



## TECHNICAL INFORMATION

# **ADDITIVES FOR DETERGENTS, CLEANING AND CARE PRODUCTS**



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# Introduction

Cleaning and care are essential for maintaining hygienic conditions in our daily lives. The use of care and cleaning products also ensures that surfaces last longer and thus contributes to a more sustainable way of life. In addition to the high demands on the performance and efficiency of the products used, the safety of their use for people and the environment also plays an increasingly important role.

With the aim of meeting all these requirements, BYK offers a range of additives that help to improve cleaning and maintenance performance. At the same time, the development of our products focuses on health and sustainability aspects.

BYK additives are very versatile and help to clean and protect a wide range of hard and soft surfaces. They achieve a wide range of effects such as an improved spray pattern, product stability or improved production and application processes. At the same time, BYK additives tolerate a very wide range of conditions (aqueous – solvent-based, acidic – alkaline).

This makes them the optimal raw material for cleaning agents in numerous applications for private households as well as for commercial cleaning and care. In the following chapters you will find the appropriate recommendations divided according to the specific application as well as the desired effect.

Additive recommendations for the for cleaning, care and detergents can be found here:  
**[“ADDITIVE SELECTION CHART DETERGENTS, CLEANING AND DETERGENTS” \(HC-AG 1\)](#)**

## Note

To ensure the best appearance and full functionality, please open in Adobe Acrobat.

## Additives for polishes: Care and protection of surfaces

In order to improve the surface properties, care products designed for the specific application are required. These are used on a wide variety of materials such as metal, stone, wood, leather or even plastics. These include polishes for vehicles, leather products, furniture and floors.

For the production of high-quality care products, BYK offers a range of **wax additives**, **defoamers** and **surface additives** to achieve the best possible surface wetting and effective protection.

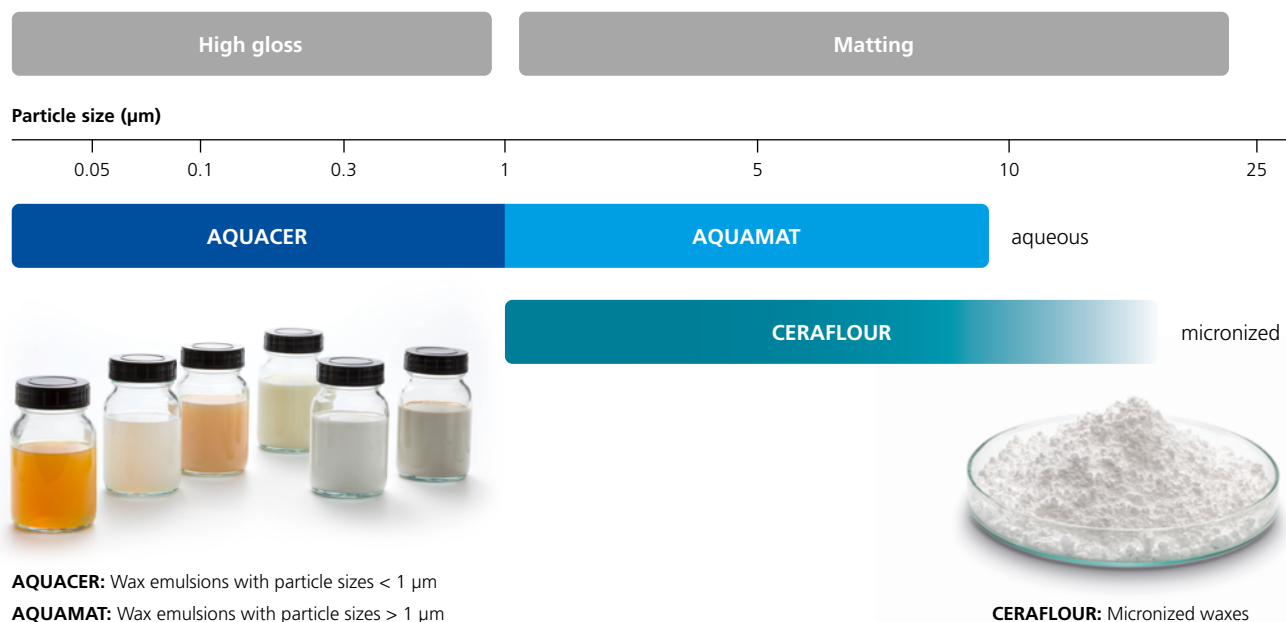
**Rheology additives** are used to adjust the desired consistency of care products. These are either pasty, creamy or liquid.

### Wax additives for use in polishes

The benefits of using waxes have been known to mankind for thousands of years. Various properties have been improved by the use of waxes. Gloss and surface protection are just two of them.

In order to make waxes suitable for use in polishes, BYK produces wax additives from them that are easy to handle and dose and have the particle size suitable for the application in question. In these wax preparations, the wax particles are finely dispersed in a liquid phase (here: water) or as micronised waxes in powder form. Finely dispersed emulsions in water are offered by BYK under the trade name **AQUACER**. **AQUAMAT** wax dispersions are wax dispersions with coarser particles ( $> 1 \mu\text{m}$ ) that are ideal for gloss reduction. Micronised waxes from BYK are offered under the trade name **CERAFLOUR**.

### Overview of BYK wax additives for polishes and their particle sizes



The industry demands functional and ready-to-use wax additives with the right particle sizes

Wax products based on synthetic polymers, such as polyethylene and polypropylene, have proven themselves as additives in polishes due to their numerous good properties that contribute to the protection and adjustment of the properties of surfaces. For reasons of sustainability and the associated efforts to avoid microplastics, additives based on natural waxes are also increasingly in focus. BYK already offers a wide range of different, mainly plant-based wax additives. The respective recommendations for specific applications are described in more detail below.

### Wax additives for floor care

Waxes are among the main components of these formulations and improve these important properties:

- **Polishability**
- **Abrasion resistance**
- **Shoe sole resistance**
- **Dirt resistance**
- **Gloss**
- **Hydrophobicity**
- **Filling properties in case of scratches**
- **Slip balancing**

**AQUACER 1075** and **AQUACER 1510** as well as **AQUACER 8059\*** and **AQUACER 8940\*** have been specially developed for floor care products and are tailored to the requirements of the market. **AQUACER 1075** **AQUACER 8059\*** is a high-density polyethylene wax provides very good mechanical resistance of the floor coating and also improves resistance to disinfectants and cleaning agents. If a reduction of surface slip (anti-slip) is desired in floor care products, this can be well adjusted with wax additives. **AQUACER 1510/AQUACER 8940\*** is polypropylene-based wax additive that is particularly well suited for this purpose. By combining these two wax additives, the desired balance between surface protection and slip resistance can be achieved.

## Bio-based wax additives for polishes

### AQUACER 565 (Carnauba wax)

- Non-volatile matter: 30 %
- pH: 6.5
- Emulsifier system: non-ionic
- Biobased carbon content (ASTM D6866): 87 %

### AQUACER 570 (Mod. sunflower wax)

- Non-volatile matter: 40 %
- pH: 5.0
- Emulsifier system: non-ionic
- Biobased carbon content (ASTM D6866): 91 %

### AQUACER 571 (Mod. rice bran wax)

- Non-volatile matter: 25 %
- pH: 9.5
- Emulsifier system: non-ionic
- Biobased carbon content (ASTM D6866): 92 %

### CERAFLOUR 1000 (Mod. biopolymer)

- Non-volatile matter: 100 %
- Particle size distribution D90: < 11 µm
- Biobased carbon content (ASTM D6866): > 97 %

**For matting**, in combination with OPTIGEL-CK

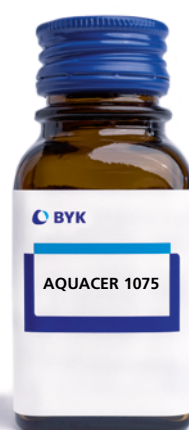
### CERAFLOUR 1010 (Rape seed wax)

- Non-volatile matter: 100 %
- Particle size distribution D90: 16 µm
- Biobased carbon content (ASTM D6866): 100 %

**For matting**, in combination with OPTIGEL-CK

G. 02

## Adjustment of the surface properties through wax additives



Surface  
hardness



Surface  
slip



G. 03

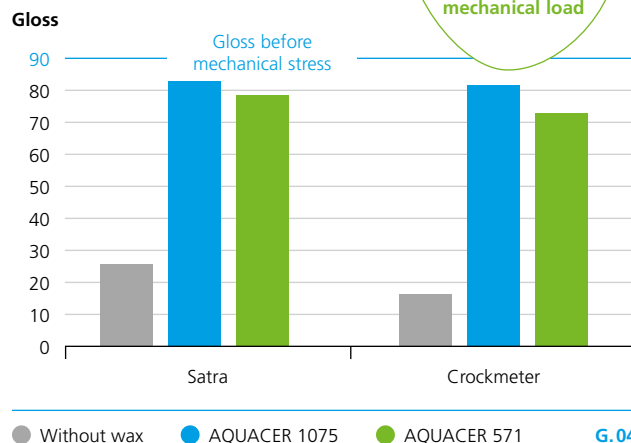
\* only available in NAFTA

Wax additives based on natural waxes can be a microplastic-free alternative. G.04 shows that **AQUACER 571**, which is based on rice bran wax, protects the surface comparably well against mechanical abrasion. The increase in slip is also well balanced and not noticeably increased compared to a polyethylene wax additive.

