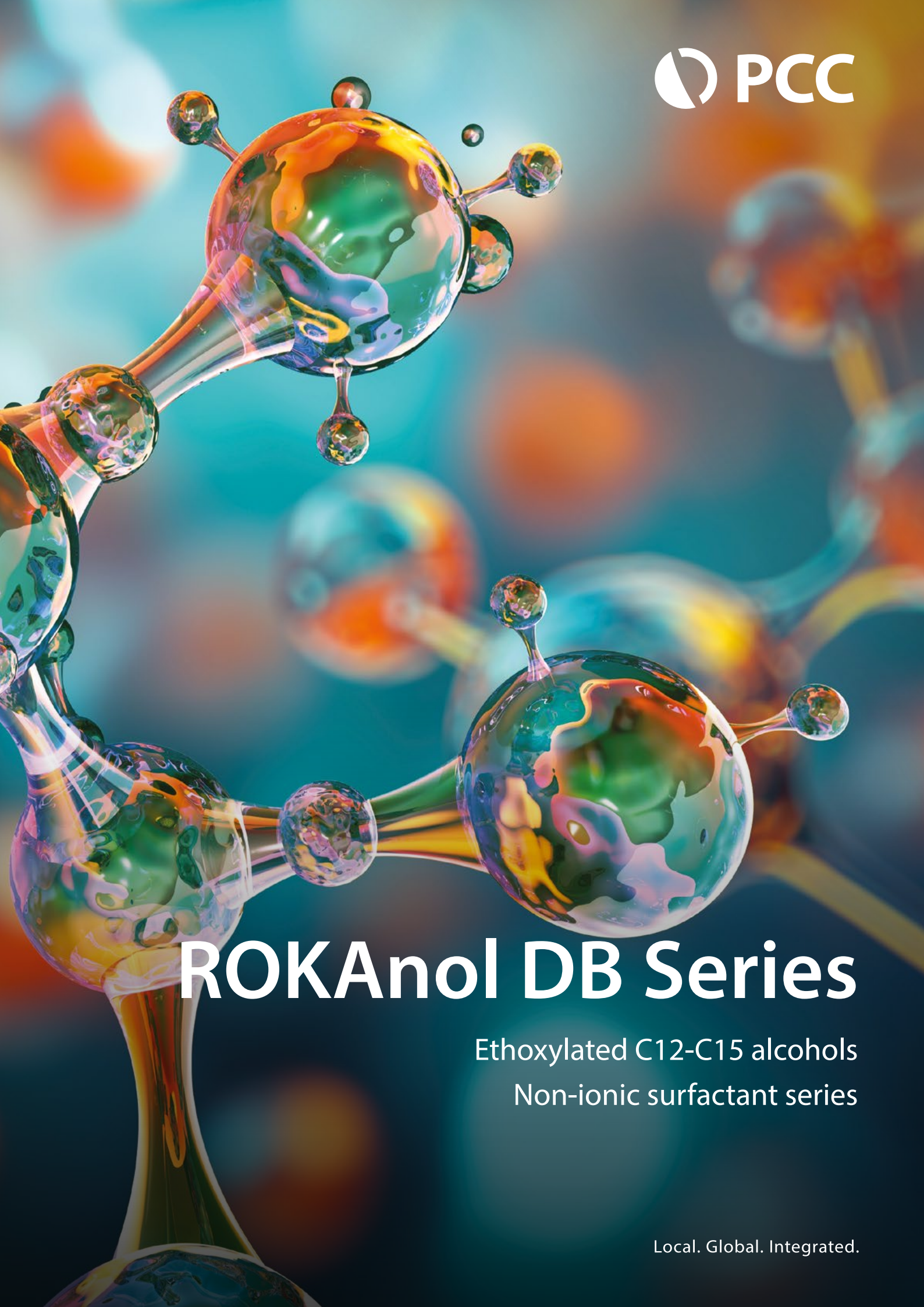


ROKAnol DB Series

Ethoxylated C12-C15 alcohols
Non-ionic surfactant series

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.

PCC ROKITA SA
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

PCC BAKKISILICON HF.

Silicon

- Microsillica
- Silicon Metal

PCC SE

Holding & Projects

- Portfolio Management
- Project Development

ROKAnol DB Series

Chemical description

ROKAnol DB Series are nonionic surfactants of the ethoxylated fatty alcohols type. The product belongs to the ROKAnol DB Series, based on C12-C15 fatty alcohol. Its high surface activity allows it to be used as an excellent detergent and a cleaning agent, and opens up the possibility of using it in other branches of industry.

