ROKAnol L7, ROKAnol L7E, ROKAnol L7EW/90

Local. Global. Integrated.


Operating in 17 countries, in 39 different locations, PCC SE currently employs over 3 300 people.

About Us

PCC Exol SA is a major player in the European surfactants market. In the eastern and central-eastern part of the continent, it is the undisputed leader in its industry. Most of the production facilities and the company's headquarters are located in Brzeg Dolny, Poland. Here we develop, test and manufacture a wide range of anionic, non-ionic and amphoteric surfactants and speciality industrial formulations.

New products are continuously added to the portfolio in response to market trends and individual customer requirements. The surfactants produced at the plants have a very wide range of industrial applications. They are used as wetting agents, emulsifiers, auxiliaries in paper, metallurgy and many other industries, as well as in household chemicals, personal care products and textiles.

PCC EXOL pays special attention to the issue of sustainable development, which is one of the key elements of the company's strategy. In order to strengthen its competitive position in the surfactants market, the company is committed to promoting responsible production and consumption throughout the value chain. The concept of sustainable development is therefore a key aspect of all the company's management and operational processes.

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PCC PCG
OXYALKYLATES
IRPC

Polyols

- Polyether polyols
- Polyester polyols
- Prepolymers
- Polyurethane Systems

PCC
ROKITA SA

Chlorine

- Chlorine
- MCAA
- Other Chlorine Downstream Product

PCC
ROKITA SA

Phosphorus

- Phosphorus derivatives
- Naphthalene derivatives
- Polycarboxyethers (PCE)

PCC EXOL SA
PCC CHEMAX INC
PCC PCG OXYALKYLATES

Surfactants

- Anionic surfactants
- Cationic surfactants
- Nonionic surfactants
- Amphoteric surfactants (betaines)
- Chemical formulation

PCC
SYNTEZA

Alkylphenols

- Nonylphenol
- Dodecylphenol
- Tristyrylphenol

PCC CONSUMER PRODUCTS SA

Consumer Products

- Household & industrial Cleaners, Detergents and Personal Care Products

PCC
ROKITA SA

Energy

- Renewable Energy
- Conventional Energy

PCC
INTERMODAL SA

Logistics

- Intermodal transport
- Road Haulage
- Rail Transport

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BAKKISILICON HF.

Silicon

- Microsillica
- Silicon Metal

PCC
SE

Holding & Projects

- Portfolio Management
- Project Development

ROKAnol L7, ROKAnol L7E and ROKAnol L7EW/90

Chemical description

Basic physical and chemical properties are summarized in the table below.

	ROKAnol L7	ROKAnol L7E	ROKAnol L7EW/90
Chemical name	Alcohols, C12-14, ethoxylated	Alcohols, C12-14, ethoxylated	Alcohols, C12-14, ethoxylated. Aqueous solution
CAS number	68439-50-9	68439-50-9	68439-50-9
INCI	Laureth-7	Laureth-7	Laureth-7 (and) Water
Appearance at temperature 40°C	**clear or slightly cloudy liquid**	**clear or slightly cloudy liquid**	**clear liquid**
Color (Hazen units)	**max 70** (at 50°C)	**max 70** (at 50°C)	**max 70** (at 40-45°C)
pH of 1% solution in deionized water, at 20°C	**4.6-7.4**	**5-7**	**5-7**
Cloud point, °C, Method A 1)	57-61	**52-59**	**51-59**
Cloud point, °C, Method B 2)	42-46	40-44	42-46
Cloud point, °C, Method C 3)	**30-40**	32-36	35-39
Cloud point, °C, Method D 4)	78-82	77-81	79-83
Cloud point, °C, Method E 5)	78-82	77-81	78-82
Water, %(m/m)	**max 1.0**	**max 0.3**	**9-11**
Molecular weight, g/mol	approx. 500	approx. 500	approx. 500
Average degree of ethoxylation, mol EO	7	7	7
Solidification point, °C	approx. 10	approx. 10	approx. 6
Density at 30°C, g/ml	0.95-1.00	0.95-1.00	approx. 0.98
Hydrophilic-lipophilic balance (HLB)	approx. 12.9	approx. 12.9	approx. 12.9
Surface tension of 0.1% solution at 25°C, mN/m	29	30	30

