



# INVENTING BEAUTY SOLUTIONS FOR YOU



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**Beauty Made Possible.**

**Baycusan®**







» There is a road from the eye  
to the heart that does not  
go through the intellect. «

Around the world, notions of beauty are as colorful as the people who pursue them. There is certainly more than just one kind of beauty, and everybody has their own idea of what beauty involves. Although personal definitions may differ, one aspect remains the same: Everyone wants to be beautiful in some way. And that's what Baycusan® is all about – enabling individual beauty through your products.

Baycusan® is your key ingredient for creating products that enable people to be as beautiful as they would like to be. We are passionate about inventing products – for you and together with you – that expand the possibilities for being beautiful. We like to keep raising the bar, re-inventing and perfecting, so that in the end it's not just products but **Beauty Made Possible.**

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# Baycusan® product portfolio

The Baycusan® product portfolio features water-based polyurethane polymers and ethanol-based polyurethane polymers as well as a polyurea powder – all carefully developed for superior performance.

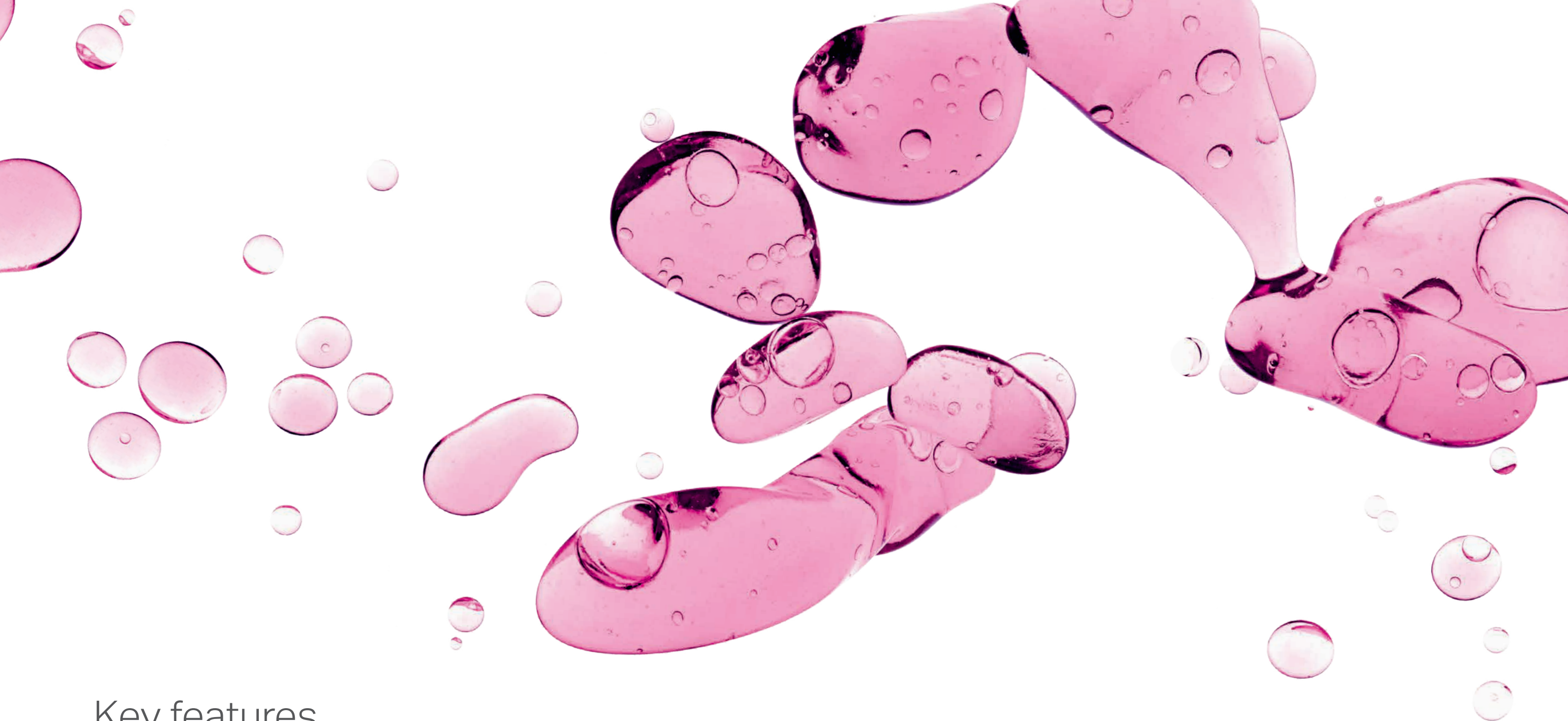
	Baycusan®	INCI Name	Solids [%]	Avg. particle size [µm]	pH	Viscosity [mPa·s]
Water-based polymers	C 1000	Polyurethane-34	40.0 ± 2.0	-	7.5 ± 1.0	≤ 500
	C 1001	Polyurethane-34	32.0 ± 2.0	-	7.5 ± 1.0	≤ 1000
	C 1003	Polyurethane-32	50.0 ± 2.0	-	7.5 ± 1.0	≤ 1000
	C 1004	Polyurethane-35	41.0 ± 2.0	-	7.5 ± 1.0	≤ 500
	C 1008	Polyurethane-48	30.0 ± 2.0	-	7.0 ± 1.5	<1000
Ethanol-based polymer	C 2000	Polyurethane-64	40.0 ± 5.0	-	-	<10000
Powder	C 1005	Methoxy PEG-11/ Methoxy PEG-17/ HDI Isocyanurate Trimer Crosspolymer	100.00	30 ± 2	-	-

## Applications

Baycusan®	SkinCare	SunCare	HairCare	ColorCosmetics
C 1000	○	●		●
C 1001	○		●	
C 1003	○			○
C 1004		○		●
C 1008			●	
C 2000		●	○	
C 1005	○	○	○	●

● especially suitable  
○ suitable





## Key features

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### ■ SunCare

- SPF boosting
- Outstanding water resistance
- Wet skin application
- Enhanced stabilization
- Good skin feeling
- Excellent sensory properties: no "balling" effect, non-greasy, no sticky feeling

### ■ SkinCare

- Easy peel off with no skin irritation
- Facilitates longer-lasting retention of actives on the surface of the skin
- Enhances efficacy of active ingredients
- Good rub-off resistance
- Good skin feel thanks to highly flexible and breathable on skin-film
- Velvety, smooth touch feel

### ■ ColorCosmetics

- Outstanding water resistance
- Good non-transfer properties
- Even color coverage
- Enhanced color expression
- Excellent cohesive strength of product in pressed powder
- Non-greasy, non-tacky and soft skin feeling

### ■ HairCare

- Excellent built-in humidity resistance
- Natural-looking and strong hold
- Strong elastic memory (style retention)
- Heat protection
- Frizz control for up to 24 hours
- Boosts shine
- Effectively reduces length of split ends
- Conditioning and detangling effect



The sun makes the  
world blossom and look great.  
Let's keep it that way.

