

# Carbopol<sup>®</sup> Aqua CC Polymer

## Novel Acrylate Copolymer for Cationic Compatible Rheology Modifier with Multifunctional Benefits

INCI Name: Polyacrylate-1 Crosspolymer

# Quick Start Guide

Carbopol<sup>®</sup> Aqua CC polymer is designed to provide cationic compatibility, smooth flow, shear thinning rheology, suspension capabilities and high clarity for low pH applications. Carbopol Aqua CC polymer offers formulators new levels of versatility for creation of high performance applications through use of a cost-effective rheology modifier. For comprehensive information on recommended formulating concepts with this unique polymer, processing information, and supplier references, please visit [www.lubrizol.com/personalcare](http://www.lubrizol.com/personalcare).

### Introduction:

Carbopol Aqua CC polymer is patent pending acrylate copolymer. This multifunctional acid-swallowable cationic thickener features an optimized balance of hydrophobic and hydrophilic characteristics with amine functionality which further activates ionic (cationic) characteristics at pH less than 6.0. Carbopol Aqua CC polymer builds viscosity utilizing the mechanisms of hydrodynamic thickening and controlled hydrophobic association when pH is reduced to less than 6.0.

### Chemistry:

Carbopol Aqua CC polymer is a cross-linked acrylate copolymer of C<sub>1-4</sub> alkyl(meth)acrylate; amine functional monomers; and a proprietary hydrophobe package. Carbopol Aqua CC polymer technology is patent-pending.

### Form:

Carbopol Aqua CC polymer is supplied as a low viscosity, off-white emulsion which contains approximately 20% total polymer solids.

### Typical Properties:

Total Solids (%), as supplied	~ 20
Viscosity (mPa·s), as supplied <sup>1</sup>	< 50
pH, as supplied	7.8 - 8.4
2.0% Gel Viscosity <sup>1</sup> (mPa·s) <sup>3</sup>	11,000 - 18,000
@ 1 hour	
2.0% Gel Yield (dyn/cm <sup>2</sup> ) <sup>3</sup>	1,000 - 2,000
@ 1 hour	
2.0% Gel Turbidity <sup>2</sup> (NTU) <sup>3</sup>	< 20

<sup>1</sup> Brookfield RVT @ 20 rpm, 25°C, 1 minute, spindle #5

<sup>2</sup> DRT-100B Turbidimeter (HF Scientific), NTU

<sup>3</sup> 2.0% polymer solids in water, neutralized with glycolic acid to pH 4.0

Lubrizol Advanced Materials, Inc. / 9911 Brecksville Road, Cleveland, Ohio 44141-3247 / TEL: 800.379.5389 or 216.447.5000

The information contained herein is believed to be reliable, but no representations, guarantees or warranties of any kind are made as to its accuracy, suitability for a particular application or the results to be obtained herefrom. Lubrizol Advanced Materials, Inc. ("Lubrizol") cannot guarantee how any products associated with this information will perform in combination with other substances or in your process as the "user". Often, the information is based on laboratory work with small-scale equipment. Due to variations in

methods, conditions and equipment used commercially in processing materials, the information does not necessarily indicate end product performance or reproducibility. As such, no warranties or guarantees are made as to the suitability of the information or products referenced hereunder for any applications disclosed to Lubrizol. Full scale testing and end product performance are the responsibility of the user. Further, any formulations presented should be used only as a suggested starting point. Lubrizol shall not be liable and

the user assumes all risk and responsibility for, any use or handling of any material beyond Lubrizol's direct control. THE SELLER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Nothing contained herein is to be considered as a permission, recommendation, or as an inducement to practice any patented invention without permission of the patent owner.

For further information, please visit: [www.lubrizol.com/personalcare](http://www.lubrizol.com/personalcare)

## **Benefits:**

- Smooth flow
- Shear thinning rheology
- Suspension
- Excellent clarity in low pH applications
- Cationic compatibility
- Stabilizer of emulsions with silicones, oils, emollients and fatty alcohols
- Compatible with anionic, cationic, amphoteric, and non-ionic surfactants
- Easy to use liquid form
- Back-alkaline mechanism for tailoring pH, viscosity and clarity for surfactant-based applications.
- Efficient and cost effective

## **Applications:**

- Low pH facial and body scrubs
- Clear conditioning shampoos and cleansers
- Pearlescent shampoos and cleansers
- Anti-dandruff shampoos
- Conditioning styling gels
- Conditioning neutralizers for permanent waves
- Hair conditioners
- Antiperspirants
- Gel moisturizers, creams and lotions

## **Formulating Guidelines:**

**Recommended Use Level:** 1.0 - 3.0% solids (5.0 - 15.0 wt% as supplied).

**Recommended pH:** < 6.0: optimal viscosity and turbidity achieved at pH 4.0 - 4.5.

**Neutralization:** Carboxylic acids (Glycolic acid, lactic acid, citric acid, etc.); citric acid is a preferred choice for surfactant use while glycolic acid is favored for use in an aqueous-based gel.

**Surfactant Compatibility:** Carbopol Aqua CC polymer is compatible with anionic, non-ionic, and cationic surfactants.

**Recommended Surfactant Active Use Levels:** 8-22% or as needed for desired levels of viscosity, irritation, foaming and clarity. Clarity is impacted once the surfactant active level falls below 15%.