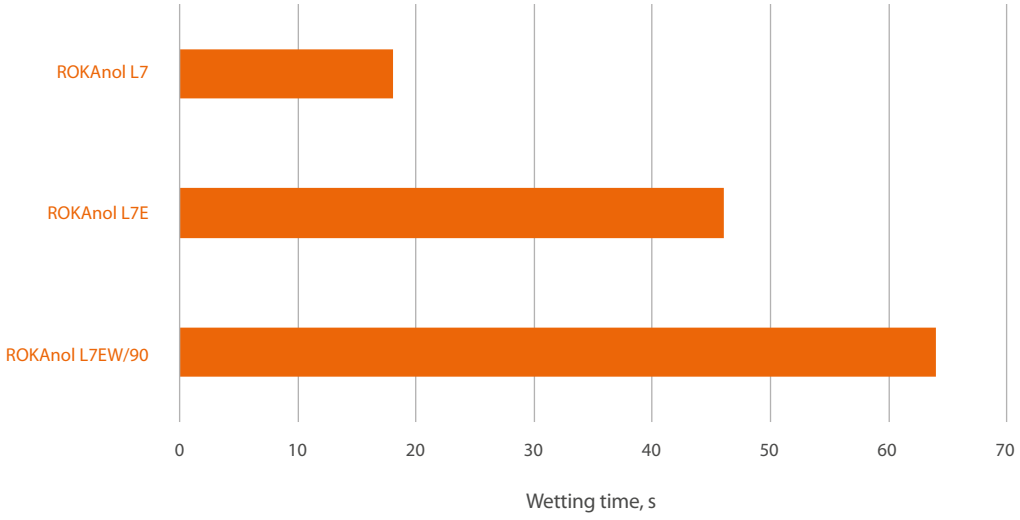
1) Cloud point according to PN-EN 1890:2006; Method A – 1% in water solution
2) Cloud point according to PN-EN 1890:2006; Method B – 1% solution in 5% NaCl solution
3) Cloud point according to PN-EN 1890:2006; Method C – 1% solution in 10% NaCl solution
4) Cloud point according to PN-EN 1890:2006; Method D – 10% solution in 25% BDG solution
5) Cloud point according to PN-EN 1890:2006; Method E – 16.7% solution in 25% BDG solution

* Bolded parameters are guaranteed technical requirements

Wetting capability

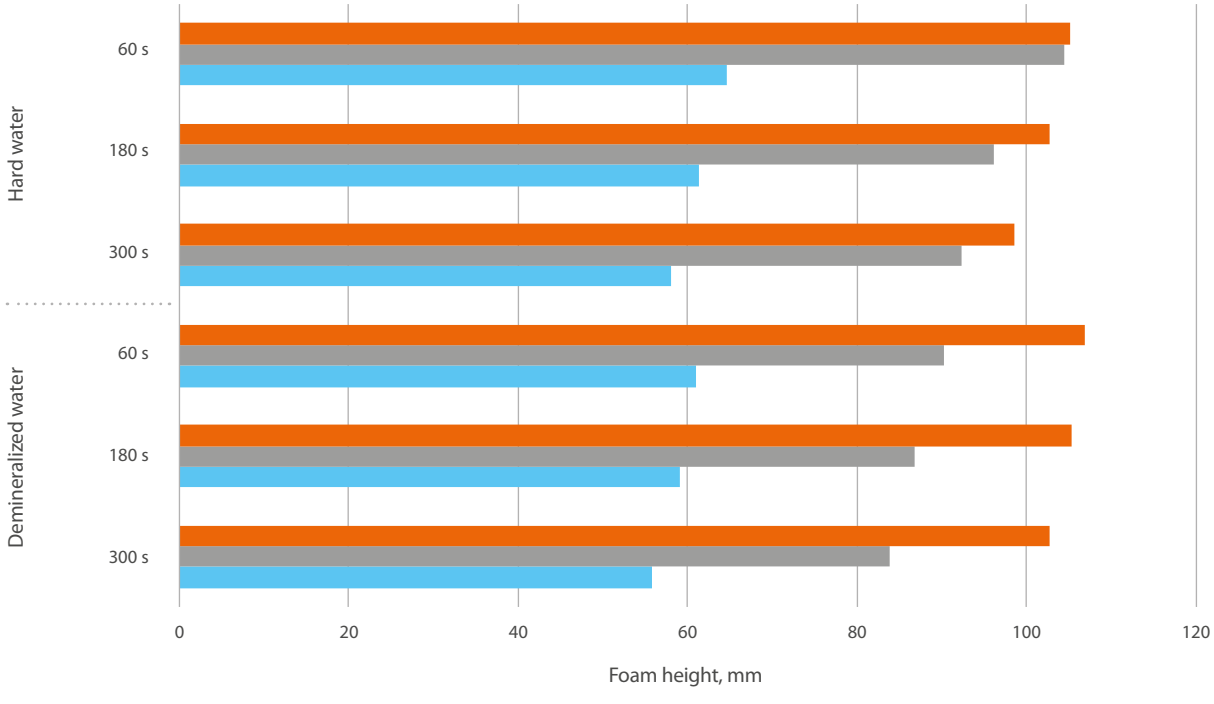
In a large number of applications, the capability of effective wetting is desired property of surfactants. The wetting capability of cotton fabric was determined according to EN 1772:2001 method.