**SunCare with Baycusan®.**







# SunCare

## Key features

- SPF boosting
- Outstanding water resistance
- Wet skin application
- Enhanced stabilization
- Good skin feeling
- Excellent sensory properties: no "balling" effect, non-greasy, no sticky feeling

## Recommended raw materials

Trade Name	Baycusan® C 1000	Baycusan® C 2000
INCI Name	Polyurethane-34	Polyurethane-64
Chemical Descriptions	Water-based polyurethane polymer (40 % polymer, 60 % water)	Ethanol-based polyurethane polymer (40 % polymer, 60 % ethanol)
Ingredient Category	Film forming	Film forming
Application Area	Emulsion-based (lotion, cream)	●
	(Hydro-)alcoholic based (spray, aerosol, gel)	●
	Oil-based	●

● suitable

## Physical properties

Trade Name	Baycusan® C 1000	Baycusan® C 2000
Appearance	White, low viscosity liquid	Transparent, low viscosity liquid
Solid Content	40.0 ± 2.0	40.0 ± 5.0
Viscosity at 23 °C	≤ 500	<10000
pH	7.5 ± 1.0	-

## SPF-boosting effect

The addition of Baycusan® C 1000 or Baycusan® C 2000 in a sun protection formulation significantly increases the sun protection factor (SPF) under special conditions. SPF measurements have shown that Baycusan® C 1000 and Baycusan® C 2000 are selective SPF boosters with the UVB filters Octocrylene and Ethylhexyl Triazone and with broadband UV filters such as bis-Ethylhexyloxyphenol Methoxyphenyl Triazine (BEMT) and Benzophenone-3. As shown in figure 1, sun care formulations containing a combination of the above-mentioned UV filters with other commonly used UV filters show analogous SPF-boosting effects.

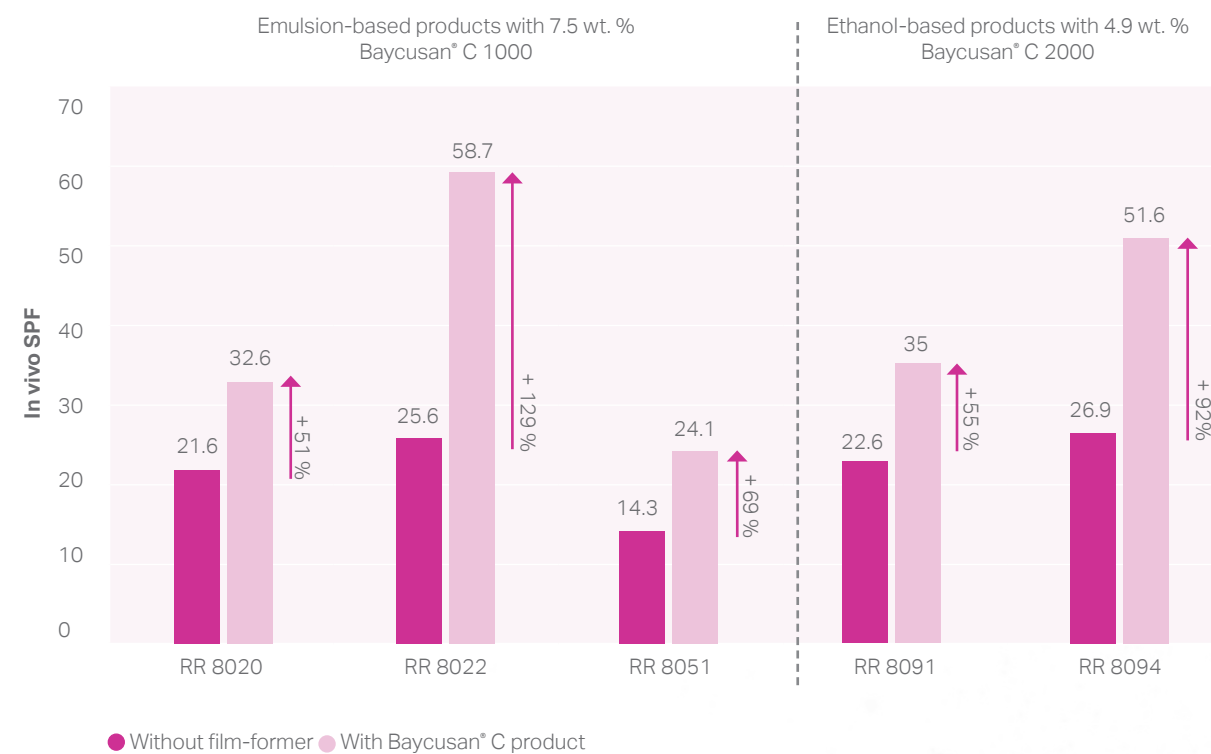


Figure 1: In vivo SPF data formulations with and without Baycusan® C1000

RR 8020: 3 % BMDBM + 10 % OCR + 5 % OS + 10 % HMS

RR 8022: 5 % OS + 13 % HMS + 7 % OCR + 4 % BP-3 + 3 % BMDBM

RR 8051: 4 % EHT + 4 % DHHB + 4 % OMC + 1 % TiO<sub>2</sub>

RR 8059: 8 % OCR + 2,5 % BEMT + 2,5 % BMDBM + 1,5 % EHT + 8 % MBBT

RR 8091: 4 % BMDBM + 7 % HMS + 7 % OCR + 2 % BEMT + 5 % EHS

### Abbreviations:

BMDBM: Butyl Methoxydibenzoylmethane

DHHB: Diethylamino Hydroxybenzoyl Hexyl Benzoate

OCR: Octocrylene

OS: Ethylhexyl Salicylate

HMS: Homosalate

EHT: Ethylhexyl Triazone

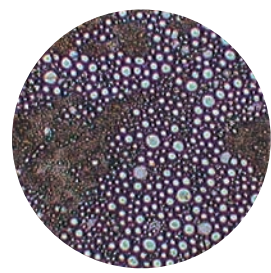
BEMT: Bis-Ethylhexyloxyphenol Methoxyphenyl triazine