As a microplastic-free alternative for matt systems, a combination of the waxy biopolymer **CERAFLOUR 1000** produced by fermentation and the natural clay **OPTIGEL-CK**, which is added to stabilise the matting biopolymer, is suitable even with small amounts of 1 % **CERAFLOUR 1000** and 1.5 % **OPTIGEL-CK**.

A complement to **CERAFLOUR 1000** is **CERAFLOUR 1010**, a micronized rape seed wax. When 2 % is used, a silk matt surface can be achieved (G.05).

## Surface protection with AQUACER 571



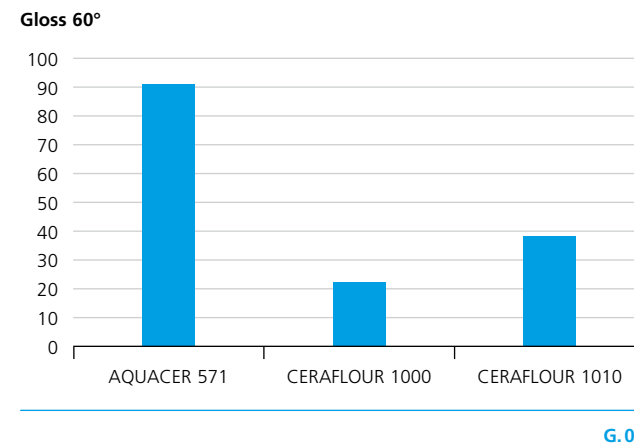
**Test method:** Gloss determination after mechanical stress

(Satra and Crockmeter test)

**System:** Floor care based on acrylic copolymer system

**Dosage:** 3 % solid wax

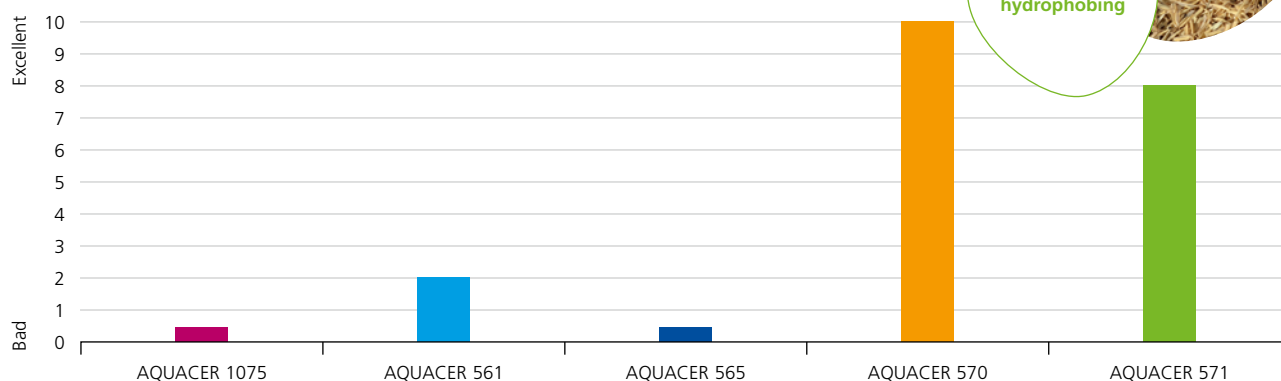
## Gloss reduction by using CERAFLOUR 1000 and CERAFLOUR 1010



## Wax additives for leather care

An important component is the wax used. Here, too, the focus is increasingly on "green" products based on natural, renewable raw materials that improve both oleophobicity and hydrophobicity. G.06 shows how effectively **AQUACER 570** (wax additive based on sunflower wax) and **AQUACER 571** (wax additive based on rice bran wax) increase surface protection in this respect.

## Static hydrophobing



**Test method:** Static hydrophobing (IKW 9.1) on leather

**System:** Leather care **Dosage:** 5.4 % solid wax **Application:** 0.2 g/100 cm<sup>2</sup>

G.06



### Wax additives for car care

When cleaning and caring for vehicles the variety of materials used must be taken into account, with a large focus on the care of painted surfaces. In addition to the numerous products for cleaning vehicles, polishes in particular are an important component for protecting and maintaining the appearance of the vehicle.

By using a combination of a carnauba wax additive such as **AQUACER 565** with a low-density polyethylene wax additive like **AQUACER 1031**, a hard protective layer can be

created on the surface. In addition, the use of the additives prevents the so-called hologram effect, as the wax additives fill the micro-scratches that occur during polishing.

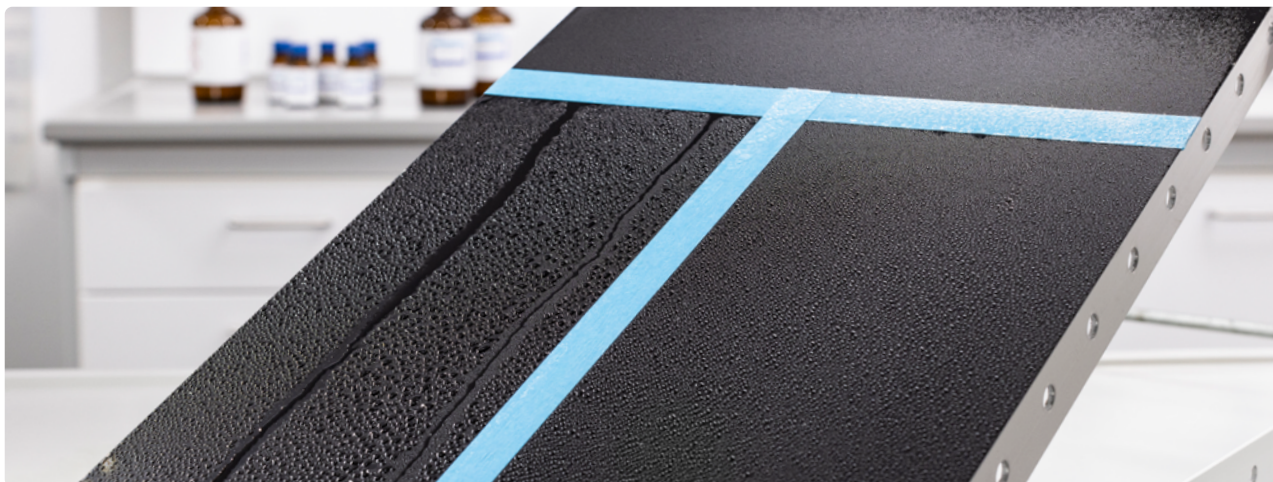
If easy polishing is desired so that the sealant can also be applied with a cloth, a wax with a lower melting point is used. Natural wax-based products are particularly suitable for this purpose. Our recommendations are **AQUACER 561** based on beeswax, **AQUACER 570** based on sunflower wax or **AQUACER 571** based on rice bran wax. In addition to gloss and colour freshening, the sealed surfaces also have very good water-repellent properties (G.07).

### Wax additives for furniture care

BYK's wax additives are also very suitable in the field of furniture care to protect the wood and to prolong the service life.

**AQUACER 571** and **AQUACER 561** in combination with **AQUACER 565** have proven to be particularly suitable additives for protecting furniture surfaces. A combination with an oil such as avocado oil is also possible, and the composition can thus be individually adapted for each care.

## AQUACER natural wax-based products ensure a water-repellent surface



With AQUACER wax additive

Without additive

### Surface additives for use in floor care products

In applying floor polish a level coating is essential for both ideal surface protection as well as appearance. Good wetting is achieved when the surface tension of the care products is lower than or equal to the surface tension of the substrate (G.08).

Due to the high surface tension of water (about 70 mN/m at room temperature), it is necessary, especially with water-based polishes, to lower the surface tension of the care products and thus ensure wetting of the floors. The surface additives offered by BYK are suitable for this purpose.