Wetting time was measured in solutions with a concentration of 1.0 g/l in demineralized water at a temperature of 20°C.



Foaming capability

Determination of the foaming capability was performed on Ross Miles Foam Analyzer according to ASTM D1173 for solutions with a concentration of 1.0 g/l in both hard (17°dH - calcium hardness of 3 Ca2+ mmol/l) and demineralized water at a temperature of 25°C.



Alkali and acid resistance

Determination of capability to form stable solutions in the acid and alkaline environment was performed according to PN-EN 14712:2005 at a temperature of 20°C. Stability in the alkaline environment is defined as the maximum concentration of sodium hydroxide (with minimum purity of 98%) in g/l in a stable surfactant solution with a concentration of 1% (as active substance). Stability in the acid environment is defined as the maximum concentration of hydrochloric acid or sulfuric acid (with purity in the range between 95 and 98%) in ml/l in a stable surfactant solution with a concentration of 1% (as active substance).

Alkali resistance (Sodium Hydroxide); concentration of 1% active matter; temperature 20°C

Product name	NaOH conc. [g/l]								
	10	20	30	40	50	60	70	80	90
ROKAnol L7	●	●	●	●	●	●	●	●	○
ROKAnol L7E	●	●	●	●	●	●	●	○	
ROKAnol L7EW/90	●	●	●	●	●	●	●	●	○

● clear, homogeneous solution ● homogeneous, cloudy solution ● homogeneous, opalescent solution ○ macroscopic phase separation

Acid resistance (Sulfuric Acid); concentration of 1% active matter; temperature 20°C

Product name	H_2SO_4 conc. [g/l]					
	1	5	20	40	140	225
ROKAnol L7	●	●	●	●	●	●
ROKAnol L7E	●	●	●	●	●	●
ROKAnol L7EW/90	●	●	●	●	●	●

● clear, homogeneous solution ● homogeneous, cloudy solution ● homogeneous, opalescent solution ○ macroscopic phase separation

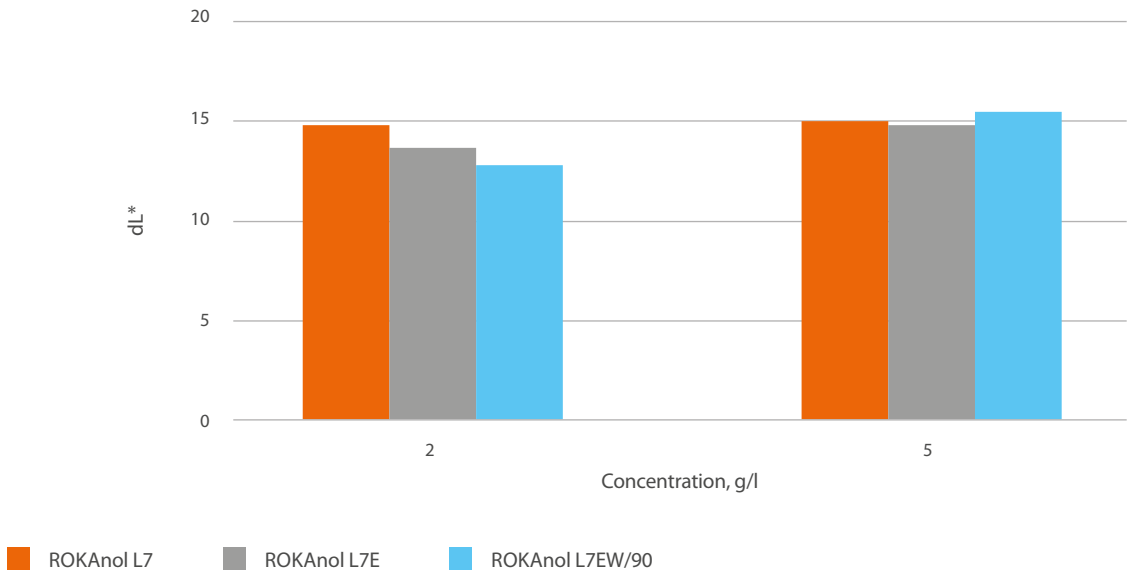
Acid resistance (Hydrochloric Acid); concentration of 1% active matter; temperature 20°C

Product name	HCl conc. [g/l]					
	1	5	20	40	140	225
ROKAnol L7	●	●	●	●	●	●
ROKAnol L7E	●	●	●	●	●	●
ROKAnol L7EW/90	●	●	●	●	●	●

● clear, homogeneous solution ● homogeneous, cloudy solution ● homogeneous, opalescent solution ○ macroscopic phase separation

Detergency

Detergency is the ability of the surfactant to remove soils from the fabric surface during the laundering process. Detergency tests were performed using to own method, with an EMPA 125 fabric: soiled with a mixture of oils and carbon black. Cotton was washed at a temperature 40°C in ROKAnol L7, ROKAnol L7E i ROKAnol L7EW/90 series solutions. After drying the fabrics and pressing them, the total color difference of the fabric before and after washing, was measured. The higher the difference is, the better detergency properties are for surfactant.



