ROKAnol NL Series

Ethoxylated C9-C11 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 NL Series

Chemical specificity

ROKAnol NL Series are high active non-ionic surfactants. They are ethylene oxide adducts to C9-C11 alcohols. The numerical part of the product name indicates the overall degree of ethoxylation. ROKAnol NL Series can be presented by the following structure:

$$CH_3(CH_2)n\text{-}O(CH_2CH_2O)n'$$

where n - 8 – 10

n' - 3, 5, 6, 8, 9

Applications

ROKAnol NL Series are especially effective in the cleaning process. They are consumed as cleaning agents in the I&I industry, but also cope well as a components of laundry detergents or hard surface cleaners. In addition, they have many other applications, such as in the textile industry or the paint and coatings industry.

- Industrial and institutional cleaning
- Laundry detergents
- Hard surface cleaners
- Textile industry
- Paints and coatings
- Others

Basic physical and chemical properties

ROKAnol	NL3	NL5	NL6W	NL6W/95	NL6	NL8W	NL8	NL9
Appearance at 20-25°C	Liquid	Liquid with a tendency to separation in time	Liquid	Liquid	Liquid with a tendency to separation in time	Liquid	Liquid with a tendency to separation in time	Liquid
Molecular weight [g/mol]	295	380	430	430	430	510	510	560
Hazen colour	Max. 50 (40°C)	Max. 70 (40°C)	Max. 70 (40°C)	Max. 70 (30°C)	Max. 70 (40°C)	Max. 70 (40°C)	Max. 70 (40°C)	Max.100 (40°C)
Hydroxyl number [mg KOH/g]	185-193	144	130	130	130	106	106	98-102
Cloud point [°C]								
Method A 1% in water solution	-	33 - 39	50 – 57	50 – 57	50 – 57	78 - 85	78 – 85	85
Method B 1% solution in 5% NaCl solution	-	25	39	39	39	63	64	69
Method C 1% solution in 10% NaCl solution	-	18	30	28	30	53	53	58
Method D 10% solution in 25% BDG solution	57	72	76	77	76	83	83	83
Method E 16.7% solution in 25% BDG solution	48	68	73	73	73	82	81	82
Approx. Solidification point [°C]	-12	-2	<-20	-5	+ 5	0	+ 15	+ 15
Water content [%, by weight]	max. 0.2	max. 0.5	8.0 – 12.0	max. 6.0	max. 0.5	8.0 - 12.0	max. 0.5	max. 0.5
pH in deionized water, at 20°C	5.5 – 7.5	4.6 – 7.4	5.0 – 7.0	5.0 – 7.0	5.0 – 7.0	5.0 – 7.0	5.0 – 7.0	5.0 – 7.0
Density at 25°C [g/cm^3]	0.95	0.97	1.00	0.99	0.99	1.03	1.03	1.01
Viscosity at 20°C [cP]	Approx. 30	Approx. 40	Approx. 70	Approx. 70	Approx. 50	Approx. 90	Approx. 70	Approx. 130
Average degree of ethoxylation [mol EO]	3	5	6	6	6	8	8	9
Surface tension of 0.1% solution at 25°C [mN/m]	26	26	29	29	28	29	32	31

Additional information

Solubility

The solubility of ROKAnol NL Series depends on the degree of ethoxylation. The higher degree of ethoxylation, the better solubility in both water and acetone. Solubility in water and other solvents has been shown in the table below:

Solubility – at 25°C, 10% Solutions

Product name	Demineralized water	Methanol	Acetone
ROKAnol NL3	○	●	○
ROKAnol NL5	●	●	○
ROKAnol NL6W	●	●	●
ROKAnol NL6W/95	●	●	●
ROKAnol NL6	●	●	○
ROKAnol NL8W	●	●	●
ROKAnol NL8	●	●	○
ROKAnol NL9	●	●	●