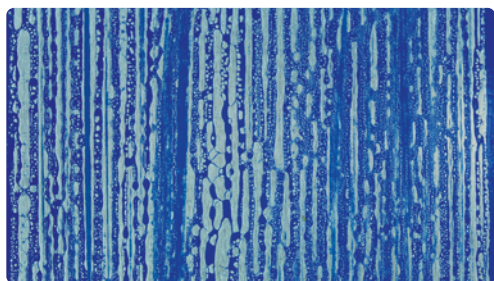
### Surface wetting and leveling

**System 1:**  
Surface tension: **33 mN/m**

**System 2:**  
Surface tension: **29 mN/m**

**System 3:**  
Surface tension: **25 mN/m**

Substrate: Surface tension **30 mN/m**



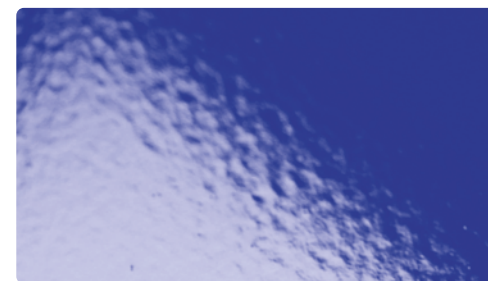
**Action:**

Reduce surface tension, then adjust flow and leveling with less active silicones.



**Action:**

If necessary, adjust flow behavior with less active silicones.



**Action:**

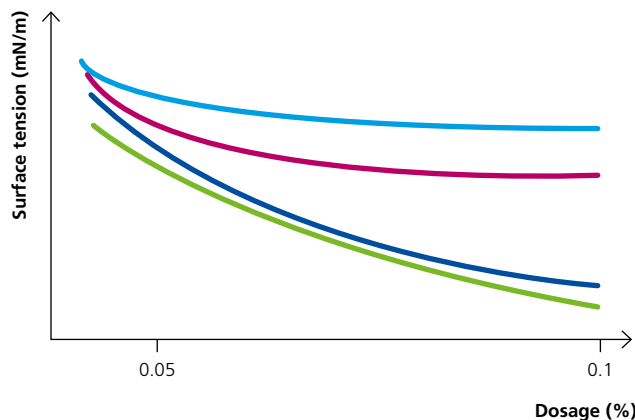
Increase surface tension by reducing the amount of active silicones, then adjust flow behavior and flow.



### Surface additives for floor care

Fluorosurfactants are often used in floor polishes, but they have a negative environmental impact due to their persistence. A more sustainable alternative is silicone surfactants, which also provide excellent wetting and spreading (G. 09). Another advantage of silicone surfactants is their low foam stabilisation. A comparison of a floor polish with and without a suitable surface additive is shown in G. 10.

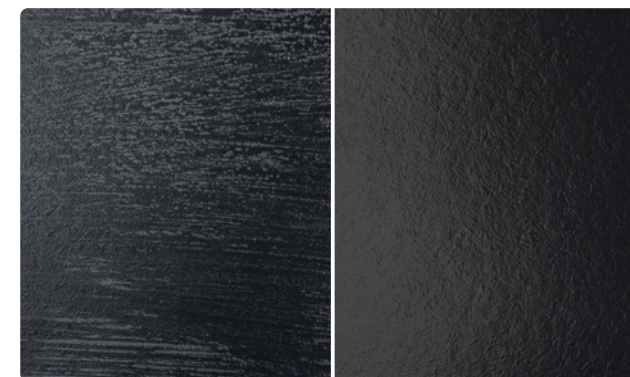
### Reduction of surface tension



- Modified silicone
- Alcohol alkoxylate
- Silicone surfactant
- Fluorosurfactant

G. 09

### Improving the leveling of a care product through a silicone surfactant



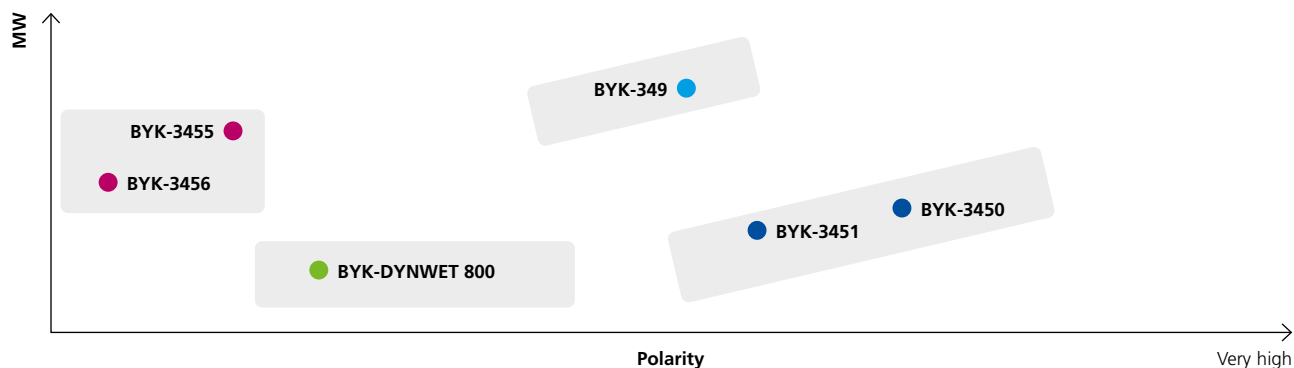
Without additive

With BYK additive

G. 10

G. 11 shows an overview of the additives that are particularly suitable for this application depending on their properties.

### Additive selection for floor care products



- Silicone surfactant universal
- Silicone surfactant improved leveling
- Tri-silicones
- Silicone-free surfactants

All products: Cyclic siloxane content below 0.1 %.

G. 11

### Defoamer for floor care

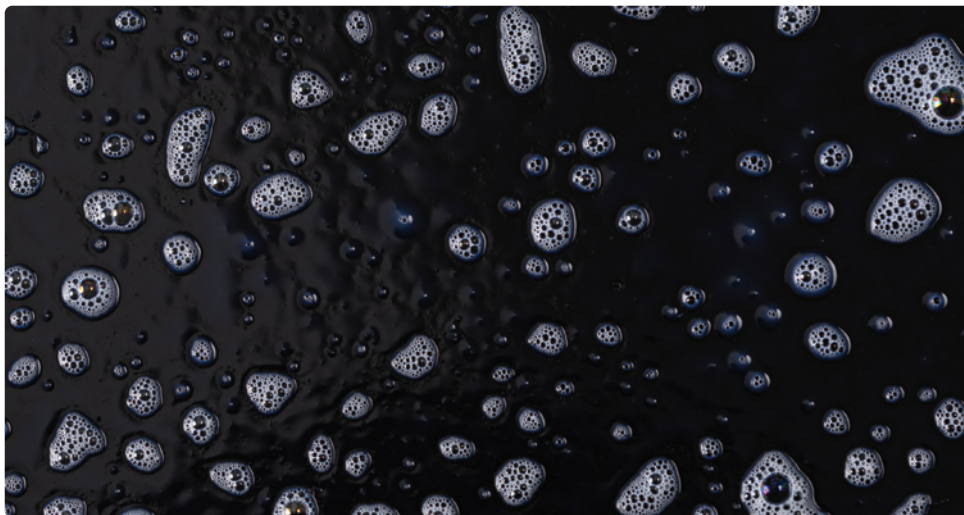
When applying floor care products, foam bubbles can form, which are stabilized by the surface-active substances in the care product. This prevents good wetting by the polish and thus limits the protection of the surface. Here too, BYK offers numerous solutions in the form of silicone defoamers and polymer defoamers to enable optimum results for different systems.

G. 12 shows how much influence a defoamer has on wetting using the example of a floor polish applied with a microfibre mop.

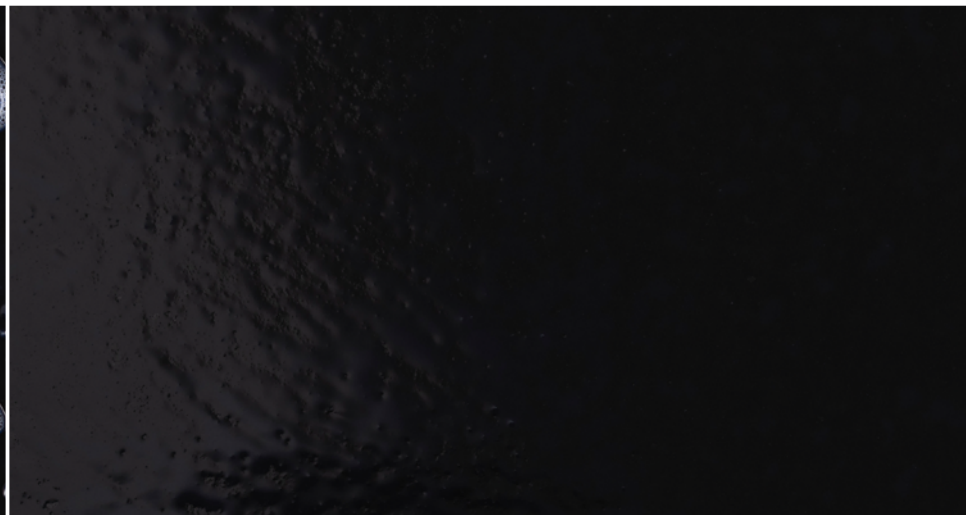


Further information on defoamers can be found in our BYK ebook **"Defoamers and air release agents"**.