The dL* parameter is described by perceptually uniform, trichromatic color models: CIE LAB and CIE LCH. The following is an interpretation of this parameter: L is defined as lightness (luminosity), while dL is determined by the equation:

dL* = L*T – L*S where: T – tested sample (fabric after the detergency test),
S – standard to which the tested sample is compared (fabric before the detergency test).

The higher the dL* value, the better the detergent effectiveness.

Solubility

Determination of the solubility of products is carried out by visual evaluation of 1%, 10% and 50% solutions of a given product in a specified solvent, 24 hours after their preparation. Visually, the appearance of the sample is evaluated according to the following scale:

Result	1	2	3	4
Appearance of the test sample	Homogeneous clear	Homogeneous opalescent	Homogeneous cloudy	Macroscopic phase separation

The results of the samples (1%, 10% and 50%) are added up and on this basis the solubility of the product is determined. The following table gives the solubility scales according to the sum of the appearance scale results:

Sum	3-6	7-9	10-12
Solubility	Soluble	Partially soluble	Insoluble

Product name	Demineralized water	Methanol	Ethyl ether	Acetone
ROKAnol L7	Soluble	Soluble	Partially soluble	Soluble
ROKAnol L7E	Soluble	Soluble	Partially soluble	Soluble
ROKAnol L7EW/90	Soluble	Soluble	Insoluble	Soluble

Laundry and stain remover formulations

Examples of laundry formulations are presented below. These are two laundry formulation – Laundry Capsules and Heavy Duty Liquid Detergent and Liquid Stain Remover. The table contains the percentage compositions of the formulations, below is the preparation method.

Laundry Capsules, LC				
Compound	Brand name	LC/L7	LC/L7E	LC/L7EW/90
		Concentration [%]		
MIPA Laureth Sulfate (and) Propylene Glycol	SULFOROKAnol L290/1M		40.00	
Laureth-7	ROKAnol L7	32.00	–	–
Laureth-7	ROKAnol L7E	–	32.00	–
Laureth-7, Aqua	ROKAnol L7EW/90	–	–	35.60
Glycerin	–		17.95	
Tetrasodium Glutamate Diacetate	–		4.00	
Enzymes	–		1.00	
Fluorescent brightener	–		0.05	
Sodium Hydroxide	–		for pH 8.0-8.5	
Aqua	–		5.00	1.40

Procedure:

1. Mix Fluorescent brightener with water until dissolved.
2. Add Glycerin and GLDA-Na4, mix.
3. Add ROKAnol L7/ ROKAnol L7E/ ROKAnol L7EW/90 and mix.
4. Then add SULFOROKAnol L290/1M, mix.
5. Add Sodium Hydroxide to obtained pH in the mass around 8.0-8.5
6. Finally, add Enzymes and mix.

Heavy Duty Liquid Detergent, HDLD				
Compound	Brand name	HDLD/L7	HDLD/L7E	HDLD/L7EW/90
		Concentration [%]		
Sodium Laureth Sulfate	SULFOROKAnol L227/1		30.0	
Laureth-7	ROKAnol L7	10.0	–	–
Laureth-7	ROKAnol L7E	–	10	–
Laureth-7, Aqua	ROKAnol L7EW/90	–	–	11.1
Potassium Cocoate	EXOsoft PC35		3.0	
Sodium Citrate	–		2.5	
Tetrasodium Glutamate Diacetate	–		2.0	
Enzymes	–		0.2	
Fluorescent brightener	–		0.1	
Citric Acid	–		for pH 7-8	
Aqua	–	52.2		51.1

Procedure:

1. Mix Fluorescent brightener with water.
2. Add Trisodium Citrate and mix until a homogeneous solution is obtained.
3. Then add SULFOROKAnol L227/1 and mix.
4. Add ROKAnol L7/ROKAnol L7E/ROKAnol L7EW/90 and mix.
5. Then add EXOsoft PC35 and mix.
6. Add GLDA-Na4, mix.
7. Add Citric Acid to obtained pH in the mass around 7-8.
8. Finally, add Enzymes and mix until a clear liquid is obtained.