**Alcohol Compatibility:** Carbopol Aqua CC polymer is compatible with hydro-alcoholic formulations with up to 20% ethanol.

**Other Compatibility:** Carbopol Aqua CC polymer is compatible with cationic ingredients and fixatives, but is incompatible with anionic polymers.

## **Recommended Order of Addition:**

- Add Carbopol Aqua CC Polymer to the water of the formulation
- Add primary surfactants (anionics) and secondary surfactants (amphoterics) if appropriate.
- Add remaining ingredients (silicones, EDTA, color, fragrance and preservative).
- Decrease pH with an acid (citric, glycolic, lactic, etc). Citric acid is a preferred choice for surfactant use while glycolic acid is favored for use in an aqueous-based gel. Formulation becomes clear at a pH < 6.0. Optimal clarity is achieved at pH 4.0 - 4.5.

## **Carbopol Aqua CC with a cationic conditioning polymer (Polyquaternium, cationic guar, etc)**

1. Add cationic polymer and Carbopol Aqua CC polymer to the water phase.
2. Premix surfactants as a separate phase.
3. Add the water phase containing Carbopol Aqua CC polymer and cationic polymer slowly to the surfactant phase with mild agitation.
4. Add remaining ingredients (silicones, EDTA, color, fragrance and preservative).
5. Decrease pH with an acid (citric, glycolic, lactic, etc). Formulation becomes clear at a pH < 6.0. Optimal clarity is achieved at pH 4.0 - 5.0.

## **Formulations Available:**

<b>CL-F0014</b>	Sulfate-Free Acne Cleanser
<b>SH-0005</b>	Anti-Dandruff Shampoo
<b>SH-0030</b>	Clear Conditioning Shampoo
<b>CD-0013 (LA)</b>	Hair Conditioning Cream
<b>AP-0003</b>	Clear Antiperspirant Gel
<b>AP-0004</b>	Clear Antiperspirant Gel
<b>AP-0005</b>	Clear Antiperspirant Roll-on
<b>AP-0006</b>	Antiperspirant Emulsion Roll-on

## **Storage & Handling:**

- Packaging: 55 gallon, 450 pound (204 kilogram) net weight plastic drums.
- Shelf life: six (6) months at room temperature (15-30°C). The shelf life of unopened containers can be increased to nine months if stored at temperatures of 0-5°C.
- Carbopol Aqua CC polymer is freeze/thaw stable as supplied.

- For best results, the polymer should be mixed and filtered prior to use.
- It is recommended that open containers of Carbopol Aqua CC polymer be used immediately after opening or stored at 0-5°C for a limited time until used. This will prevent “skinning” on the surface or discoloration of the liquid. If discoloration does occur, the polymer will perform as intended as long as the emulsion has a viscosity less than 500 mPa·s.
- Low shear pumps should be used to transfer the product. Transferring the product into another storage vessel is not recommended because Carbopol Aqua CC polymer contains amine groups that can discolor when they are exposed to the atmosphere. If storage in tanks is required, the use of agitated stainless steel storage and mixing tanks with a nitrogen blanket are recommended.

## **Regulatory Status:**

Carbopol Aqua CC polymer qualifies as polymer exempt from TSCA, EINECS and ELINCS registration. All monomers used in Carbopol Aqua CC polymer are listed on EINECS. As supplied, Carbopol Aqua CC polymer complies with the European Union Cosmetics Directive 76/768/EEC, 7th Amendment. It is not classified or manufactured using any chemicals designated as carcinogenic, mutagenic or reproductive toxicant (CMR).

Accordingly, Carbopol Aqua CC polymer can be used commercially in the U.S., Europe, Japan, Latin America, South America, China, and the rest of Asia with the exception of Korea.

Registration is pending in Korea, Canada, and Australia. A Japanese INCI name will be provided once it has been finalized.

## **Toxicology:**

The toxicity profile of Carbopol Aqua CC polymer, as supplied, indicates that it has a low potential for causing irritation or sensitization. These data indicate that the product is suitable for a personal care application where there is contact with hair or skin. A complete summary of toxicological effects is available upon request.

## **Microbiology:**

Carbopol Aqua CC polymer, as supplied, contains 0.1% benzalkonium chloride. The polymer as supplied has passed a Mixed Inoculum Preservative Efficacy Test (Challenge Test). Formulators are advised to conduct normal microbial testing of formulated products.

## **Genetically Modified Organisms (GMO):**

Carbopol Aqua CC polymer is prepared solely from synthetic material and does not contain, and is not derived from, any material of plant or animal origin.

## **Other General Information:**

- The Harmonized Tariff System (Schedule B) number for Carbopol Aqua CC polymer is 3906.90.6000.

## **Other Literature Available:**

- Product Summary Brochure (TDS-363)
- Temporary Product Specification
- Test Procedures
- Material Safety Data Sheet (MSDS)
- Toxicological Summary (TOX-087)
- Microbial Summary (TOX-088)
- Formulations CL-F0014, SH-0005, SH-0030, CD-0013 (LA), AP-0003, AP-0004, AP-0005, and AP-0006.