C(H3(CH2)n-O(CH2CH2O)n' where **n – 11 – 14**

n' – 3, 7, 5, 11

Application

ROKAnol DB Series are especially effective in the cleaning process can successfully become ingredients of household and professionalcleaning agents, detergents as well as an emulsifier in industrial application.

- Industrial and institutional cleaning
- Metalworking
- Household detergent
- Laundry detergents
- Agrochemicals
- Hard surface cleaners
- Others

Basic physical and chemical properties

Basic information concerning their physical and chemical properties is summarised in a Table 1.

General characteristic

Product name	ROKAnol DB3	ROKAnol DB5	ROKAnol DB6	ROKAnol DB7	ROKAnol DB7W	ROKAnol DB7R	ROKAnol DB9	ROKAnol DB11W
Appearance	Liquid or paste [a]	Clear or slightly turbid liquid [a]	Liquid [c]	Slightly turbid liquid or paste [b]	Oily liquid [a]	Liquid [a]	Paste [a]	Oily liquid or paste [a]
Average molecular weight [g/mol]	approx. 330	approx. 415	approx. 464	approx. 530	approx. 530	–	approx. 600	approx. 680
Color	max. 70 [b]	max. 50 [b]	max. 60 [c]	max. 70 [b]	max. 70 [b]	max. 70 [b]	max. 100 [b]	max. 50 [c]
Solution pH	4.6 ÷ 7.4 [a]	4.6 ÷ 7.4 [a]	5 ÷ 7 [b]	4.6 ÷ 7.4 [a]	4.6 ÷ 7.4 [a]	5.0 ÷ 7.0 [a]	5.0 ÷ 7.0 [a]	5.0 ÷ 7.0
Cloud point [°C]	–	65 ÷ 72 [c]	76 ÷ 82 [d]	–	48 ÷ 52 [a]	48 ÷ 52 [a]	61 ÷ 69 [a]	60 ÷ 64 [b]
Water content [%]	max. 0.3	max. 0.5	max. 0.5	max. 0.5	7 ÷ 10	max. 0.5	max. 0.5	8 ÷ 12
Solidification point [°C]	approx. 10	approx. 10	approx. 15	approx. 20	approx. 5	approx. 5	approx. 26	approx. 16
Density [g/mL]	approx. 0.93 [a]	approx. 0.957 [a]	approx. 0.96 [b]	approx. 0.97 [a]	approx. 0.099 [b]	approx. 0.97 [c]	approx. 0.98 [d]	approx. 1.02 [b]
Viscosity at 25°C [cP]	–	–	approx. 45	–	–	–	–	–
Hydroxyl number [mg KOH/g]	164 ÷ 172	130 ÷ 140	–	100 ÷ 114	–	–	–	–
HLB	7.8	10.5	11.4	12	12	12	13.2	13.6

Appearance:
a – at 20÷25°C
b – at 25÷30°C
c – at 50°C

Color:
a – Hazen units at 30°C
b – Hazen units at 40°C
c – Hazen units at 50°C

pH according to PN-EN 1262:2004 solution B at 20°C where:
a – pH of a 1% solution
b – pH of a 10% solution

Cloud point according to PN-EN 1890:2000:
a – aqueous solution
b – 100 g/l NaCl solution
c – 45 g butyldiglycol/water solution
d – 25 g butyldiglycol/water solution

Water content was measured according to PN-ISO 760:2001, direct method, solvent – methanol