BP-3: Benzophenone-3



## Stabilization properties

Baycusan® C 1000 also acts as a stabilizing aid for oil-in-water (O/W) emulsions. These light microscopy photos (see fig. 2) show the effect of Baycusan® C 1000 on the structure of an oil-in-water emulsion and its influence on the stability of the emulsion. By adding Baycusan® C 1000 to an oil-in-water emulsion, the oil particle diameter is reduced and the particle distribution narrowed. Formulators can take advantage of this property by using a different formulating approach to formulate water-resistant formulations.



RR 8021 without  
Baycusan® C 1000

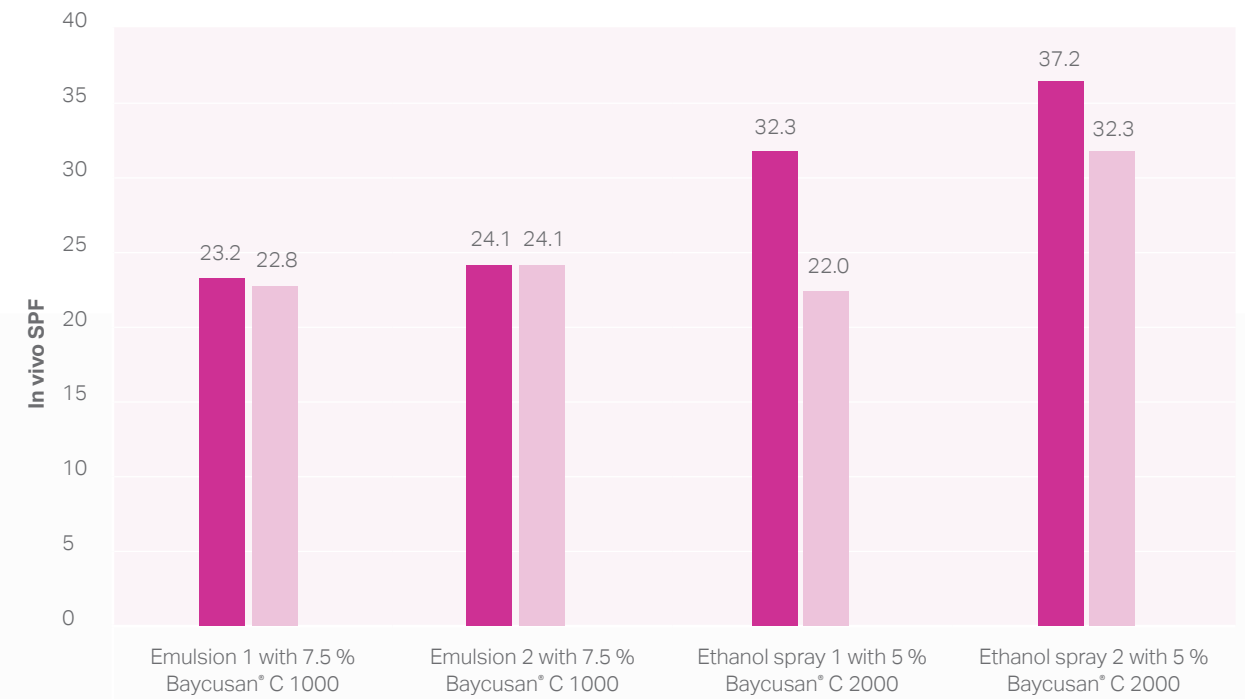


RR 8021 with  
5 wt. % Baycusan® C 1000

Figure 2: Light microscopy, 1 week after formulating, scale 50 µm

## Water resistance

As confirmed by in-vivo tests conducted in accordance with guidelines established by the European Cosmetics Association (see fig. 3), water resistance can be achieved in emulsion-based formulations and ethanol-based formulations with Baycusan® C 1000 and Baycusan® C 2000. By using the stabilization properties of Baycusan® C 1000 in an emulsion-based product, the emulsifier or polymeric stabilizer concentration can be reduced to avoid product re-emulsification on contact with water.



● Static SPF ● SPF after 2\*20 min. immersion

Figure 3: In vivo SPF data before and after immersion

**Emulsion 1:** Emulsion stabilized with 0.15 % Acrylates/C10-30 Alkyl Acrylates Crosspolymer (Pemulen® TR-2, Lubrizol) and containing 4 % OMC + 4.5 % BMDBM + 4 % BEMT (RR 8023)

**Emulsion 2:** Emulsion stabilized with 0.25 % Acrylates/C10-30 Alkyl Acrylates Crosspolymer (Carbopol® ETD 2020, Lubrizol) and containing 4% EHT + 4 % DHHB + 4 % OMC + 1 % TiO<sub>2</sub> (RR 8051)

**Ethanol spray 1:** Ethanol solution containing 4.9 % BMDBM + 2 % BEMT + 10 % OCR + 3 % DBT + 5 % OS + 10 % HMS

**Ethanol spray 2:** Ethanol solution containing 4 % BMDBM + 7 % HMS + 7 % OCR + 2 % BEMT + 5 % OS

### Abbreviations:

**BMDBM:** Butyl Methoxydibenzoylmethane

**DHHB:** Diethylamino Hydroxybenzoyl Hexyl Benzoate

**OCR:** Octocrylene

**OS:** Ethylhexyl Salicylate

**HMS:** Homosalate

**EHT:** Ethylhexyl Triazone

**BEMT:** Bis-Ethylhexyloxyphenol Methoxyphenyltriazine

**BP-3:** Benzophenone-3



Our skin is like a  
delicate pearl.  
Let's treasure its beauty  
with gentle passion.