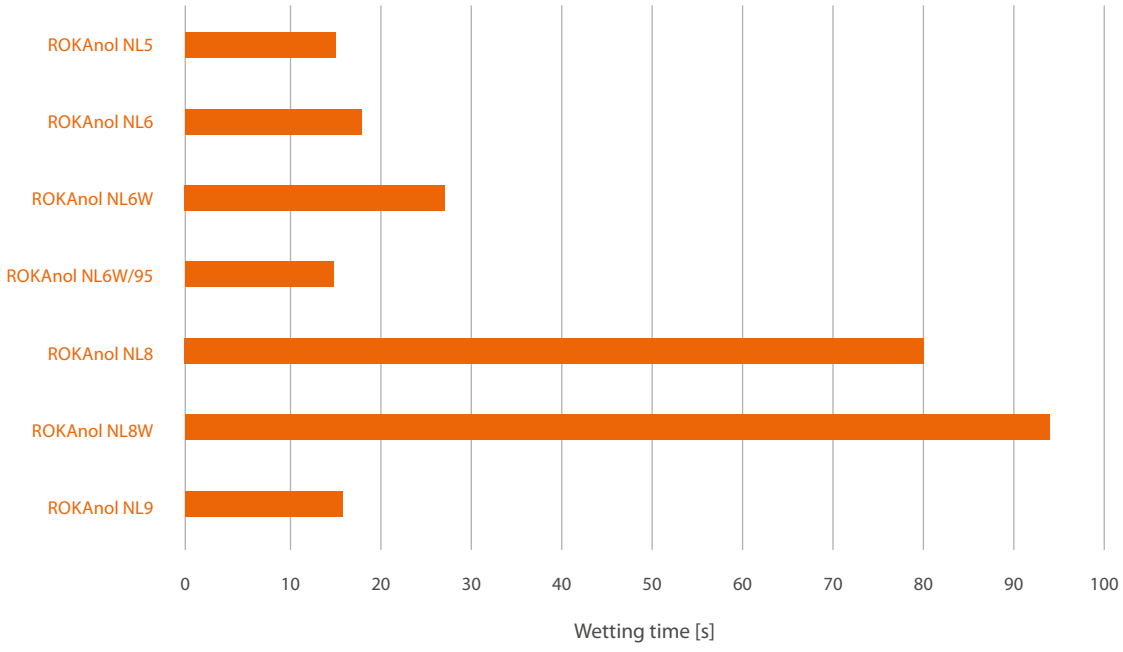
○ macroscopic phase separation ● homogeneous, cloudy solution ● clear, homogeneous solution ● homogeneous, opalescent solution

Wetting capability

Surfactants reduce the surface tension of liquids in which they are dissolved. Thanks to them, any liquid (usually water) has greater wetting capability, which increases its ability to get as close as possible to the solid. This is very important for many surfactant applications, especially in cleaning processes.

The capability of wetting cotton fabric was determined in accordance to **PN-EN 1772:2001** Standard.

Concentration of 1.0 g/l; demineralized water; temperature 20°C

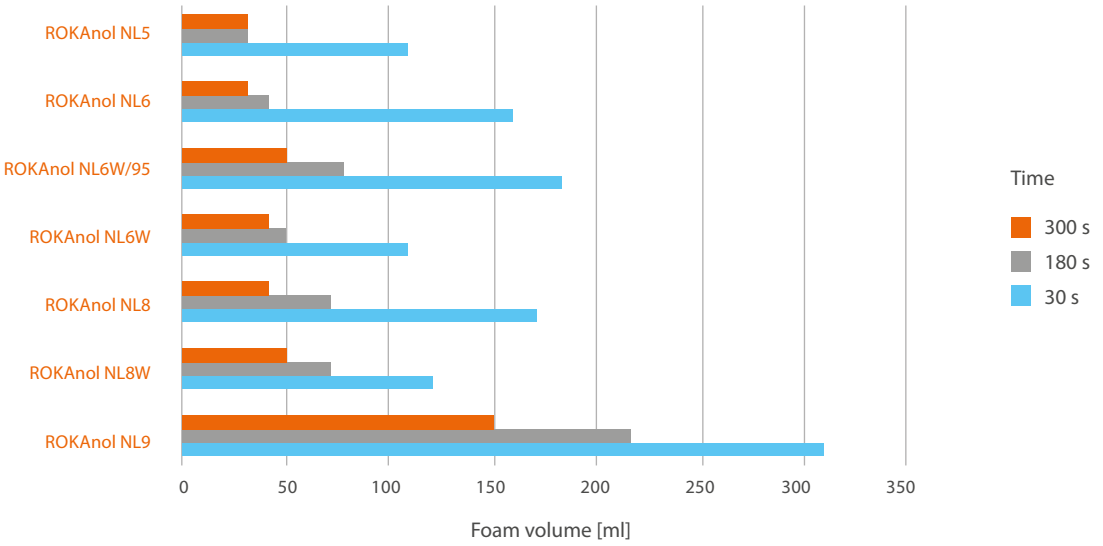


* The data presented in the charts were developed on the basis of tests carried out at PCC EXOL SA