### Improvement of surface wetting by BYK-1679



Without defoamer



With BYK-1679

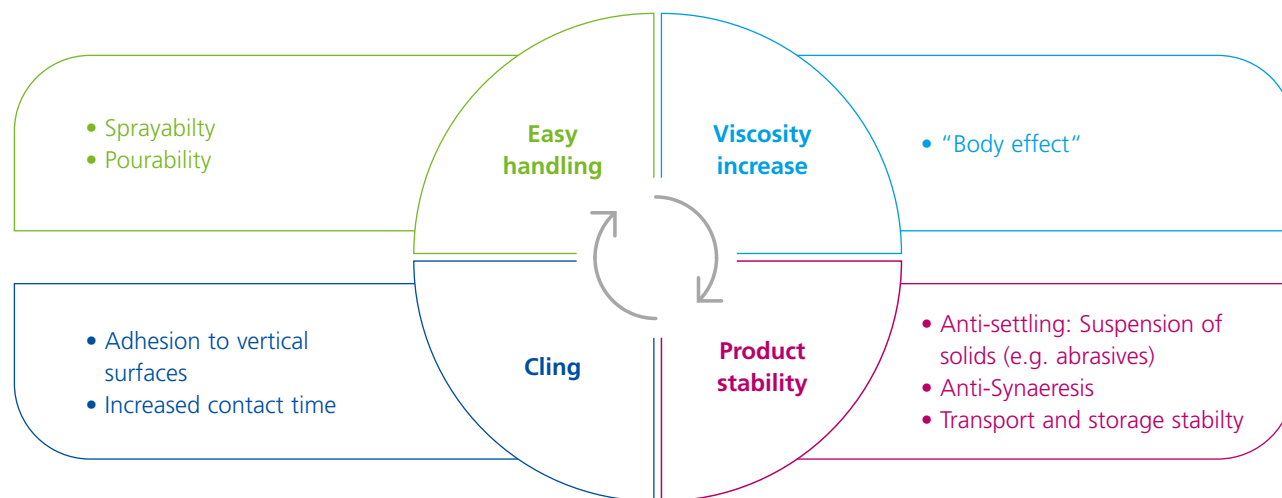
## Additives for cleaning agents: Cleaning of surfaces

The surface cleaning sector includes the markets for private households and for commercial cleaning.

Rheological additives can influence the properties of these products in various ways and help to make them more efficient. G. 13 gives an overview of the properties that are improved by rheological additives.

Other additives such as defoamers or wetting and dispersing additives for cleaners containing solids also improve the properties, handling and stability of cleaners. Here, too, BYK offers versatile options for different systems, as shown in the following chapters.

### Improvement of cleaning agents through rheological additives



## Aqueous cleaners

Depending on the area of application, such as bathroom or kitchen, household cleaners are chemically different. BYK offers additives that are stable in this wide pH range and improve the desired properties in the cleaner.

## Rheology additives

Besides increasing viscosity, an important goal is to make the cleaning products more stable against settling of solids or syneresis (phase separation). This is particularly essential for maintaining the quality of the cleaner. Sufficient stabilisation of the composition is necessary, especially during longer storage or demanding transport.

Often cleaning products should be easy to spray (shear thinning), and after spraying the viscosity should build up again quite quickly. Cleaners for sloping or vertical surfaces, for example, should adhere as long as possible to the surface to be cleaned in order to achieve the maximum effect. Rheological additives that produce so-called thixotropic or pseudoplastic flow behavior are particularly suitable for this purpose (G. 14).

Two groups of additives in particular are recommended for achieving the effects mentioned.

One is the layered silicates, which include natural bentonites (**OPTIGEL**) as well as synthetic hectorites (**LAPONITE**). **LAPONITE** additives such as **LAPONITE-RD** are particularly

suitable for use in transparent cleaners. For more demanding systems (high and low pH values, high electrolyte content), **LAPONITE-EP** is suitable.

As illustrated in G. 15, these layered silicates arrange themselves like a stack of plates when dry. When dispersed in water, water molecules and other components are incorporated into the interlayer between the platelets. This swelling will increase the distance between the layers until the point they separate and discrete disc shaped platelets are formed in solution.

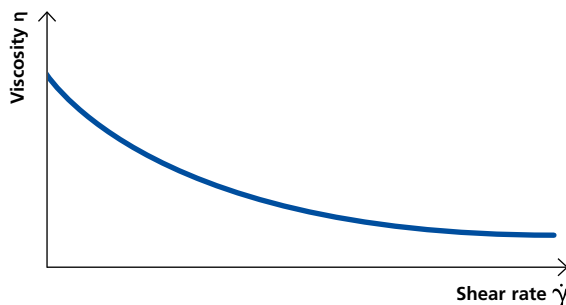
Through electrostatic interactions, these platelets form a three-dimensional network ("house-of-cards" structure), which leads to the desired rheological effect.

## Overview of the viscosity profiles

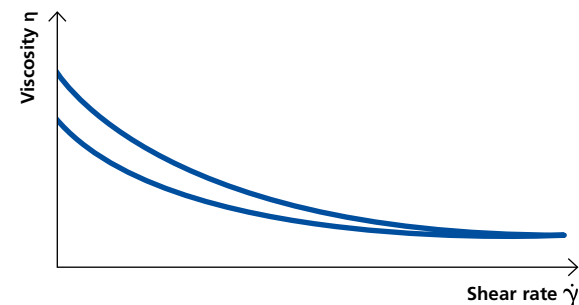
### Newtonian flow behavior



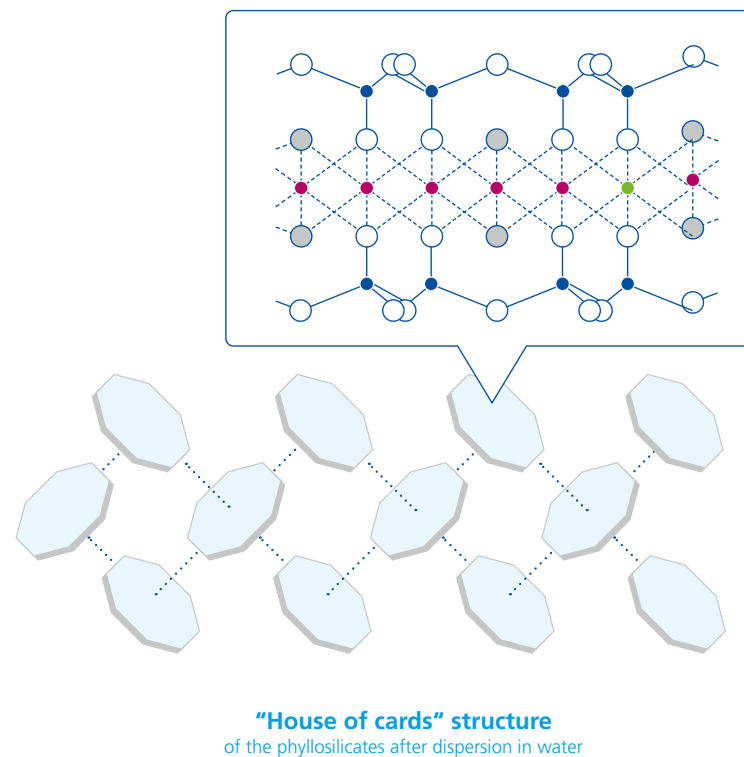
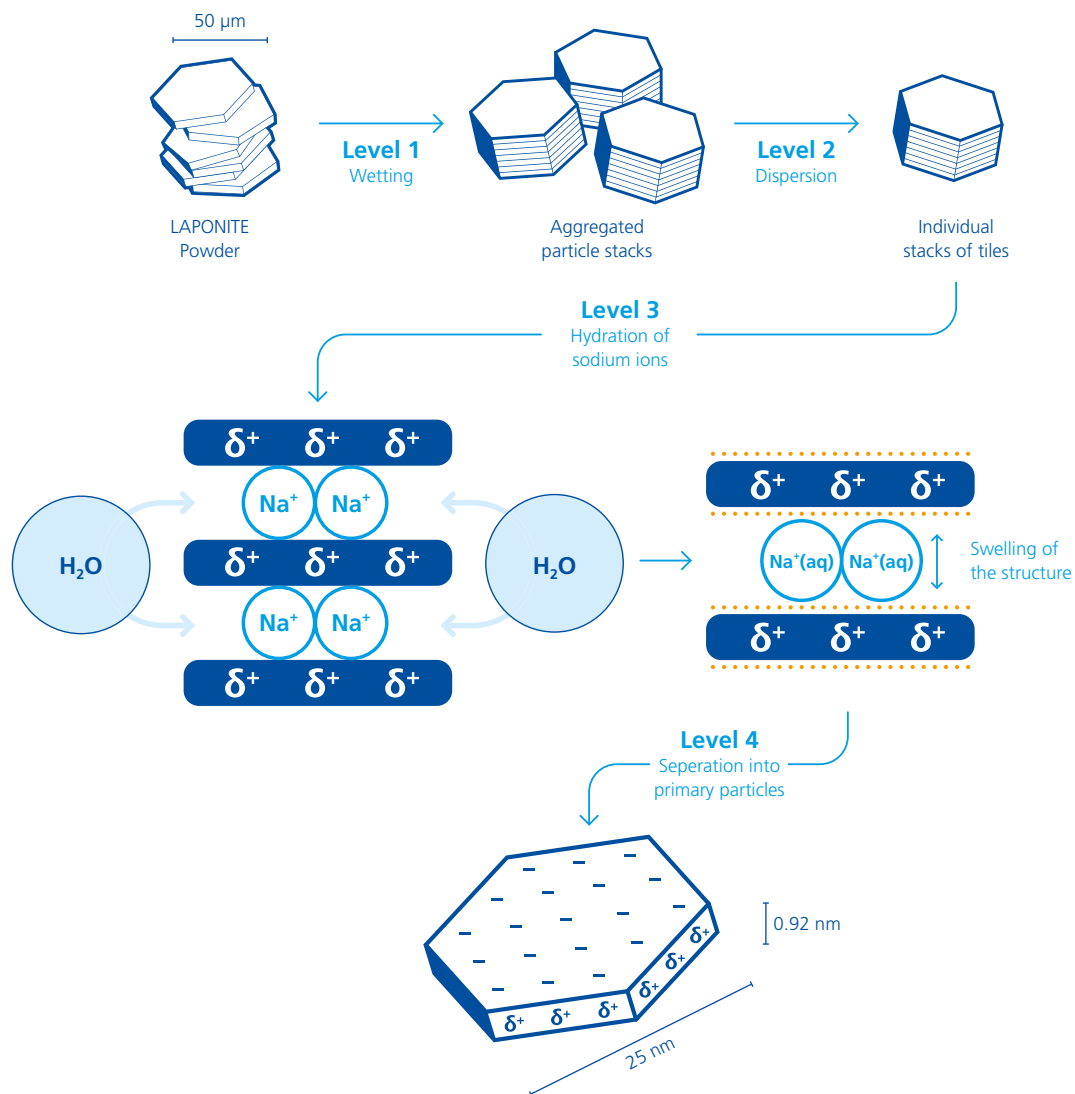
### Pseudoplastic flow behavior