**SkinCare with Baycusan®.**





# SkinCare

## Key features

- Easy peel off with no skin irritation
- Facilitates longer-lasting retention of actives on the surface of the skin
- Enhances efficacy of active ingredients
- Good rub-off resistance
- Good skin feel thanks to highly flexible and breathable on skin-film
- Velvety, smooth touch feel

## Recommended raw materials.

Trade Name	Baycusan® C 1000	Baycusan® C 1001	Baycusan® C 1004	Baycusan® C 1005
<b>INCI Name</b>	Polyurethane-34	Polyurethane-34	Polyurethane-35	Methoxy PEG-11/ Methoxy PEG-17/ HDI Isocyanurate Trimer Copolymer
<b>Chemical Descriptions</b>	Water-based polyurethane polymer (40 % polymer, 60 % water)	Water-based polyurethane polymer (32 % polymer, 68 % water)	Water-based polyurethane polymer (41 % polymer, 59 % water)	Polyurea Powder
<b>Ingredient Category</b>	Film-forming	Film-forming	Film-forming	Sensory additive
<b>Application Area</b>	Face care products	●	●	●
	Body care products	●	●	●
	Hand/Foot care products	●	●	●
	Skin cleansing		●	●
Make-up Primer	●		●	

● suitable

## Physical properties

Trade Name	Baycusan® C 1000	Baycusan® C 1001	Baycusan® C 1004	Baycusan® C 1005
<b>Appearance</b>	White, low viscosity liquid	White, low viscosity liquid	White, low viscosity liquid	Powder
<b>Solid Content</b>	40.0 ± 2.0	32.0 ± 2.0	41.0 ± 2.0	100.00
<b>Viscosity at 23 °C</b>	≤ 500	≤ 1000	≤ 1000	-
<b>pH</b>	7.5 ± 1.0	7.5 ± 1.0	7.5 ± 1.0	-

## High wear comfort

When incorporated into skin care formulations, Baycusan® C 1000 forms a highly flexible and breathable film that mimics the movement of skin. This film creates a naturally soft feel on the skin without any tightening sensation. To determine the breathability of Baycusan® C 1000, the water vapor transmission of its film on hydrated vitro skin was measured. For comparison, hydrated vitro skin was coated with either Baycusan® C 1000 or a competing polymer solution (40 % solids) at a concentration of 2 mg/cm<sup>2</sup>. Figure 4 shows clearly that Baycusan® C 1000 forms a breathable film whereas an acrylates copolymer film-former is more occlusive than either the control substance or Baycusan® C 1000.

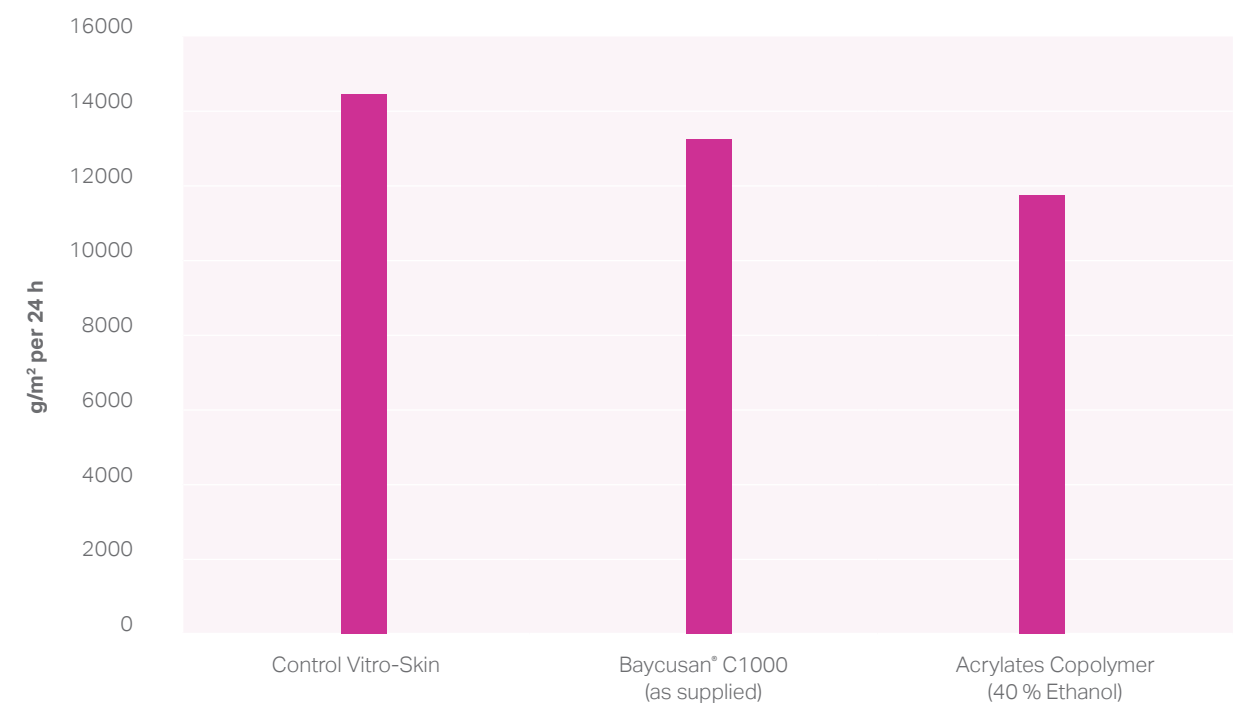


Figure 4: Water vapour transmission results



## Enhancing the efficacy of active ingredients

Baycusan® C 1000 can significantly improve the efficacy of skin care formulations. In-vivo studies demonstrate that Baycusan® C 1000 supports the controlled release of actives such as salicylic acid into the stratum corneum, consequently reducing the high irritation potential of salicylic acid. The influence of Baycusan® C 1000 on the efficacy of acne treatment was evaluated in vivo on the backs of subjects suffering from acne by applying the test formulation for four consecutive days. The results (see fig. 5) demonstrate that Baycusan® C 1000 produces a greater improvement in the acne symptoms than treatment with the control formulation: a significant reduction in redness, inflammation, and the size of acne pustules.