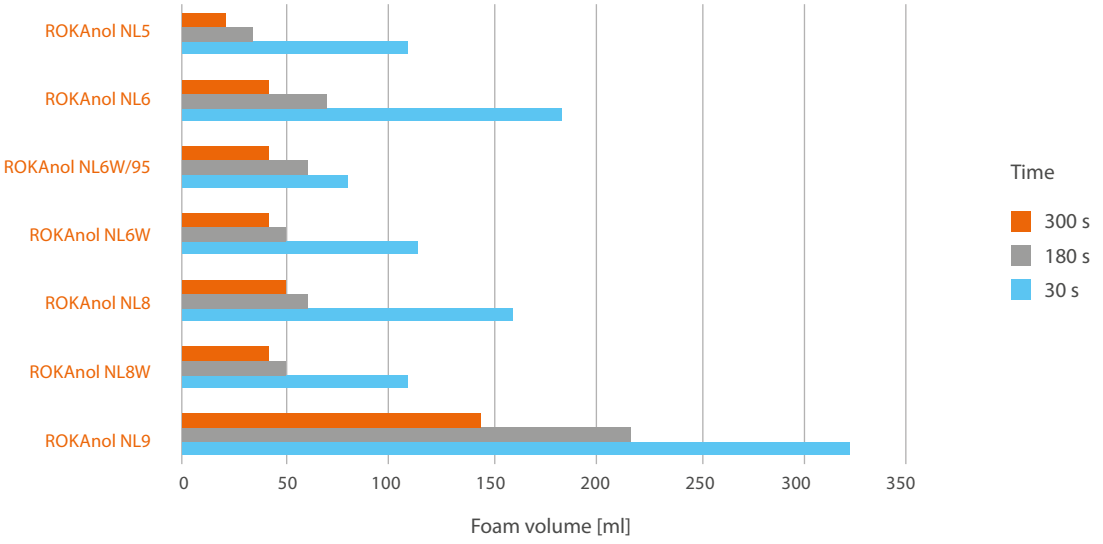
Foaming capability

Foam is a heterogeneous system in which the liquid is the continuous phase and the dispersed phase is a gas. Foams, as well as emulsions, are thermodynamically unstable systems, so surfactant molecules on the interface are required to stabilize them. The ability to foam a substance is important in many industrial applications including the detergents, where it prevents re-dirt in the washing or cleaning processes. The determination of the foaming capability was performed according to **PN-ISO 696: 1994** Standard (the modified Ross-Miles method) at a temperature of 25°C, for a surfactant concentration of 1 g/l, in both hard (17°d) and demineralized water.

Concentration of 1.0 g/l; demineralized water; temperature 25°C



Concentration of 1.0 g/l; hard water; temperature 25°C



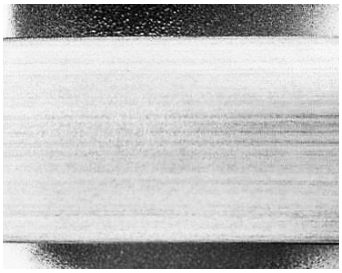
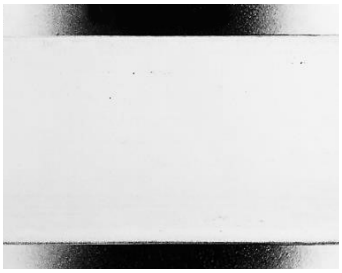
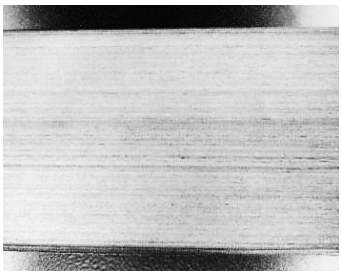
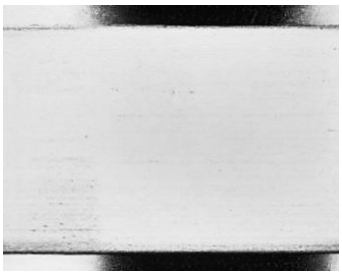
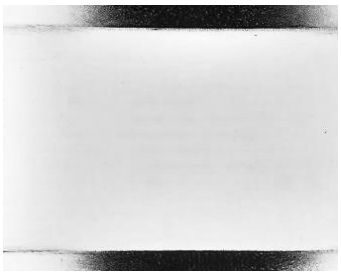
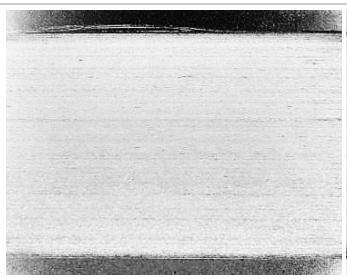
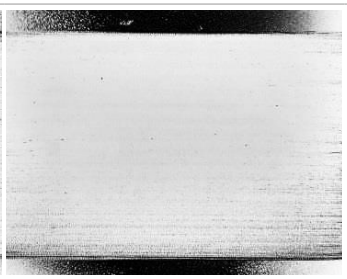
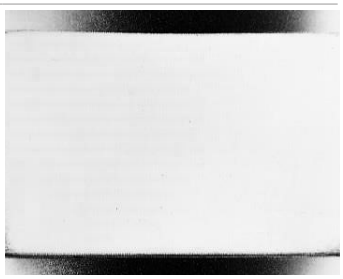
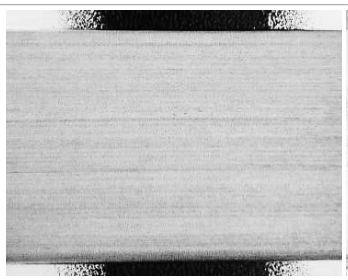
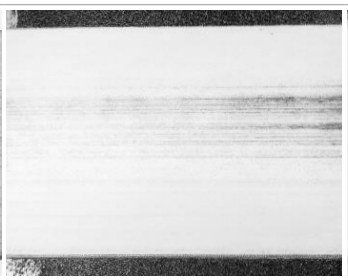
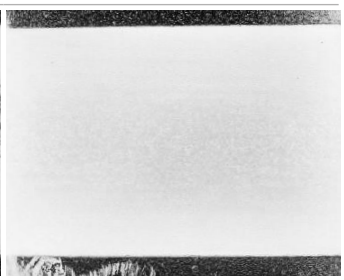
* The data presented in the charts were developed on the basis of tests carried out at PCC EXOL SA