### Thixotropic flow behavior



## Rheology build-up by phyllosilicates: dispersion in water





A major advantage of layered silicates over other rheological additives such as polysaccharides is the spray pattern produced. This enables a more even distribution of the cleaner on the surface by generating fine drops.

### LAPONITE-RD: Good spray pattern and adhesion to vertical surfaces



With polysaccharide

With LAPONITE-RD

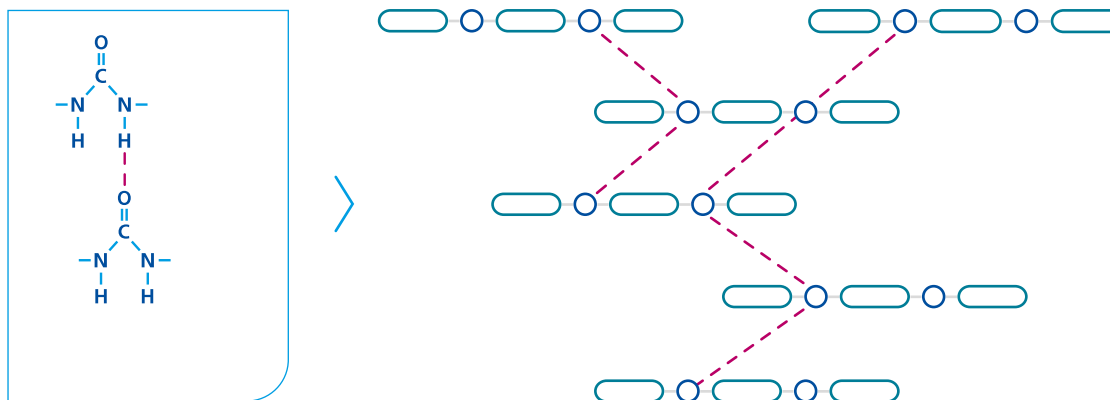
G. 16

An alternative option are specially designed liquid organic additives, such as **RHEOBYK-7420 CA\*/ES/ET\***.

**RHEOBYK-7420** is available in 3 different solvents: CA based on an alicyclic amide, ES based on amide ester and ET based on amide ether. These are also suitable for use in transparent products. **RHEOBYK-7420** is stable across a wide pH range and it can easily be incorporated at any time during production.

**RHEOBYK-7420** forms a network through hydrogen bonds. Here, too, a shear-thinning behaviour occurs. Easy sprayability with subsequent good adhesion to vertical surfaces is generated as well as an excellent stabilisation of the product (against syneresis and settling).

### Structure formation through hydrogen bonds



G. 17

\* not available in NAFTA

## Defoamer

Cleaning products usually produce quite a lot of foam due to the amount of surfactants they contain. This is not always desirable with regard to handling in production (e.g. filling), but also for the end user, and can lead to considerable problems.

BYK has a wide range of defoamers in its portfolio, which are based on different chemistries. The largest class is made up of silicone defoamers, whose active components are organically modified polysiloxanes. As alternatives, BYK offers silicone-free polymer defoamers and mineral oil

defoamers. Depending on the desired effect, a rapid breakdown of the resulting foam can be achieved or a build-up of foam can be prevented.

In application tests, **BYK-1679**, an aqueous emulsion of a silicone defoamer, proved to be a particularly effective defoamer. **BYK-1679** is stable in both alkaline and acidic systems and can therefore be used in a wide range of applications. Designed especially for acidic systems, very good results could be achieved with the ECOLABEL-compliant silicone defoamers **BYK-1723** and **BYK-1724**.

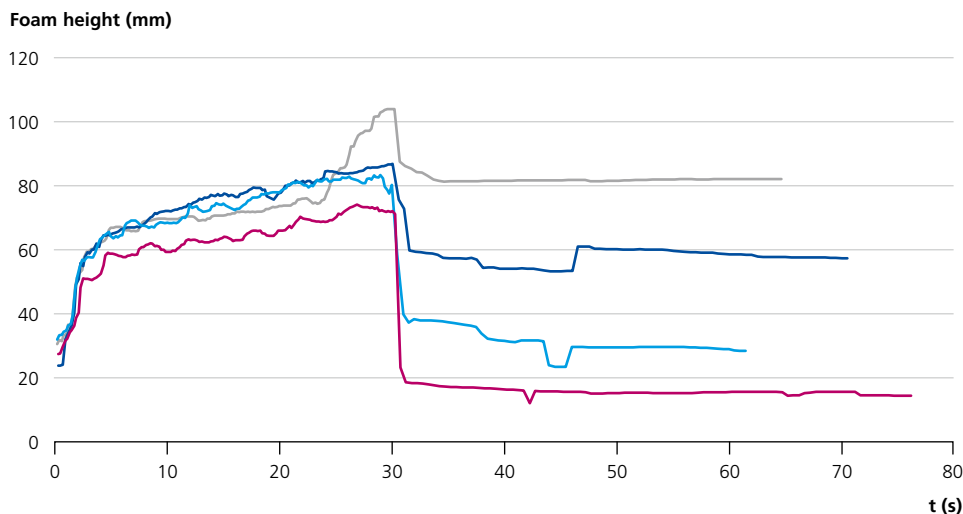
G. 18 shows the trend of foam formation using different defoamers in a 1 % sodium lauryl sulphate solution.



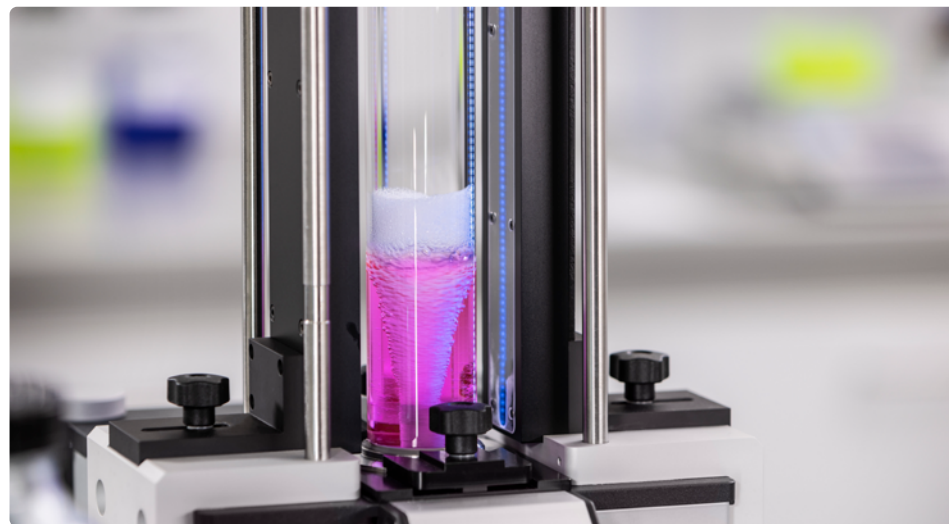
Further information on defoamers can be found in our BYK ebook "**Defoamers and air release agents**".