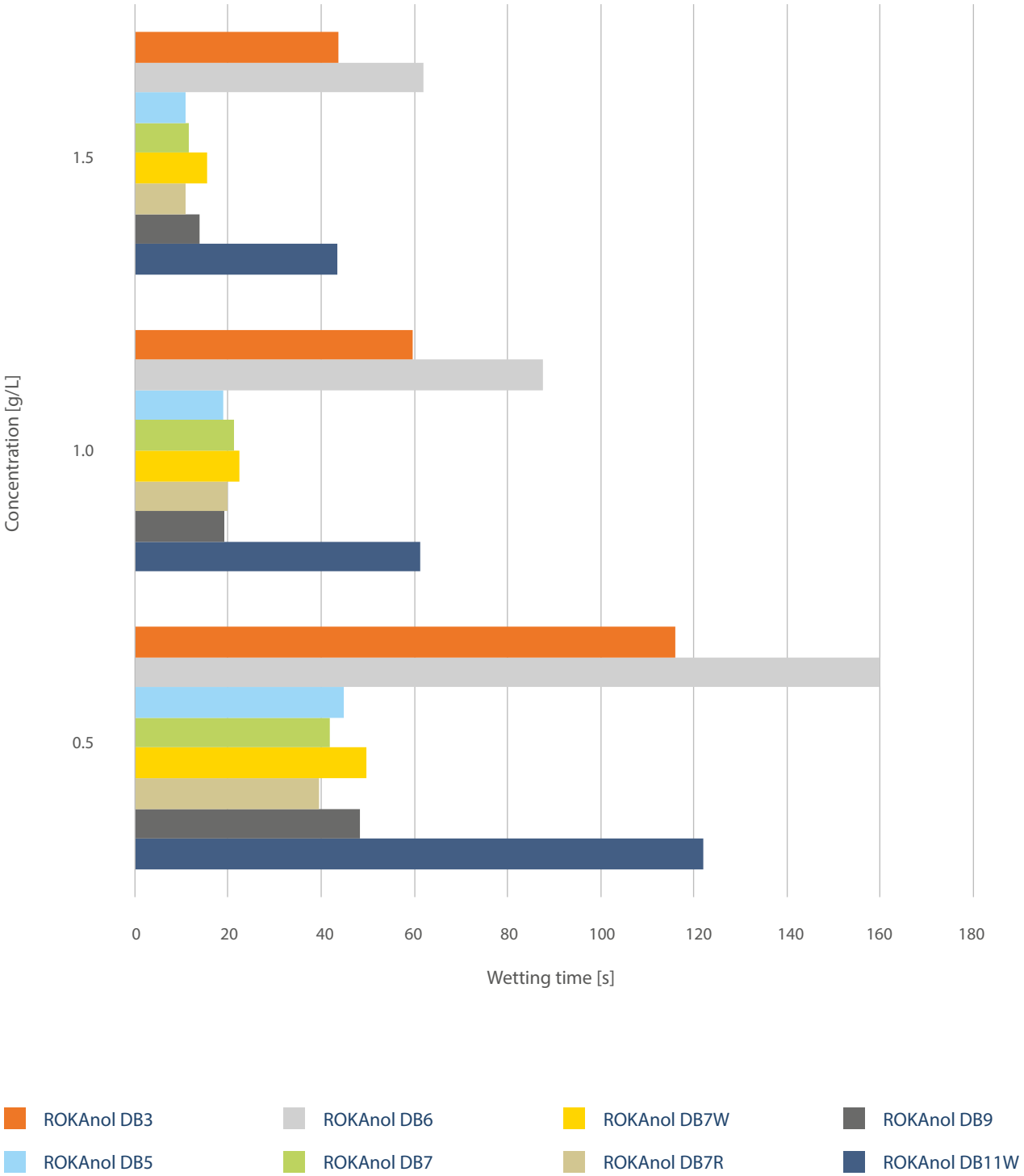
Density measurements:
a – at 20°C
b – at 25°C
c – at 40°C
d – at 50°C