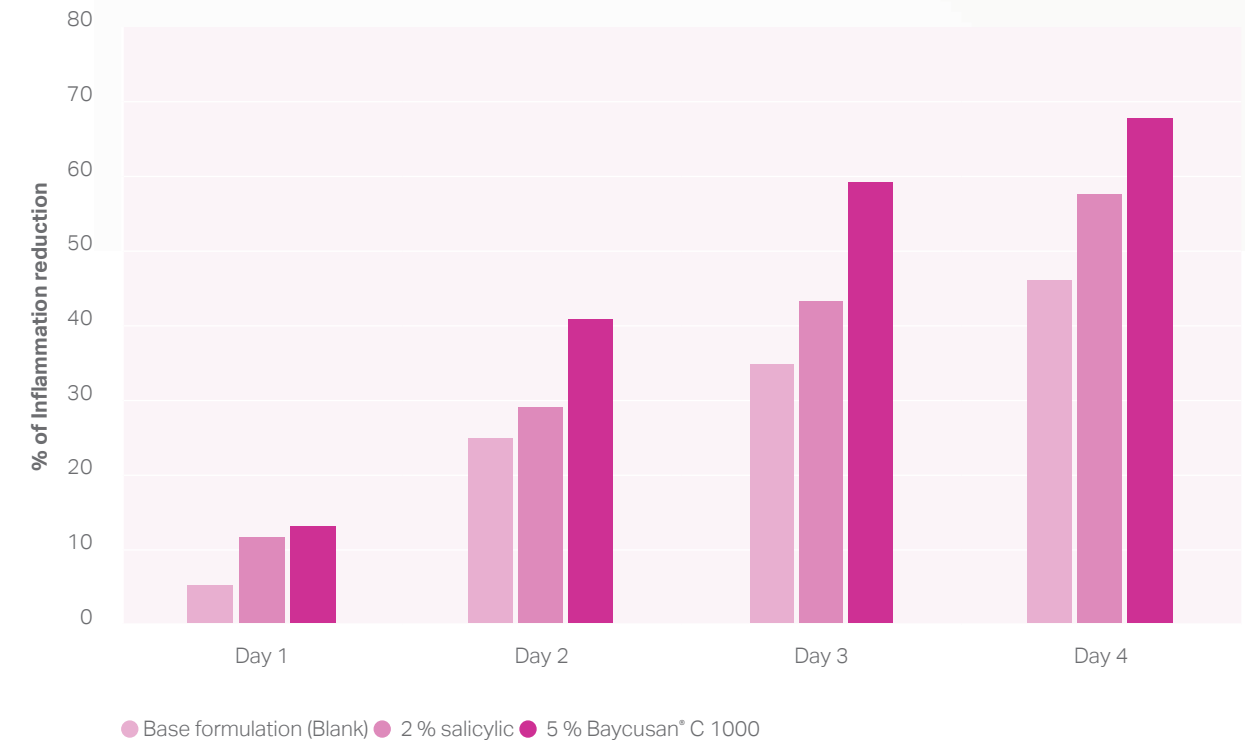


Figure 5.1: Inflammation reduction

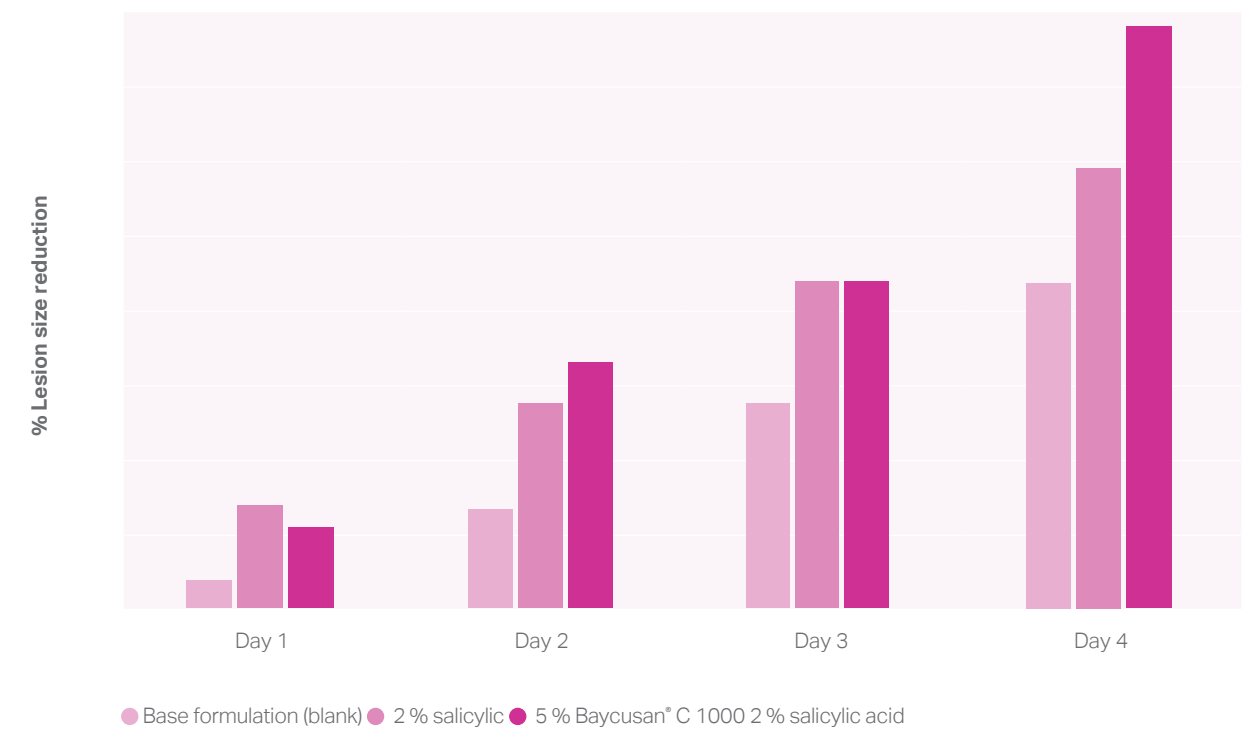


Figure 5.2: Acne lesion size reduction





Color is one of life's  
amazing wonders.  
Let's celebrate its  
pure joy.