## Defoaming behavior of various BYK defoamers

### Foaming behavior under agitation (4000 rpm; 30 s)



### Dynamic Foam Analyzer DFA, Krüss Co.



## Solvent-based cleaners

For solventborne cleaners, various additives offer optimization of the product properties. In addition to tailoring the viscosity, the stability of cleaners can be improved due to the anti-settling/anti-syneresis properties of the additives.

In non-polar solvents **RHEOBYK-7411 ES** is the first recommendation, for medium polar systems **RHEOBYK-7410 ET**. For alcohols and other water miscible solvents **RHEOBYK-7420 CA/ES/ET** can also be used.

Alternatively, organically modified layer silicates can be used to adjust the flow behaviour of solvent-based cleaners.

BYK's portfolio can essentially be divided into two product classes:

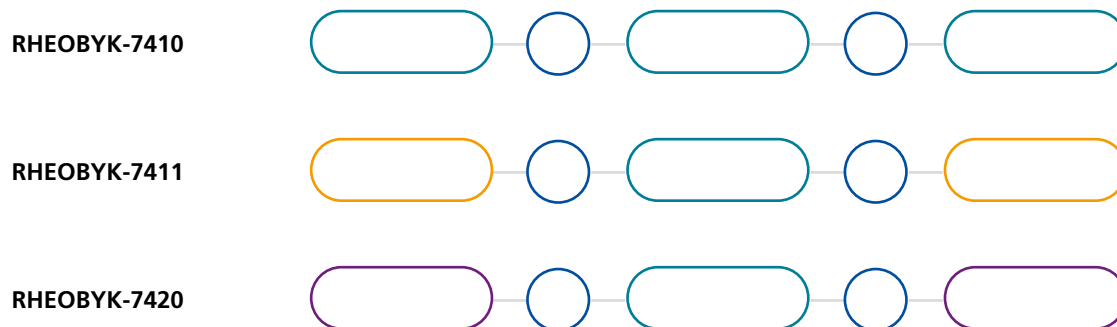
- **CLAYTONE**: organo-layered silicates based on bentonites.
- **GARAMITE**: organo-layered silicates based on a mineral mixture

Organophilic layered silicates of the **GARAMITE** product family are based on a mineral mixture of rod-shaped sepiolite and plate-shaped bentonite minerals. They are easy to incorporate and do not require polar activators for gel formation.

The selection of the most suitable organophilic layered silicate depends on the polarity of the medium and the available incorporation conditions.

## Structure and formation of the network of urea-based additives

### Chemical structures



● Urea groups    Modified groups: ● High polarity    ● Medium polarity    ● Low polarity

G. 19

## Cleaning agents containing solids

### Rheology additives

Some cleaning agents contain insoluble solids. These can be abrasive substances in so-called scouring agents, but also particles or capsules of a decorative nature or other function. The particles are suspended and stabilised in solution by the anti-settling properties of the appropriate rheological additives.

For transparent cleaners, modified ureas can be used. These are liquid and can be easily added at any time. BYK offers additives for different polarities. For aqueous formulations, **RHEOBYK-7420 CA/ES/ET** is particularly suitable for effective particle stabilisation.

For scouring milks containing up to 50 % abrasives such as calcite, layered silicates like organically modified OPTIGEL-WX prevent settling and syneresis without excessively increasing viscosity and affecting application properties.

### Wetting and dispersing additives

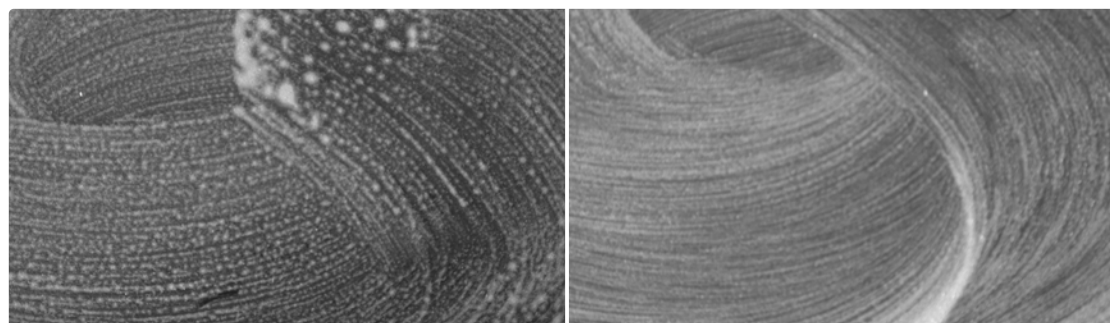
Wetting and dispersing additives such as **DISPERBYK-199 BF** improve the flowability of the product in production and application. The solids contained in the product are deflocculated, which results in a finer distribution of the individual particles. The different properties of a scouring milk with and without additive are shown in G.21.

## Anti-settling by using rheological additives



G.20

## Stabilization of a scouring milk with calcium carbonate using DISPERBYK-199 BF



Control

With DISPERBYK-199 BF

G.21

## Disinfectants and hygiene cleaners

In household applications, the use of hygienic cleaners is primarily concerned with reducing harmful microorganisms. To avert health risks, contamination of surfaces and possible transmission of diseases by pathogenic microorganisms should be avoided. The search for products that are as sustainable and safe as possible to ensure the hygiene necessary for our health is more topical than ever.

The extraordinary biomedical potential of hypochlorous acid has long been recognised. However, simple, water-thin HClO solutions have the major disadvantage that they run off surfaces quickly, considerably limiting the antimicrobial potential. The low viscosity of the solutions reduces the contact time with the surface to be cleaned, which leads to a shorter effective time. Vertical applications in particular are challenging. Hydrogels overcome this limitation and lead to an improved and more sustainable use.

The newly developed **PURABYK-R 5500** is a unique additive which combines the desired properties (thickening, thixotropy, etc.) with a high purity and an extraordinary stability against strong oxidising agents such as hypochlorous acid. This makes **PURABYK-R 5500** a perfect additive for the formation of hydrogels based on HClO. Further advantages of this product are its high tolerance to electrolytes and the ability to incorporate it directly into the hypochlorous acid solution.

The aqueous formulation based on hypochlorous acid **PURABYK-R 5500** forms a hydrogel which exhibits thixotropic behaviour. This results in a readily sprayable solution.

Another alternative for the formation of shear-thinning hydrogels from aqueous solutions of hypochlorous acid is **PURABYK-R 5501**, which also brings the advantages of **PURABYK-R 5500** mentioned above. In some systems,

better compatibility can be achieved. However, **PURABYK-R 5501** does not tolerate high salt contents and must be predispersed in water.

Cleaners based on the corresponding hypochlorite in very alkaline bleaching agents are also frequently used to eliminate microorganisms. Here, the associative thickener (**HASE** thickener: **Hydrophobically, modified Alkali Soluble Emulsion**) **RHEOBYK-HV 80** is a very effective and stable additive to adjust the desired viscosity.

## Recommended use of PURABYK-R 5500 and PURABYK-R 5501 for the formation of HClO hydrogels

Addition method	Low NaCl (< 2%)	More NaCl (> 2%)
Pre-dispersion	PURABYK-R 5500 PURABYK-R 5501	PURABYK-R 5500
Direct addition	PURABYK-R 5500	-

Suitable for applications in HClO solutions with **up to 4 % NaCl** content.

- At 2 % NaCl or less, the product can be added **directly to the HClO solution**.
- If the NaCl content is higher than 2 %, the product must be pre-dispersed in ultrapure water before being added to the HClO.





