	Tris acetate EDTA buffer	Buffer solution for DNA electrophoresis	1000 ml/pouch	5x	8,3 ±0,05	**1242.1**	10 unit(s)
ROTI®Fair 10x TBE	Tris acetate EDTA buffer	Buffer solution for DNA electrophoresis	1000 ml/pouch	10x	8,3 ±0,05	**1243.1**	10 unit(s)
ROTI®Fair TBS 7.6	Tris-buffered salt solution, Tris Buffered Saline	General solution for assays in molecular biology and biochemistry	500 ml/tablet	1x	7,6 ±0,05	**1244.1**	10 unit(s)
						1244.2	100 unit(s)
ROTI®Fair TBS 8.0	Tris-buffered salt solution, Tris Buffered Saline	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	1x	8,0 ±0,05	**1245.1**	10 unit(s)
ROTI®Fair 10x TBS 8.0	Tris-buffered salt solution, Tris Buffered Saline	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	10x	8,0 ±0,05	**1247.1**	10 unit(s)
ROTI®Fair TBST 7.6	Tris-buffered salt solution with Tween, Tris Buffered Saline/Tween	General solution for assays in molecular biology and biochemistry	500 ml/tablet	1x	7,6 ±0,05	**1248.1**	10 unit(s)
						1248.2	100 unit(s)
ROTI®Fair 10x TE	Tris EDTA buffer	Buffer solution for solubilisation and dilution of nucleic acids	1000 ml/pouch	10x	7,4 ±0,05	**1268.1**	10 unit(s)
ROTI®Fair TG-Western	Tris-glycine buffer	Buffer for protein electrophoresis and transfer	1000 ml/pouch	1x	8,3 ±0,05	**1269.1**	10 unit(s)
	Tris-glycine buffer	Buffer for protein electrophoresis and transfer	5000 ml/pouch	1x	8,3 ±0,05	**1276.1**	10 unit(s)
ROTI®Fair 1M Tris 7.4	Tris solution	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	1 M	7,4 ±0,05	**1251.1**	10 unit(s)
ROTI®Fair 1M Tris 8.0	Tris solution	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	1 M	8,0 ±0,05	**1260.1**	10 unit(s)
ROTI®Fair 1M Tris 8.3	Tris solution	General solution for assays in molecular biology and biochemistry	1000 ml/pouch	1 M	8,3 ±0,05	**1261.1**	10 unit(s)

For safety information and additional data, see our current catalogue or at www.carlroth.com

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