Liquid Stain Remover, LSR				
Compound	Brand name	LSR/L7	LSR/L7E	LSR/L7EW/90
		Concentration [%]		
Laureth-7	ROKAnol L7	11.0	–	–
Laureth-7	ROKAnol L7E	–	11.0	–
Laureth-7, Aqua	ROKAnol L7EW/90	–	–	12.2
Sodium Dodecylbenzenesulfonate	ABSNa 50	7.7		
Hydrogen Peroxide	–	30.0		
Etidronic Acid	–	4.0		
Sodium Hydroxide	–	for pH ~ 4.5		
Aqua	–	47.3		46.1

Procedure:

1. Mix ABSNa 50 with water.
2. Add ROKAnol L7/ ROKAnol L7E/ ROKAnol L7EW/90 and mix until a homogeneous solution is obtained.
3. Then add HEDP and mix.
4. Add Sodium Hydroxide to obtained pH in the mass around 4.5.
5. Then add Hydrogen Peroxide and until a clear liquid is obtained.

* The pictures present the results of tests carried out at PCC EXOL SA

Detergency of laundry and stain remover formulations

Effectiveness of the formulation was confirmed in a detergency test. Detergency is the ability of the detergent to remove soils from the fabric surface during the laundering process. Detergency tests were performed using to own method on fabric soiled with standard, different dirt: 1. Fluid make-up, 2. Curry, 3. Blood, aged, 4. Wine, aged, 5. Spaghetti sauce with beef, 6. Chocolate ice cream, aged, 7. Grass/mud, with thickening agent, 8. Highly discriminative tea, 9. Grass, pure, 10. Baby food carrot/potato, 11. Standard clay, 12. Beta-carotene on cotton, circular stain, 13. Dirty Motor Oil (DMO), 14. Butterfat with colorant, 15. Beef fat, colored with Sudan Red.

Tested dirt divided into three categories:

Enzymatic
- Blood, aged
- Chocolate ice cream, aged

Bleachable
- Curry
- Wine, aged
- Grass/mud, with thickening agent
- Highly discriminative tea
- Grass, pure
- Standard clay
- Beta-carotene on cotton, circular stain
- Baby food carrot/potato

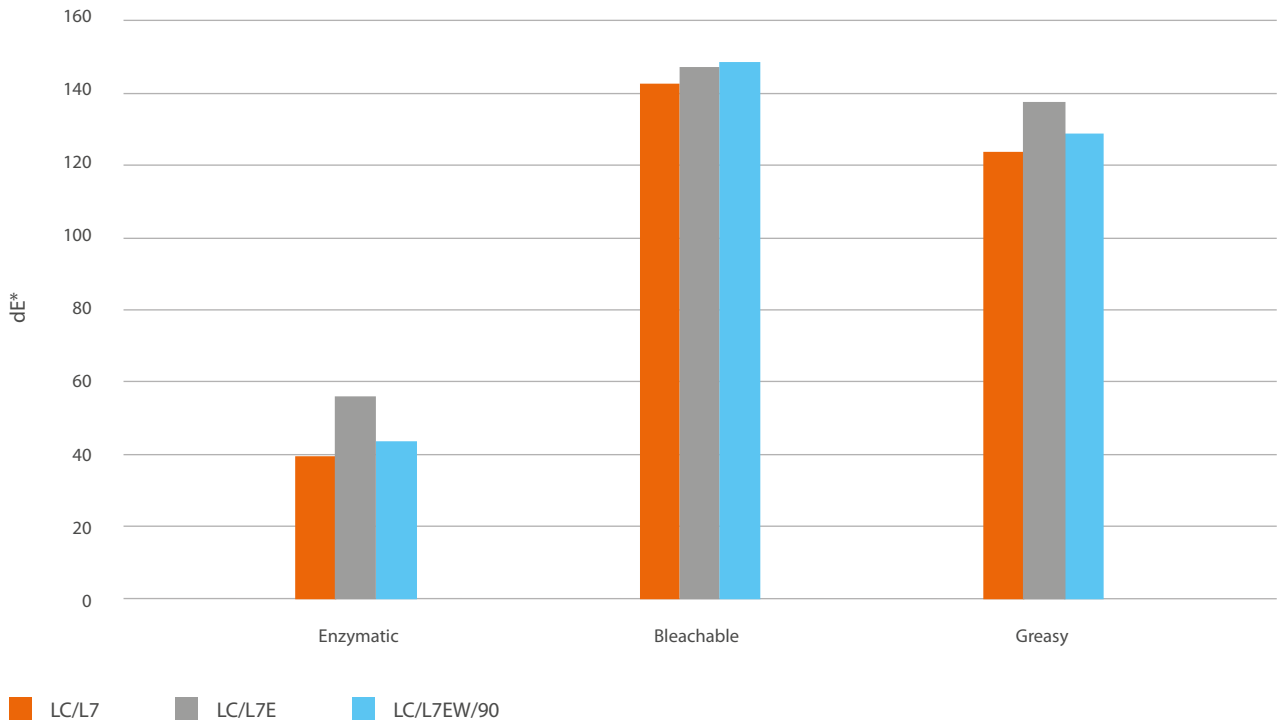
Greasy
- Fluid make-up
- Spaghetti sauce with beef
- Butter with colorant
- Beef fat, colored with Sudan Red
- Dirty Motor Oil (DMO)