# Additives for detergents and fabric softeners: Cleaning and care of textiles

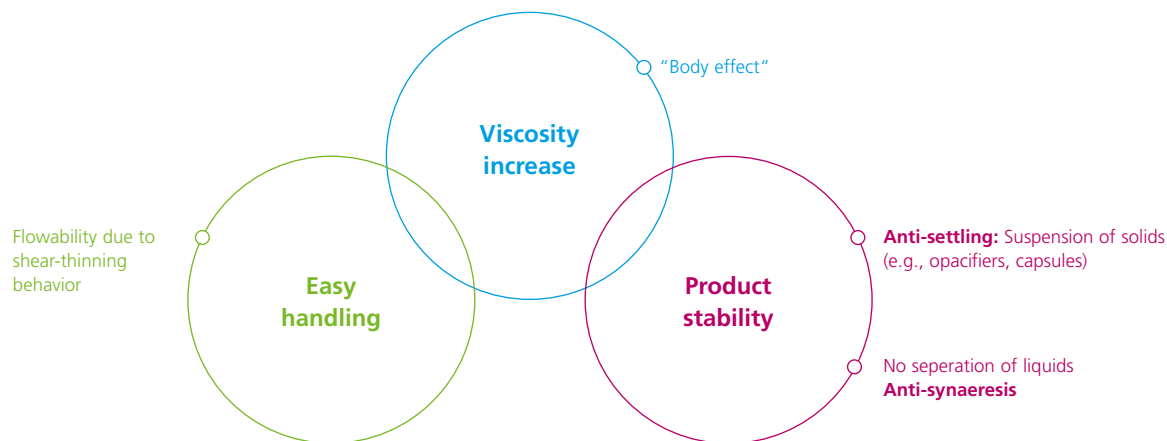
## Detergent

### Liquid detergent

Liquid products are increasingly being used in the detergent sector. These vary in their proportion of water. There are numerous formulations with water as the main component, but there are also more and more products on the market that are available as concentrates.

In these liquid products, rheological additives from BYK are useful components for improving certain properties. On the one hand, an adjustment of the desired viscosity is an important factor. Stabilizing the product against settling particles such as opacifiers and fragrance capsules also plays a major role. The use of additives increases product stability, especially during storage and transport, while maintaining ease of handling.

## Improvement of detergent products by rheology additives



### Stabilisation of solids (fragrance capsules and opacifiers)

The liquid rheology additive **RHEOBYK-7420 CA/ES/ET** is ideal for stabilizing insoluble solids such as opacifiers or fragrance capsules in liquid detergents. It can be used in transparent formulations and added at any time.

**RHEOBYK-440**, which can also be dosed in liquid form, shows excellent anti-settling properties in these formulations. The following figure shows two examples where **RHEOBYK-440** is successfully used as an anti-settling additive. On the one hand, it is very good at preventing floating of capsules in various formulations (G.23 right).

On the other hand, **RHEOBYK-440** is also suitable for preventing the settling of opacifiers (G.22 left). In this case, CERAFLOR 1001, a biopolymer produced by fermentation and easily biodegradable, was used.

### Adjusting the viscosity

To adjust the viscosity, the liquid associative thickener **RHEOBYK-HV 80** is ideal. **RHEOBYK-HV 80** tolerates high surfactant contents, produces an almost Newtonian flow behaviour and does not impair the transparency of the detergent. G.24 shows that the desired viscosity can be adjusted stepwise with **RHEOBYK-HV 80**.

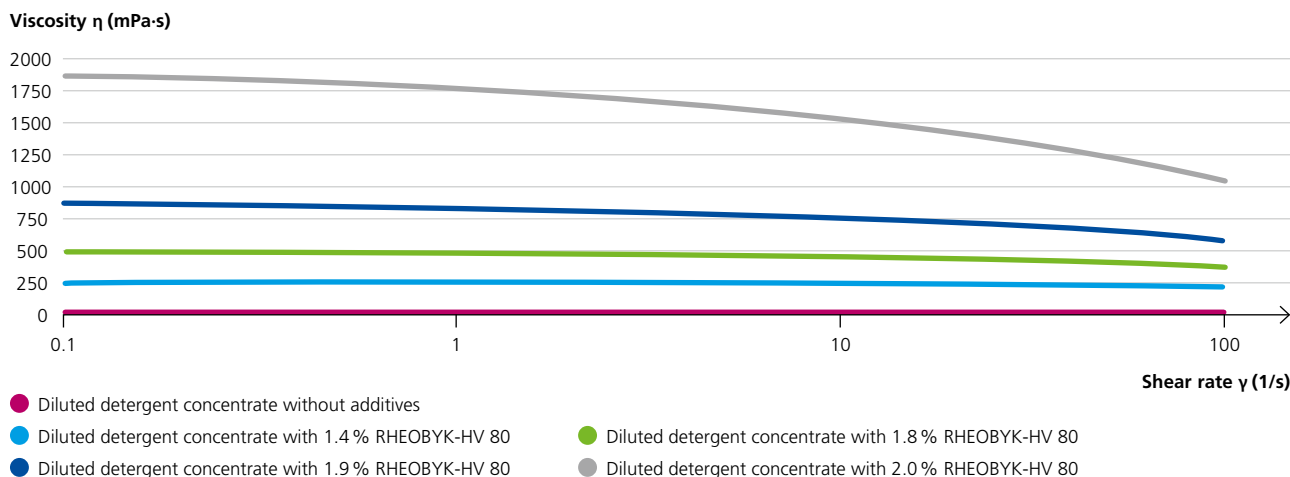
Another alternative is the polyurethane-based associative thickener **RHEOBYK-H 7625 VF**, which also comes in liquid form and leads to a transparent product.

## Stabilization of opacifiers and fragrance capsules by RHEOBYK additives



G.23

## Rheology adjustment of a liquid detergent with RHEOBYK-HV 80



G.24

## Fabric softener

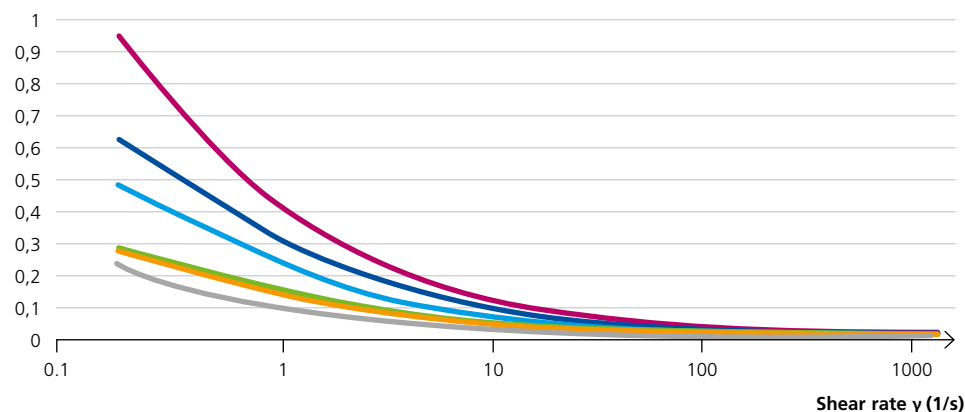
Liquid fabric softeners contain cationic surfactants, mainly quaternary ester compounds, so-called esterquats. Many rheological additives such as anionic polyacrylates are therefore incompatible. Here, neutral thickeners such as **RHEOBYK-H 7625 VF** based on a polyurethane structure and **RHEOBYK-7420 CA/ES/ET** based on a urea structure can be used.

These additives cause a strong increase in viscosity in the low shear range and in addition a thixotropic flow behaviour. Both products are liquid and can be incorporated at any point during production. The choice of the most efficient additive depends on the formulation.

If stabilisation of particles such as opacifiers or fragrance capsules is desired, **RHEOBYK-7420 CA/ES/ET** or **RHEOBYK-440** can be used.

### Viscosity curve of a commercial fabric softener thickened with RHEOBYK-H 7625 VF and RHEOBYK-7420 ES

Viscosity  $\eta$  (mPa·s)

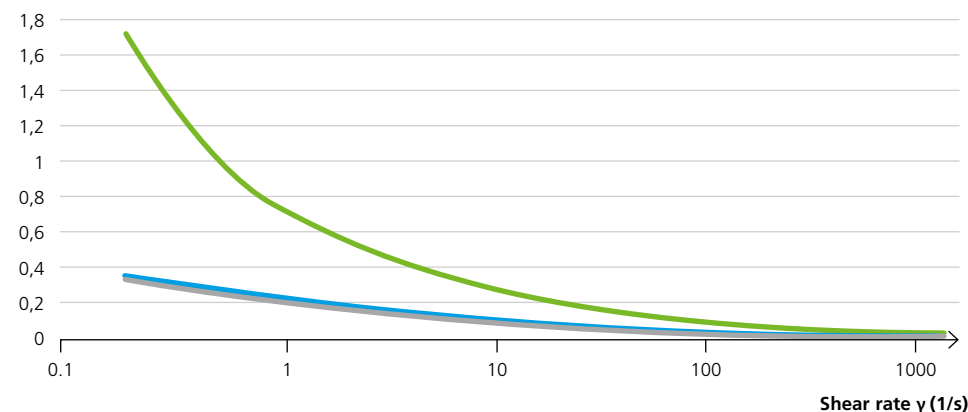


- Commercial fabric softener 1
- Commercial fabric softener 1 + 0.5 % RHEOBYK-H 7625 VF
- Commercial fabric softener 1 + 0.75 % RHEOBYK-H 7625 VF
- Commercial fabric softener 1 + 0.2 % RHEOBYK-7420 ES
- Commercial fabric softener 1 + 0.3 % RHEOBYK-7420 ES
- Commercial fabric softener 1 + 0.4 % RHEOBYK-7420 ES