Detergency on hard surfaces

Detergency is the ability of the surfactant to remove greasy soil from the surface of the masonite tile in the cleaning process. Non-polar structural fragments of surfactants form a micelle which interact with a particle of dirt.

Subsequently, an emulsion is formed, that can be removed mechanically with a sponge. The cleaning process was carried out on a BYK Gardner scrub abrasion tester according to our own method.

Comparison of masonite tiles, before and after the detergency tests

Concentration [g/l] / Product name	0	2	5
ROKAnol NL5			
ROKAnol NL6			
ROKAnol NL8			
ROKAnol NL9			

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

Detergency on hard surface results in dL units

Product name	Demi water	ROKAnol NL9		ROKAnol NL8		ROKAnol NL6		ROKAnol NL5	
Concentration	-	2 g/L	5 g/L	2 g/L	5 g/L	2 g/L	5 g/L	2 g/L	5 g/L
The aritmetic average of all measurements [dL units]	41	35	31	33	32	33	32	31	31

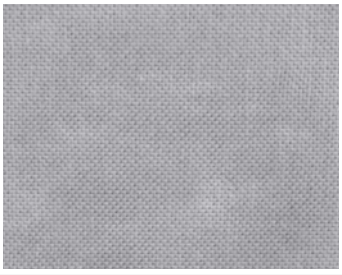
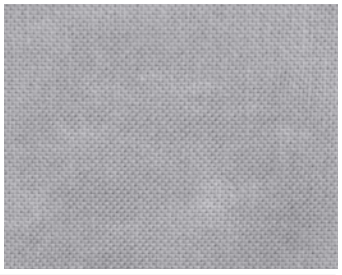
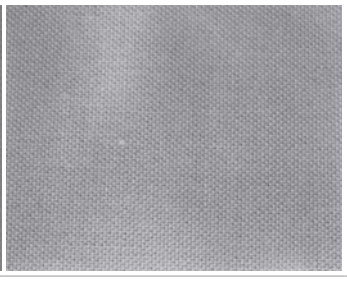
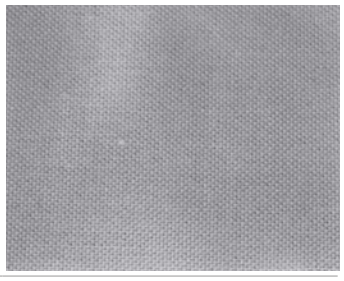
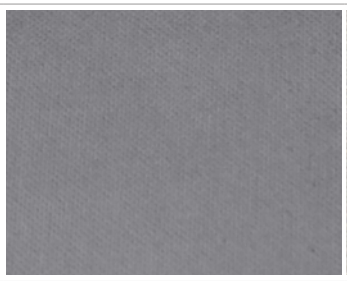
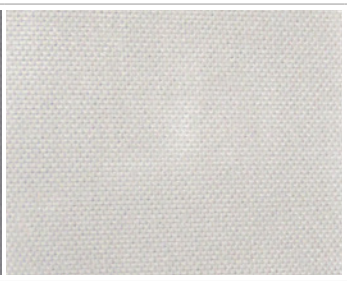
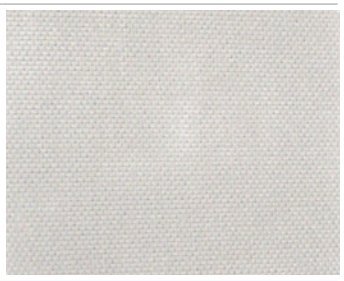
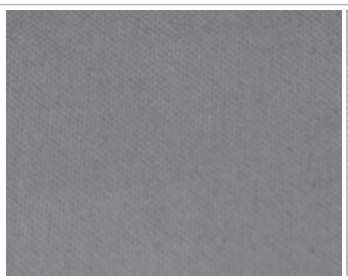
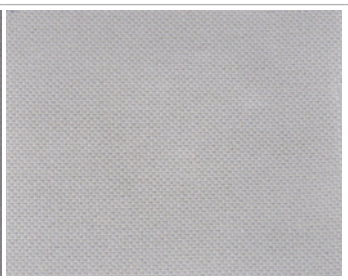
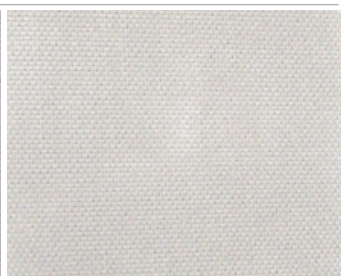
The cleaning process is described by the dL parameter according to the CIE LAB method. This parameter determines the change in the brightness (luminescence) between the tested sample and the standard which is a white plate. Detergency tests on hard surfaces were carried out in 3 replicates for each concentration of each product. The dL parameter is described by the following formula:

