

Open the Door
to Infinite Possibilities

CARBOPOL®
SMART Polymers

Lubrizol

FORMULATE *with*™
CONFIDENCE

FORMULA CONCEPTS USING CARBOPOL SMART POLYMERS

Sparkling Clear Soap-Based Body Wash (CL-B0102)

This clear soap-based body wash features a combination of soaps and surfactants to create rich, creamy foam. **Carbopol SMART 1000 polymer** thickens and stabilizes the formula, providing excellent flow and suspension of eye-catching glitter beads, while also contributing a light, clean afterfeel.

Features:

Soap-surfactant combination chassis using fatty acid soaps, sodium cocoyl glycinate and cocamidopropyl betaine

Formulation Properties

Formula pH	9.0 – 9.5
Viscosity (mPa-s)	3,000
Clarity (NTU)	< 20



Tuscan Glow Exfoliating Body Wash (CL-B0103)

This paraben-free, sodium benzoate preserved body wash contains a combination of cationic conditioning polymers for superior flash foam and lather. **Carbopol SMART 2000 polymer** thickens and stabilizes the formula, giving excellent clarity in the presence of these functional ingredients.

Features:

- Traditional surfactant cleansing chassis containing 13% total surfactant
- Merquat™ 7SPR conditioning polymer and Glucquat™ 125 humectant provide conditioning and sensory

Formulation Properties

Formula pH	5.2
Viscosity (mPa-s)	8,000
Clarity (NTU)	< 30



Purifying Anti-Acne Facial Wash (CL-F0045)

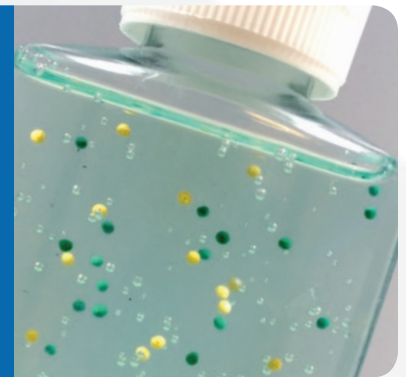
This clear, sulfate-free anti-acne facial scrub cleanses the skin while imparting a soft, satiny afterfeel. **Carbopol SMART 3000 polymer** allows for the suspension of scrubs or beads, while maintaining formulation clarity in the presence of salicylic acid and at very low pH.

Features:

- Sulfate-free surfactant cleansing chassis containing 13% total surfactant
- Contains salicylic acid for anti-acne claims

Formulation Properties

Formula pH	3.5 – 4.0
Viscosity (mPa-s)	8,000
Clarity (NTU)	< 25



Consumers are always looking for something more – better aesthetics, milder sensory, richer foam. For formulators, the challenge is clear – develop unique formulations that are truly differentiated and that consumers will prefer. New formulations mean new ingredients and added complexity. Now, there is a solution to deliver the kind of performance that consumers demand with the robustness to function across a wide range of formulations and applications. With Carbopol SMART polymers in your toolbox, if you can imagine it, you can do it.

For complete formulation details, samples and more information visit www.lubrizol.com/personalcare

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Tough Formulation Challenges Require SMART Solutions.

Introducing Carbopol® SMART Polymers



Flexibility. Simplicity. Performance.

Carbopol® SMART 1000 Polymer

- Allows formulators to create brilliant, stable hand, face and body cleansers using soap and soap-syndet combination systems
- Delivers exceptional foaming and sensory that will delight consumers
- Reduces the irritation and skin dryness commonly experienced from using soap-based cleansers
- Builds formulations that have crystal clarity and good suspension power
- Simple, easy-to-use liquid thickener

Carbopol® SMART 2000 Polymer

- Can be used to formulate a wide range of products, from traditional body and hand cleansers to high pH soap-based cleansers
- Delivers exceptional foaming and sensory that will delight consumers
- Interacts with surfactant to reduce skin irritancy and promotes mild, smooth sensory
- Builds formulations that have exceptional suspension power, enabling striking visuals
- Simple, easy-to-use liquid thickener – requires no neutralization and can be processed continuously

Carbopol® SMART 3000 Polymer

- Provides unprecedented formulation flexibility – delivers performance independent of formula pH
- Enables formulation of crystal clear low pH (pH 3.5 – 5.5) hand and body cleansing products
- Delivers exceptional foaming and sensory that will delight consumers
- Offers high compatibility with a wide range of ingredients, including cationic polymers, fragrances and preservatives
- Interacts with surfactant to reduce skin irritancy and promotes mild, smooth sensory
- Builds formulations that have exceptional suspension power, enabling striking visuals
- Simple, easy-to-use liquid thickener – requires no neutralization and can be processed continuously



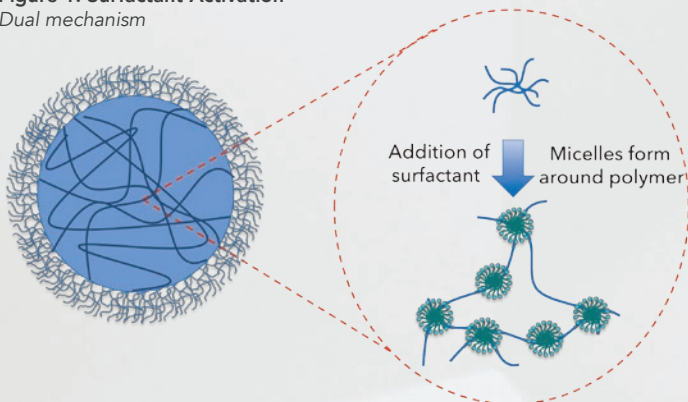
From traditional cleansing chassis to complex, milder systems and across the full range of formulation pH, Carbopol SMART polymers deliver exceptional clarity, suspension, and elegant rheology to your products, while also enhancing mildness, skin feel and foam aesthetics. Best of all, Carbopol SMART polymers are easy-to-use liquid polymers that require no neutralization; simply add the polymer at any time in the process for instant viscosity and yield. Carbopol SMART polymers – a simple solution for difficult formulating challenges.