**ColorCosmetics with Baycusan®.**





# ColorCosmetics

## Key features

- Outstanding water resistance
- Good non-transfer properties
- Even color coverage
- Enhanced color expression
- Excellent cohesive strength of product in pressed powder
- Non-greasy, non-tacky and soft skin feeling

## Recommended raw materials

Trade Name	Baycusan® C 1000	Baycusan® C 1004	Baycusan® C 1005	
<b>INCI Name</b>	Polyurethane-34	Polyurethane-35	Methoxy PEG-11/Methoxy PEG-17/ HDI Isocyanurate Trimer Copolymer	
<b>Chemical Descriptions</b>	Water-based polyurethane polymer (40 % polymer, 60 % water)	Water-based polyurethane polymer (41 % polymer, 59 % water)	Polyurea Powder	
<b>Ingredient Category</b>	Film forming	Film forming	Sensory additive	
<b>Application Area</b>	Mascara	●		
	Eyeliners	●		
	Eyeshadow			●
	Liquid Foundation	●	●	●
	Powder Foundation			●
	Make-up base	●	●	●
	Lipstick and Lipgloss		●	●
	Nail Polish		●	

● suitable

## Physical properties

Trade Name	Baycusan® C 1000	Baycusan® C 1004	Baycusan® C 1005
<b>Appearance</b>	White, low viscosity liquid	White, low viscosity liquid	powder
<b>Solid Content</b>	40.0 ± 2.0	41.0 ± 2.0	100.00
<b>Viscosity at 23°C</b>	≤ 500	≤ 1000	-
<b>pH</b>	7.5 ± 1.0	7.5 ± 1.0	-





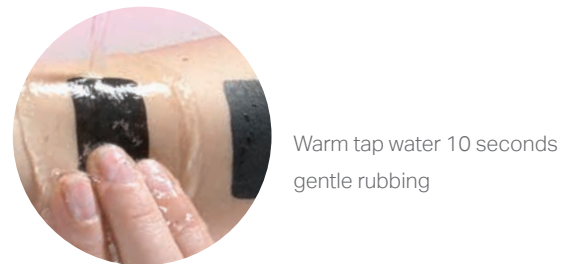
## Outstanding water resistance

Since Baycusan® C 1004 imparts superior wet rub-off resistance to color cosmetics formulations, it is an excellent choice for formulating waterproof and rub-off-resistant mascaras, eyeliners and liquid foundations. The excellent rub-off resistance properties of a mascara formulation (RR 8017) are demonstrated in figure 6.

Before test:



Test:



After test:



Figure 6: Rub-off resistance

## Immediate non-transfer properties

The evaluation of non-transfer properties was conducted in vivo by spreading a fixed amount of foundation onto the forearm of volunteers under controlled conditions. After drying, the volunteers left an imprint of their forearm on a sheet of absorbing paper. As shown in figure 7, the imprints left from different foundation formulations containing Baycusan® C 1004 are significantly lower than standard formulations without Baycusan® C 1004.

O/W



W/O



W/S



Figure 7: Results of imprints



### Enhancement of color expression lipstick

Baycusan® C 1005 positively affects the pigment spreadability of any type of pigmented formulation. This excellent pigment spreadability is demonstrated by an even color distribution on skin (better color pay-off) and a better coverage, as illustrated in figure 8 for a lipstick formulation.



Figure 8: From left to right: control formulation 1 (with a competitive powder 1), control formulation 2 (with a competitive powder 2), formulation with 4,7 wt. % Baycusan® C 1005 (formulation RR 8028)

### Excellent cohesive strength of product in pressed powder

Figure 9 displays the influence of Baycusan® C 1005 and other widely used powders such as Nylon-12, silica, polyethylene, etc. on the cohesive strength of a pressed eye shadow powder at a concentration of 2 wt. % active. In order to quantify the cohesive strength of the pressed powders, they were dropped ten times onto cement from a height of 30 cm. The number of drops required to produce cracks in the pressed powder was noted. As shown in figure 9, Baycusan® C 1005 imparts not only a powdery, velvety finish on skin, but significantly improves the cohesive strength of the formula as well.

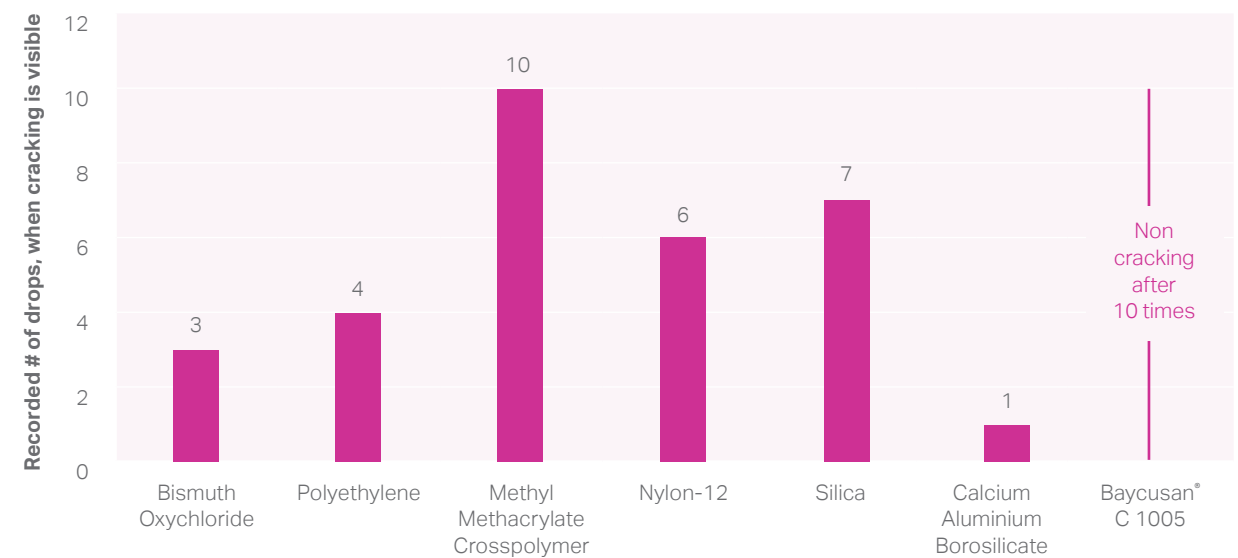


Figure 9: Drop test results



Hair can be the mirror  
of one's soul.  
Let's polish and protect  
it and keep it in balance.