Detergency test was performed under the following conditions:

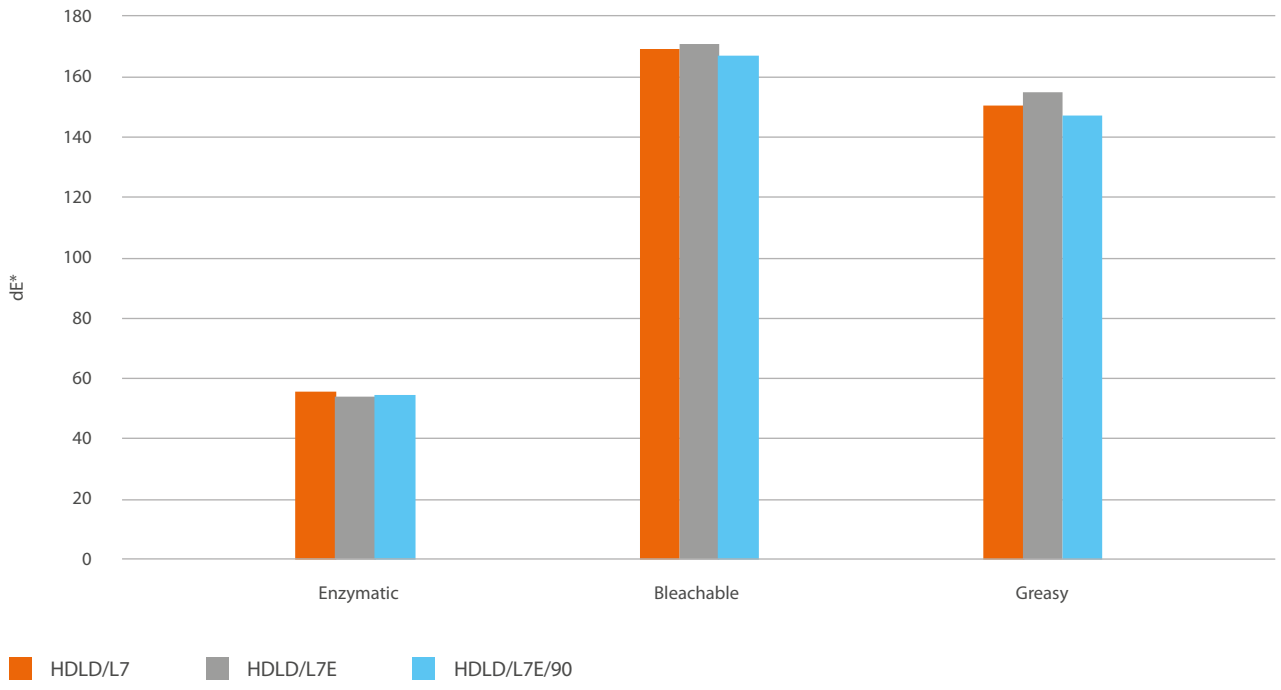
- automatic washing machine
- water hardness (13 °dH)
- cotton program, 40°C
- load – dry, white towels
  - 2 kg for HDLD
  - 2.5 kg for LC and LSR
- dose
  - HDLD – 30 ml of formulation
  - LC – 20 g of formulation
  - LSR – 100 ml + washing capsule
- fabric soiled with standard dirt

After the washing process was performed, the standardly soiled fabrics were dried and then the degree of washing was assessed by measuring parameter dE* from the CIELab scale, as the difference between the initially stain and the degree of its washing - higher dE*, better detergency.