How Do They Work?

The Carbopol SMART polymers are non-ionic, amphiphilic cross-linked copolymers. Unlike many other polymeric rheology modifiers, these materials are not activated by neutralization. Instead, they are activated by the surfactant in the formulation, enabling them to provide uniform performance independent of formulation pH.

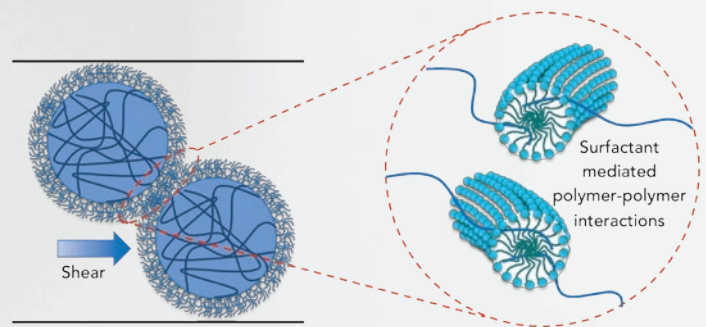
This surfactant activation occurs due to a dual mechanism. The first part of the mechanism is the swelling of individual polymer microgels, which is driven by self-assembly of surfactant micelles around hydrophobic domains of the polymer (Figure 1).

Figure 1: Surfactant Activation
Dual mechanism



These micelles electrostatically repel one another, swelling open the polymer microgels and creating a space-filling network. Once swollen, microgels engage with one another through surfactant-mediated interactions at the surface of the microgel, creating a shear-resistant polymer-surfactant network (Figure 2).

Figure 2: Shear-resistant Polymer-Surfactant Network



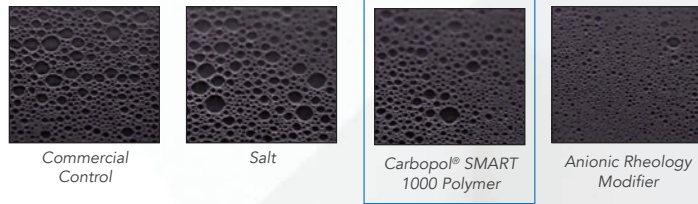
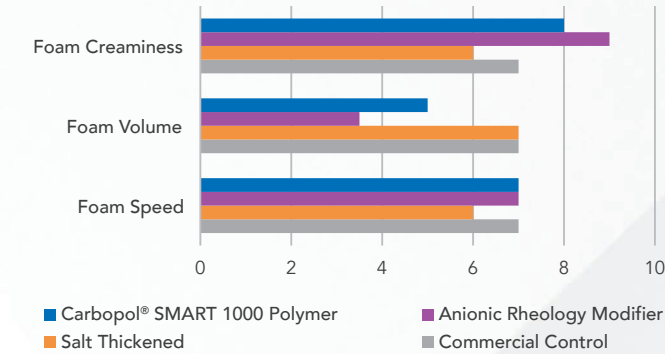
The two effects allow Carbopol SMART polymers to provide pH-independent clarity, viscosity with aesthetically pleasing flow and suspension in surfactant-containing formulations.

Delivering Products That Consumers Desire

Carbopol SMART polymers deliver exceptional sensorial benefits to formulations, enhancing mildness, skin feel and foam aesthetics. Not only do your formulations look great on the shelf, but they deliver an experience that will bring consumers back for more.

Figure 3: Foam Performance

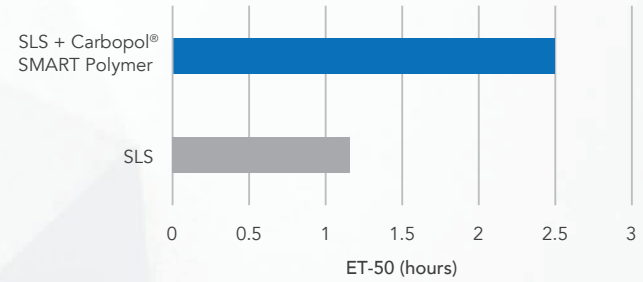
Sensory panel ranking as tested in formulations containing 11 wt% active SLES-1, 2 wt% TS CAPB, 0.25% sodium benzoate, pH = 5. Rankings are done on a scale of 1-10, with 10 representing most preferred



Individual surfactant molecules and small surfactant micelles have been shown to cause irritation of the skin commonly resulting from the use of cleansing products. Through polymer-surfactant interactions, Carbopol SMART polymers are able to reduce surfactant irritation, making your products milder on the skin, less drying with a soft, supple afterfeel.

Figure 4: Exceptional Mildness

The addition of Carbopol® SMART 1000 polymer to sodium lauryl sulfate increases the ET-50 of the surfactant, indicating reduced irritation of the system and increased overall mildness



Consumers desire, more than anything, personal cleansers that are safe to use. There has been a push in the market toward the use of food-grade preservative systems at lower formulation pH. Carbopol SMART polymers were designed to excel in these formulation conditions. Due to the nonionic nature of the polymers, they offer unprecedented compatibility with preservatives, actives, fragrances and other functional ingredients, even at low pH levels.

Figure 5: Brilliant...and Safe Formulations

A variety of cleansing formulations containing Carbopol® SMART 3000 polymer and preserved with sodium benzoate. All formulations are pH 4.5 – 5.0.



Because What Matters Most is the Experience You Create...

Lubrizol

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