HLB was determined using calculation method

Wetting capability

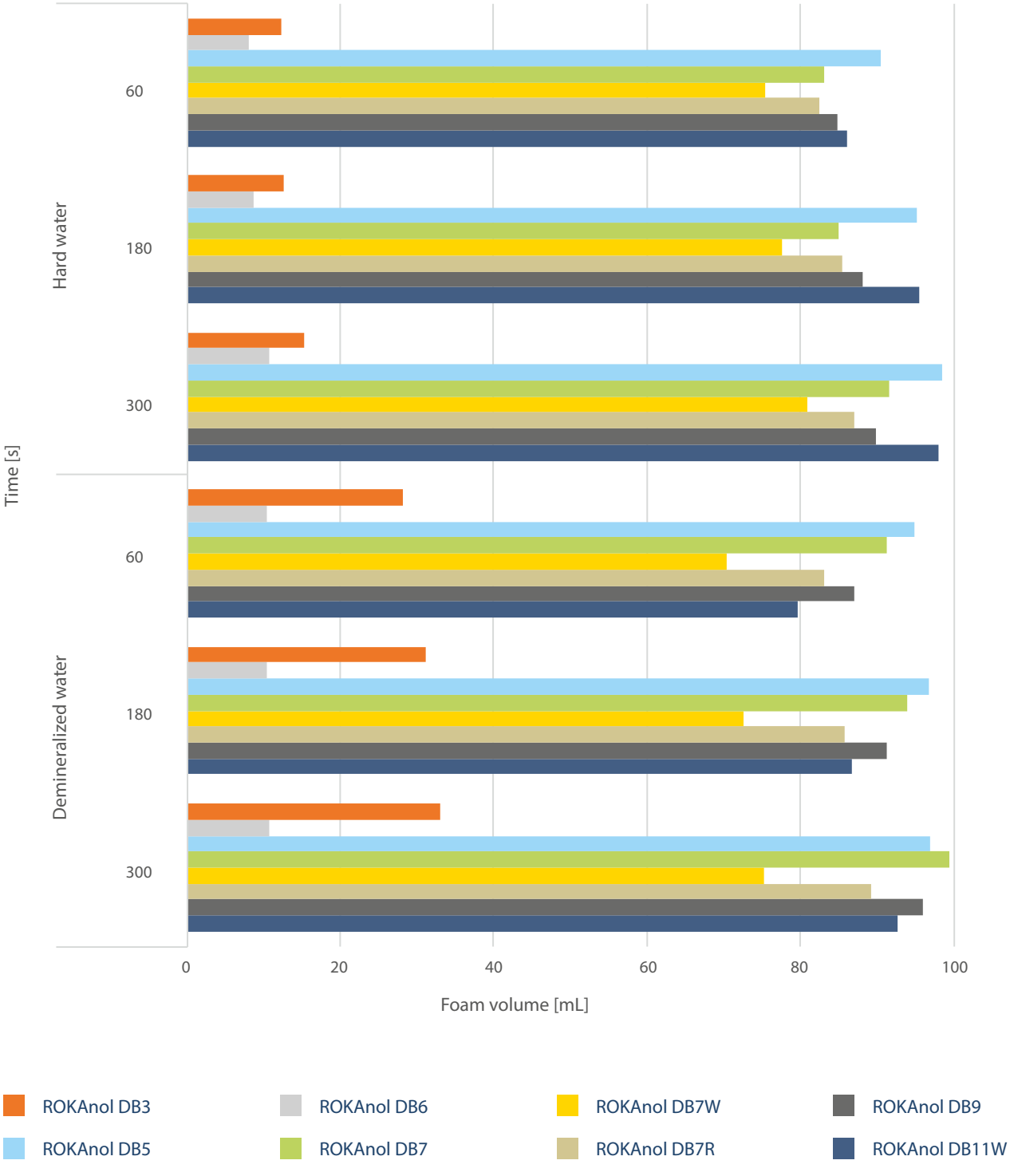
In a large number of applications the capability of effective wetting is desired property of surfactants. The wetting capability of cotton fabric was determined according to EN 1772:2001 method.

Wetting time (time in seconds necessary for wetting the textile material) was measured in ROKAnols solutions with a concentration of 1.0 g/L in distilled 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 the ROKAnol DB Series 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.



Stability

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 sulphuric acid (with purity in the range between 95 and 98%) and hydrogen chloride (with purity in the range between 35 and 38%) in ml/L in a stable surfactantsolution with a concentration of 1% (as active substance).

Stability in the peroxides environment was measured using hydrogen peroxide at a concentration of 30% in ml/L in a stable surfactant solution with a concentration of 1% (as active substance).

Alkali resistance (SODIUM HYDROXIDE); concentration of 1%; temperature 20°C

Product	NaOH conc. [g/L]											
	10	20	30	40	50	60	70	80	110	120	180	225
ROKAnol DB3	o	o	o	o	o	o	o	o	o	o	o	o
ROKAnol DB5	o	o	o	o	o	o	o	o	o	o	o	o
ROKAnol DB6	•	•	•	•	o	o	o	o	o	o	o	o
ROKAnol DB7	•	•	•	•	•	o	o	o	o	o	o	o
ROKAnol DB7W	•	•	•	•	•	o	o	o	o	o	o	o
ROKAnol DB7R	•	•	•	o	o	o	o	o	o	o	o	o
ROKAnol DB9	•	•	•	•	•	•	o	o	o	o	o	o
ROKAnol DB11W	•	•	•	•	•	•	•	o	o	o	o	o

• homogenous, clear solution • homogeneous, opalescent solution • homogeneous, cloudy solution o macroscopic phase separation