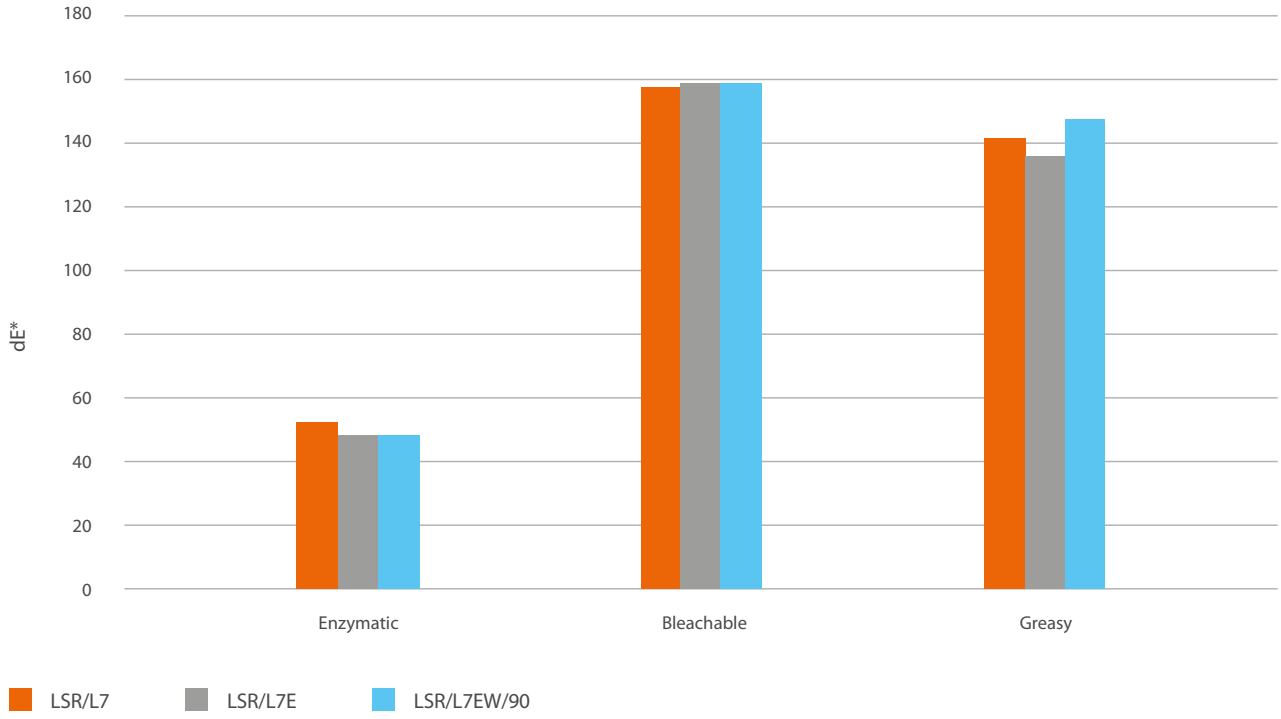
Laundry Capsules (8 g/kg clothes)



Heavy Duty Liquid Detergents (15 ml/kg clothes)



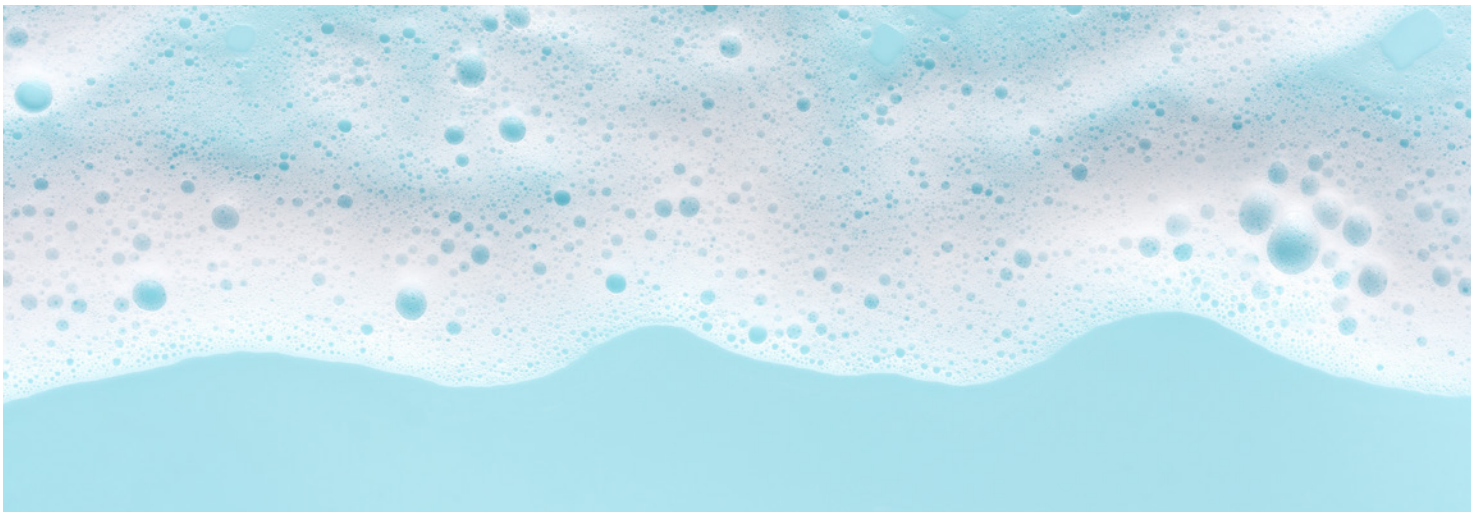
Liquid Stain Removers (40 ml/kg clothes + washing capsule)