**HairCare with Baycusan®.**





# HairCare

## Key features

- Excellent built-in humidity resistance
- Natural-looking and strong hold
- Strong elastic memory (style retention)
- Heat protection
- Frizz control for up to 24 hours
- Boosts shine
- Effectively reduces length of split ends
- Conditioning and detangling effect

## Recommended raw materials

Trade Name			Baycusan® C 1001	Baycusan® C 1008
INCI Name			Polyurethane-34	Polyurethane-48
Chemical Descriptions			Water-based polyurethane polymer (40 % polymer, 60 % water)	Water-based polyurethane polymer (30 % polymer, 70 % water)
Ingredient Category			Film-forming	Film-forming
Application Area	Hair styling	Aerosol and pump hair spray		●
		Setting lotion, cream and gel cream	●	●
		Aerosol and pump mousse		●
	Hair care	Hair treatment		●
		Leave-on conditioner	●	

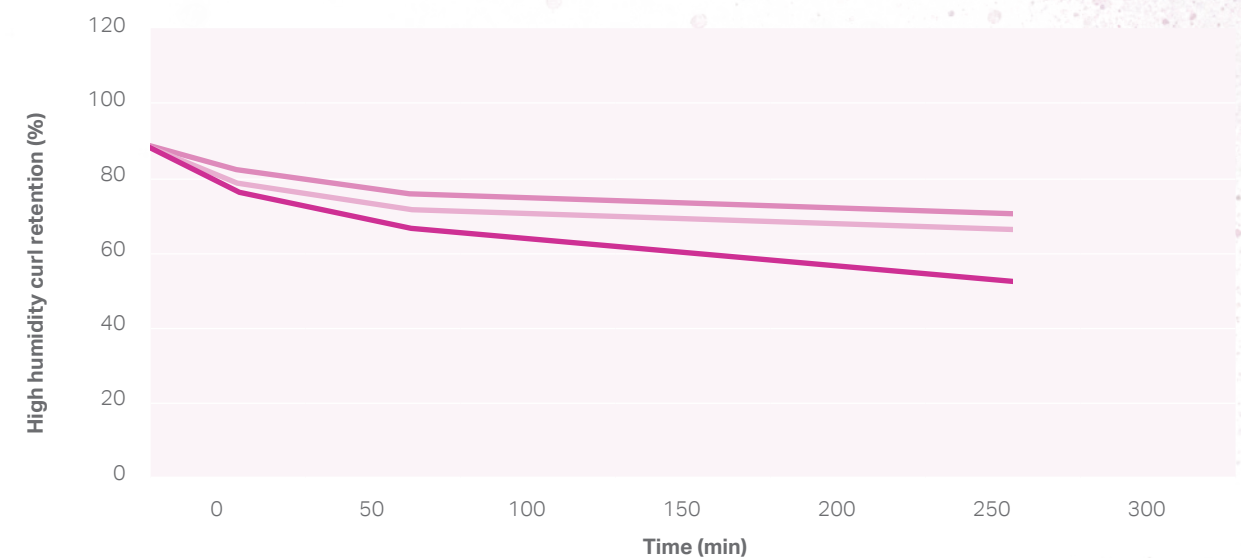
● suitable

## Physical properties

Trade Name	Baycusan® C 1001	Baycusan® C 1008
Appearance	White, low viscosity liquid	White, low viscosity liquid
Solid Content	32.0 ± 2.0	30.0 ± 2.0
Viscosity at 23°C	≤ 500	≤ 1000
pH	7.5 ± 1.0	7.0 ± 1.0

## Excellent built-in humidity resistance

Baycusan® C 1001 and Baycusan® C 1008 provide excellent high humidity curl retention for styling formulations – even better than market-leading polyacrylate styling polymers. As shown in figure 10, curl retention is measured as a function of time at 75 % humidity and 25 °C. Caucasian dark-brown hair tresses were treated with an aqueous solution of Baycusan® C 1001 and Baycusan® C 1008 at a concentration of 2 wt. % active.



● Baycusan® C 1008 ● Baycusan® C 1001 ● Acrylate <copolymer

Figure 10: Results of high humidity curl retention





## Natural strong hold

Figure 11 shows a comparison of flexural strength tests (2 wt. % active polymer in alcoholic solution, 50 % relative humidity, 21 °C). Baycusan® C 1008 imparts strong holding power – as good as state-of-the-art styling copolymers.