Acid resistance (SULPHURIC ACID, HYDROGEN CHLORIDE); concentration of 1%; temperature 20°C

Product	H_2SO_4 conc. [g/L]											
	10	20	30	40	50	60	70	80	110	120	180	225
ROKAnol DB3	o	o	o	o	o	o	o	o	o	o	o	o
ROKAnol DB5	o	o	o	o	o	o	o	o	o	o	o	o
ROKAnol DB6	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB7	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB7W	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB7R	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB9	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB11W	•	•	•	•	•	•	•	•	•	•	•	•

• homogenous, clear solution • homogeneous, opalescent solution • homogeneous, cloudy solution o macroscopic phase separation

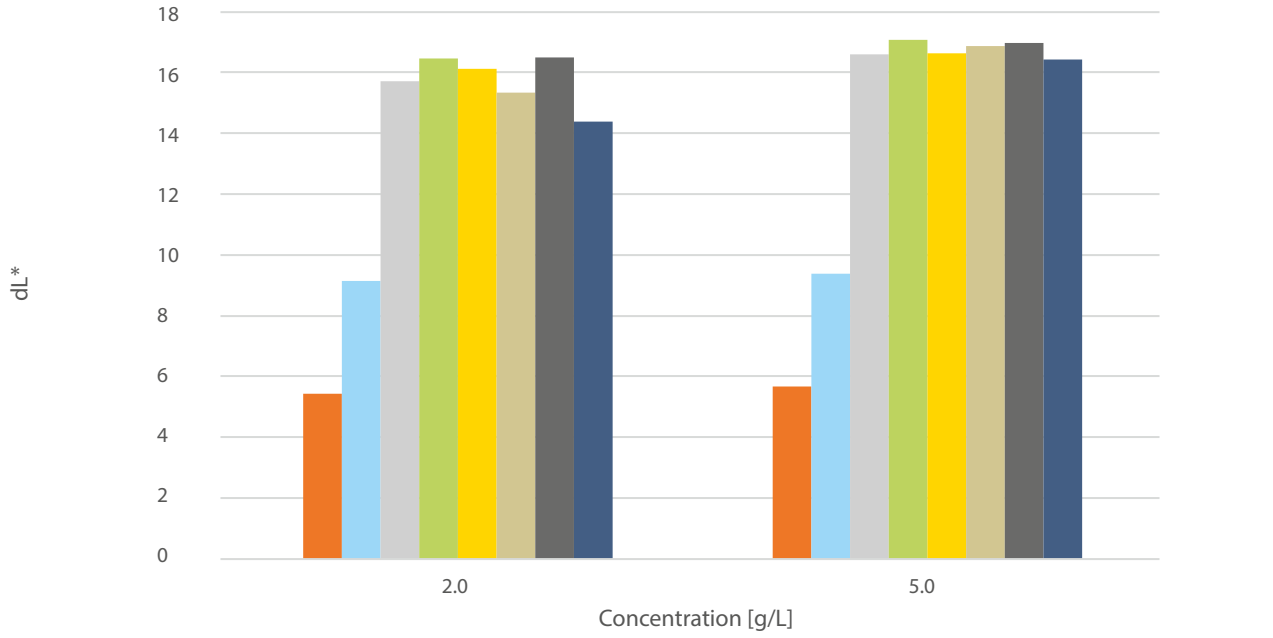
Peroxides resistance (HYDROGEN PEROXIDE); concentration of 1%; temperature 20°C

Product	H_2O_2 conc. [g/L]											
	10	20	30	40	50	60	70	80	110	120	180	225
ROKAnol DB3	o	o	o	o	o	o	o	o	o	o	o	o
ROKAnol DB5	o	o	o	o	o	o	o	o	o	o	o	o
ROKAnol DB6	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB7	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB7W	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB7R	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB9	•	•	•	•	•	•	•	•	•	•	•	•
ROKAnol DB11W	•	•	•	•	•	•	•	•	•	•	•	•

• homogenous, clear solution • homogeneous, opalescent solution • homogeneous, cloudy solution o 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 DB 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.