dL = LT – LS, where: T – tested sample (plate after cleaning process)
S – standard to which the tested sample is compared (white plate)

Detergency on a cotton fabric

Determination of detergency on a cotton fabric is tantamount to assessing the effectiveness of washing with the use of surfactants. Detergency tests were performed according to PCC EXOL SA own method, using EMPA 125 fabric (cotton), soiled with a mixture of oils and pigments that were washed in ROKAnol NL Series solutions.

Comparison of the EMPA 125 fabric, before and after the detergency tests

Concentration [g/l] / Product name	0	2	5
ROKAnol NL9			
ROKAnol NL8			
ROKAnol NL6			
ROKAnol NL5			

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

Cotton fabric detergency results in dL units

Product name	ROKAnol NL9		ROKAnol NL8		ROKAnol NL6		ROKAnol NL5	
Concentration	2 g/L	5 g/L	2 g/L	5 g/L	2 g/L	5 g/L	2 g/L	5 g/L
The aritmetic average of all measurements [dL units]	13	13	12	12	21	21	18	21

As with the detergency on hard surface method, the cleaning process is described by the dL parameter in accordance with the CIE LAB method. The difference is that the standard in this case is the soiled fabric, so the higher the value of the dL parameter, the better the tested fabric is cleaned.

Alkali and acid resistance

Surfactants used in industrial cleaning have to be resistant to strong acids or alkalis. Acidic cleaning agents are mainly used to remove mineral deposits from acid-resistant surfaces, while alkaline agents are known primarily for their remarkable degreasing ability.

The analysis of this stability for ROKAnol NL Series has been performed in accordance with the **PN-EN 14712:2005** Standard.

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

Product name \ NaOH conc. [g/l]	10	20	30	40	50	60	70	80	90	100
ROKAnol NL3	○									
ROKAnol NL5	●	●	○							
ROKAnol NL6	●	●	●	●	○					
ROKAnol NL6W/95	●	●	●	●	●	○				
ROKAnol NL6W	●	●	●	●	●	○				
ROKAnol NL8	●	●	●	●	●	●	●	○		
ROKAnol NL8W	●	●	●	●	●	●	●	○		
ROKAnol NL9	●	●	●	●	●	●	●	●	●	○

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

Acid resistance (Sulphuric Acid); concentration of 1%; temperature 20°C

H_2SO_4 conc. [g/l / Product name	1	10	40	60	120	140	225
ROKAnol NL3	○	○	○	○	○	○	●
ROKAnol NL5	●	●	●	●	●	●	●
ROKAnol NL6	●	●	●	●	●	●	●
ROKAnol NL6W/95	●	●	●	●	●	●	●
ROKAnol NL6W	●	●	●	●	●	●	●
ROKAnol NL8	●	●	●	●	●	●	●
ROKAnol NL8W	●	●	●	●	●	●	●
ROKAnol NL9	●	●	●	●	●	●	●

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

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