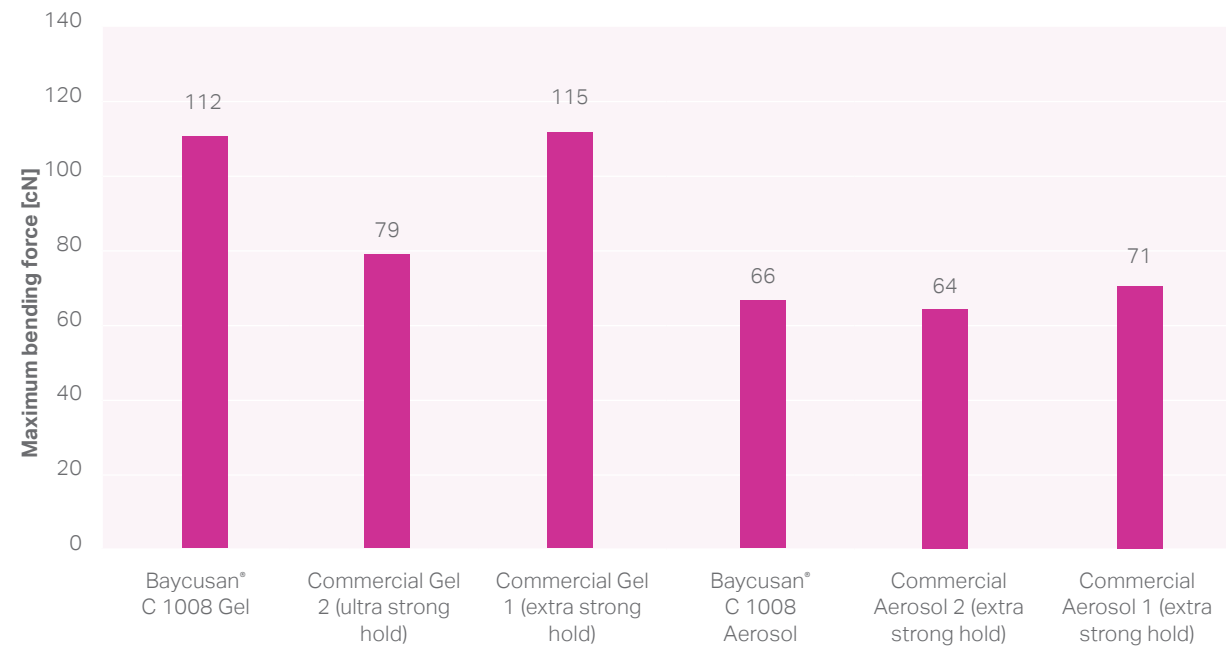


Figure 11: Results of flexural strength test

**Commercial aerosol 1:** based on acrylate copolymer

**Commercial aerosol 2:** based on acrylate copolymer and vinylpyrrolidone copolymer

**Commercial gel 1:** based on vinylpyrrolidone copolymer

**Commercial gel 2:** based on a mixture of vinylpyrrolidone copolymer

## Excellent style retention

Elasticity is one of the key characteristics of Baycusan® C 1001 and Baycusan® C 1008. Compared to traditional fixative polymers, Baycusan® C 1001 and Baycusan® C 1008 form exceptionally flexible films on hair. Figure 12 shows SEM images of single knotted hair fibers coated with an acrylate copolymer and Baycusan® C 1001. Under stress, the acrylate copolymer film becomes very brittle, while the Baycusan® C 1001 film remains smooth and shows no cracking. This property results in excellent curl resilience. Figure 13 below illustrates the change in curl retention after running fingers through the curl (curl snap test). After they are run through ten times, Baycusan® C 1008 clearly exhibits a better curl retention than an acrylate copolymer or a competing polyurethane.



Figure 12: SEM images of single knotted hair fiber

Before test:



Baycusan® C 1008

Acrylates copolymer

Competitive polyurethane

After test:



Baycusan® C 1008

Acrylates copolymer

Competitive polyurethane

Figure 13: Curl snap test results

## Heat protection

Loss of lustrous shine, split hair ends and hair breakage are annoying features of hair damaged by styling tools, such as blow dryers, curlers and straightening irons, which can reach temperatures of up to 230 °C. Baycusan® C 1008, a polymer that is stable up to 270 °C, forms a protective coating on hair fiber so the hair feels revived, soft and non-sticky. Electron microscope images of hair fibers (see fig. 14) that have been regularly treated with a straightening iron over a long period of time show significant differences compared to conventional heat protection products. The thin, highly elastic Baycusan® C 1008 film protects hair against overheating. It expands with the hair under the influence of high temperatures and shrinks again during cooling, preventing fractures forming on the surface of the hair fibers.



Figure 14: SEM images of hair fibers after heat appliance, scale 10 µm



## Frizz control up to 24 hours

Baycusan® C 1008 adds long-lasting frizz control to leave-on formulations, providing significant volume reduction over 24 hours – even at 90 % relative humidity (see fig. 15). With leave-in conditioners silicone oil is often used to achieve this effect. However, Baycusan® polyurethane dispersions also enable silicone oil-free formulations to form a protective film on the hair fibers. The film's non-greasy texture gives hair a flexible feel and breathtaking shine.

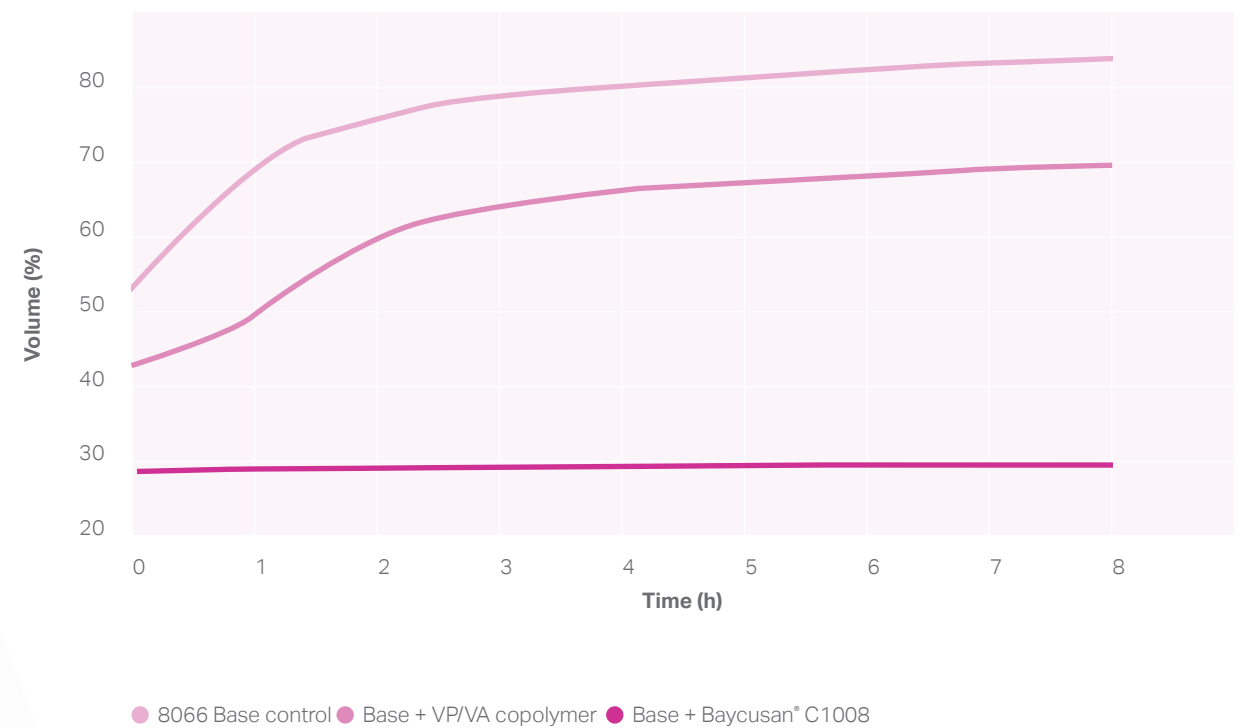


Figure 15: Volume of frizzy hair as a function of time: 8 h under 80 % RH