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 DB3	●	●	●	●
ROKAnol DB5	●	●	●	●
ROKAnol DB6	●	●	●	●
ROKAnol DB7	●	●	●	●
ROKAnol DB7W	●	●	●	●
ROKAnol DB7R	●	●	●	●
ROKAnol DB9	●	●	●	●
ROKAnol DB11W	●	●	●	●

● Soluble ● Partially soluble ● Insoluble

Viscosity of stain removal formulation

Test was conducted on the effect of changing the concentration of ROKAnol in the formulation on the viscosity of the final product. Viscosity was tested using an IKA ROTAVISC lo-vi Complete viscometer, spindle 6.7, temperature 20°C. The results are shown in the graph.

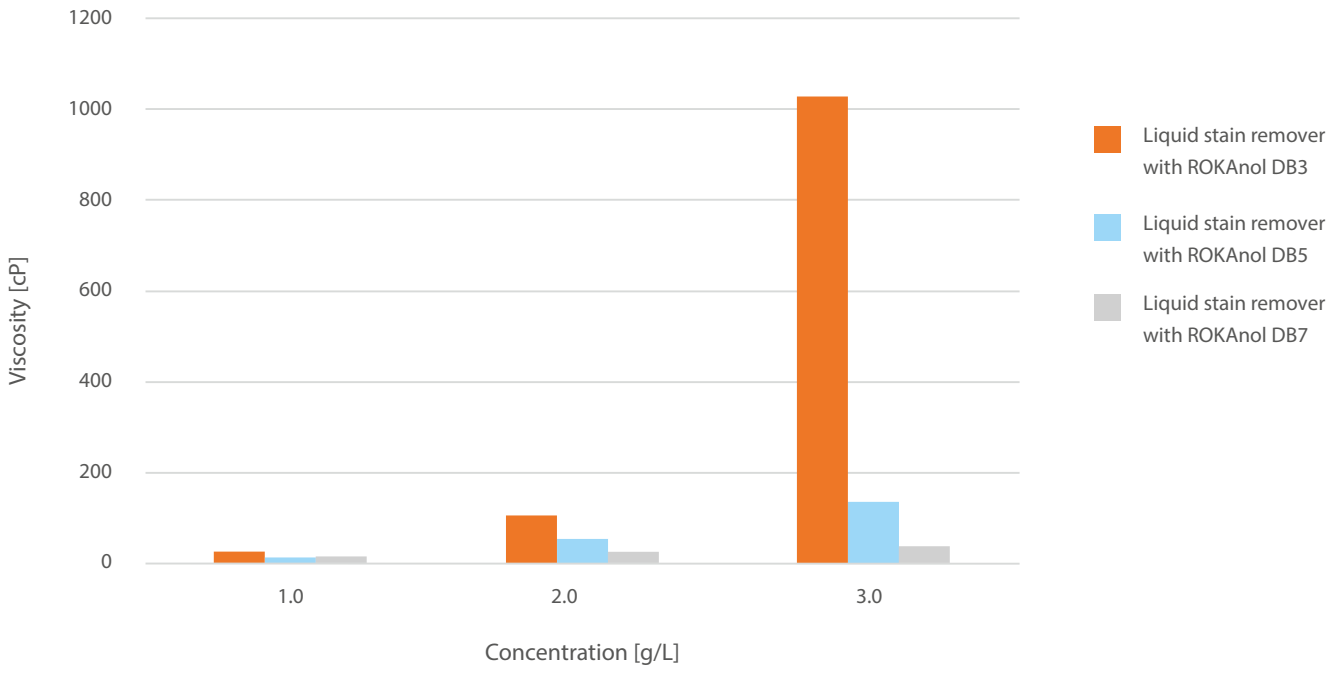
Liquid stain remover

Compound	Brand name	Concentration [%]	Function
C12-16 Laureth-7	**ROKAnol L7A**	**9.0**	**Breaks down stains**
Sodium Dodecylbenzenesulfonate	**ABSNa 50**	**8.0**	**Removes stains / foaming agent**
C12-15 Pareth-3 / C12-15 Pareth-5 / C12-15 Pareth-7	**ROKAnol DB3 / ROKAnol DB5 / ROKAnol DB7**	**1.0 / 2.0 / 3.0**	**Removes stains / rheology modifier**
Hydrogen Peroxide	–	30.0	Bleaching agent
Aqua	–	up to 100.0	Solvent

Appearance	visual method	clear liquid
pH		6

Procedure:

1. Mix **ABSNa 50** with water.
2. Add **ROKAnol L7A** and mix until a homogeneous solution is obtained.
3. Add **ROKAnol DB3/ ROKAnol DB5/ ROKAnol DB7** and mix.
4. Then add Hydrogen Peroxide and mix.



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