G.25

### Viscosity curve of a medium viscosity fabric softener, thickened with RHEOBYK-H 7625 VF

Viscosity  $\eta$  (mPa·s)



- Commercial fabric softener 2
- Commercial fabric softener 2 + 0.5 % RHEOBYK-H 7625 VF
- Commercial fabric softener 2 + 0.2 % RHEOBYK-7420 ES

G.26

### Improving the soft handle

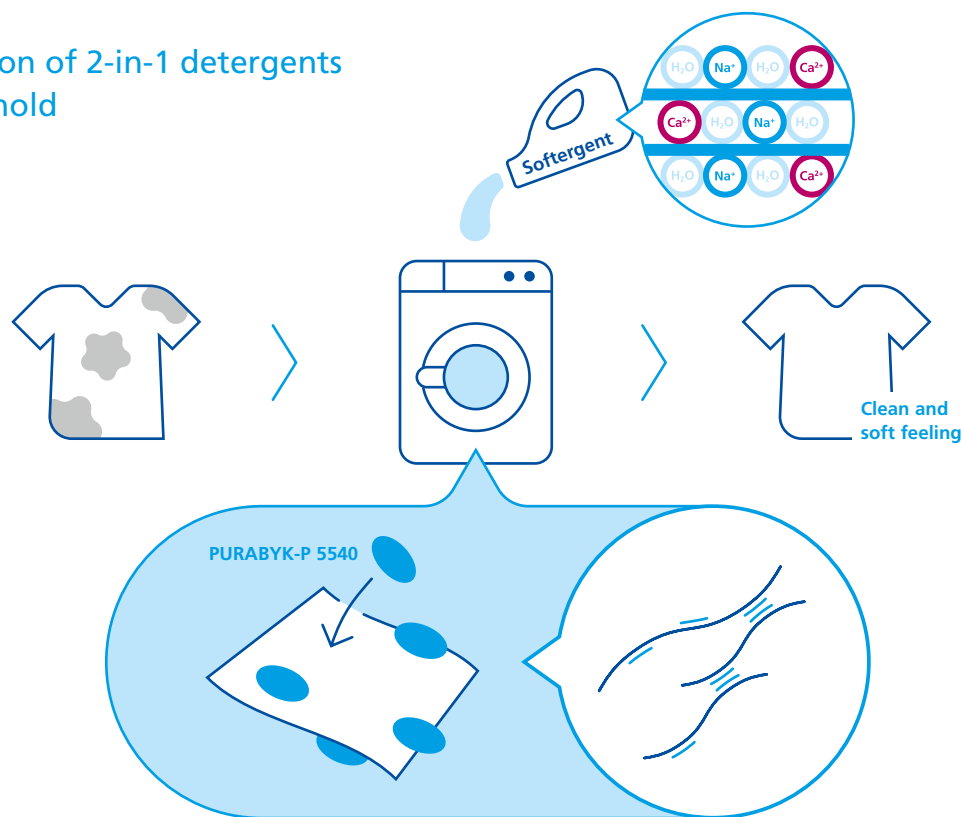
Typically, the substances responsible for the soft handle of laundry in fabric softeners are cationic surfactants. In the vast majority of products, these are quaternary ammonium compounds known as esterquats. Due to their cationic character, they cannot be combined with the anionic

surfactants in detergent products. Therefore, fabric softeners must always be provided and dosed as a separate product.

To improve sustainability and cost efficiency, 2-in-1 detergents (softergents) are desirable.

These contain the active substances to improve the soft handle and other properties (e.g. easy ironing) of the textiles already in one product with the main detergent.

### Application of 2-in-1 detergents in household

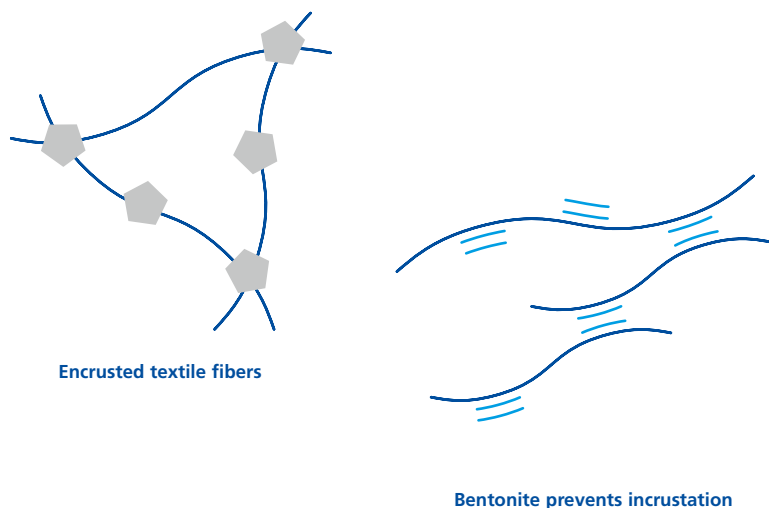


**PURABYK-P 5540** has been specially developed for this purpose. This additive uses the positive effects of bentonites on the softness of textiles, which have been known since ancient times. **PURABYK-P 5540** prevents incrustation of the fibres, which is often caused by water hardness. In addition, the individual platelets of the layered silicate lay down on the surface of the textiles similar to the mechanism of the esterquats and thus ensure a smoother surface of the laundry that can be clearly felt. G.28 shows the mechanism of how the polyanionic silicate platelets align on the textile surface through divalent cation bridges.

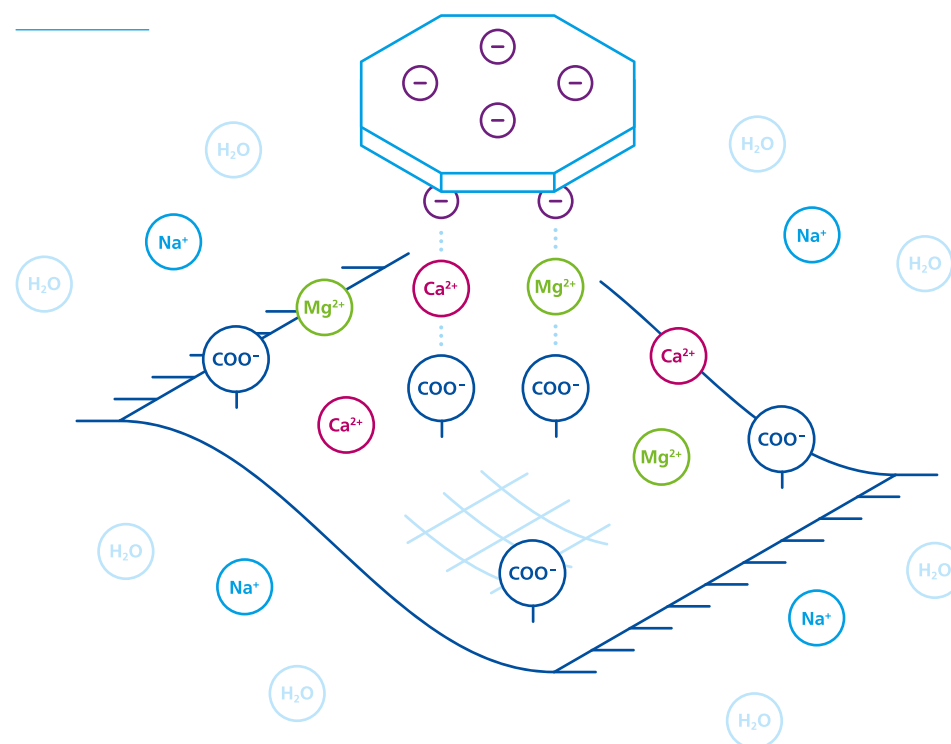
Due to the anionic character of **PURABYK-P 5540**, the additive can be combined well with detergent products, in contrast to the classic fabric softener systems. In this way, interaction with the fabric softener is achieved very early in the washing process. Other beneficial effects of using **PURABYK-P 5540** are protection against greying, easier ironing of the laundry and greater comfort through absorption of perspiration.

The additive was specially developed for detergent systems and is a particularly pure mineral with a high degree of whiteness, so that when added to a powder detergent, no visual difference is visible.

## Prevention of incrustations by PURABYK-P 5540



## Layer silicate interaction with the textile surface





**BYK-Chemie GmbH**  
 Abelstraße 45  
 46483 Wesel  
 Germany  
 Tel +49 281 670-0  
 Fax +49 281 65735  
  
[info@byk.com](mailto:info@byk.com)  
[www.byk.com](http://www.byk.com)

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