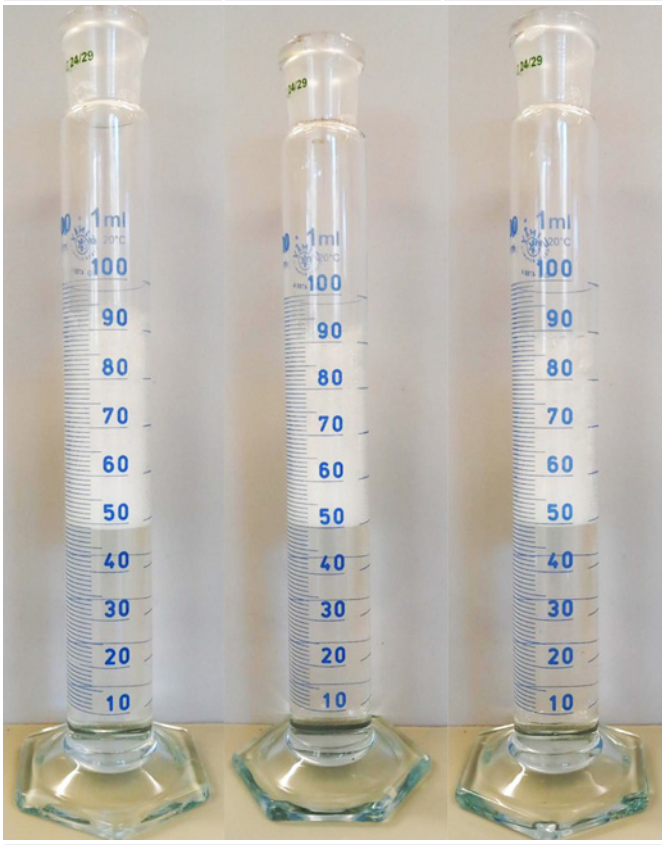
Manual Dishwashing Liquid formulations

1. In the table presented Manual Dishwashing Liquid based on ROKAnol L7, ROKAnol L7E and ROKAnol L7EW/90.

Manual Dishwashing Liquid, MDL1				
Compound	Brand name	MDL1/L7	MDL1/L7E	MDL1/L7EW/90
		Concentration [%]		
Sodium Laureth Sulfate	SULFOROKAnol L270/1		8.0	
Cocamidopropyl Betaine	ROKAmina K30		5.0	
Cocamide DEA	ROKAmid KAD		1.0	
Laureth-7	ROKAnol L7	2.0	–	–
Laureth-7	ROKAnol L7E	–	2.0	–
Laureth-7, Aqua	ROKAnol L7EW/90	–	–	2.2
Sodium Chloride	–		2.5	
Aqua	–	81.5		81.3
Physical and chemical properties				
Appearance		clear, transparent homogenous liquid		
Viscosity, 20°C [cP]		3000-4000	400-600	300-500
pH		6-7	6-7	6-7



The foaming properties was measured for samples: MDL1/L7, MDL1/L7E, MDL1/L7EW/90. The results were presented on the photos.

MDL1/L7	MDL1/L7E	MDL1/L7EW/90
		
After 30 seconds		

MDL1/L7	MDL1/L7E	MDL1/L7EW/90
		
5 minutes		

2. In below table presented similar manual dishwashing formulation but with higher organic matter. It shows, that small modification of composition allows obtained higher viscosity.

Manual Dishwashing Liquid, MDL2				
Compound	Brand name	MDL2/L7	MDL2/L7E	MDL2/L7EW/90
		Concentration [%]		
Sodium Laureth Sulfate	SULFOROKAnol L270/1	10.0		
Cocamidopropyl Betaine	ROKAmina K30	7.0		
Cocamide DEA	ROKAmid KAD	0.7		
Laureth-7	ROKAnol L7	1.4	–	–
Laureth-7	ROKAnol L7E	–	1.4	–
Laureth-7, Aqua	ROKAnol L7EW/90	–	–	1.6
Sodium Chloride	–	2.6		
Aqua	–	78.3		78.1
Physical and chemical properties				
Appearance		clear, transparent homogenous liquid		
Viscosity, 20°C [cP]		3500-4500	2000-3000	4000-5000
pH		6-7	6-7	6-7

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