

Carbopol® polymers: The superior choice for long-lasting oral care products



Driven by increasing consumer demand for premium mouthwash and toothpaste products, the oral care market is forecast to rise significantly by 2030. For oral care companies looking to stand out in the growing market, high-quality functional ingredients can enable innovative products that meet consumer demands.

In an oral care market survey conducted by Lubrizol Life Science Health (LLS Health), it was found that long-lasting properties ranked in the top four factors that can influence consumer buying decisions. Carbopol® polymers exhibit sustained mucoadhesive properties to deliver these long-lasting oral care benefits, giving your product a competitive edge in the market.

COMPARISON OF MUCOADHESIVE POLYMERS FOR LONG-LASTING ORAL CARE FORMULATIONS

To evaluate Carbopol® polymers' mucoadhesive properties, we studied the polymers *in vitro* in comparison to other materials, including xanthan gum, carrageenan, sodium carboxymethylcellulose (Na-CMC), copolymer of methyl vinyl ether and maleic anhydride (PVM/MA - commercialized as Gantrez™ polymers), and hydroxypropyl cellulose (HPC).

It was found that:

- Compared to other materials studied, **Carbopol® polymers provided the longest retention over time.**
- Carbopol® polymer 974P NF displayed great mucoadhesive properties with nearly **60% of the formulation remaining after 30 minutes.**
- Conversely, the formulation containing Gantrez™ polymer (PVA/MA) offered poor retention with almost **90% washed off after 1 minute.** Formulations containing HPC and poloxamer were entirely washed off within the first few minutes of the study.

Carbopol® polymers provide the longest retention over time

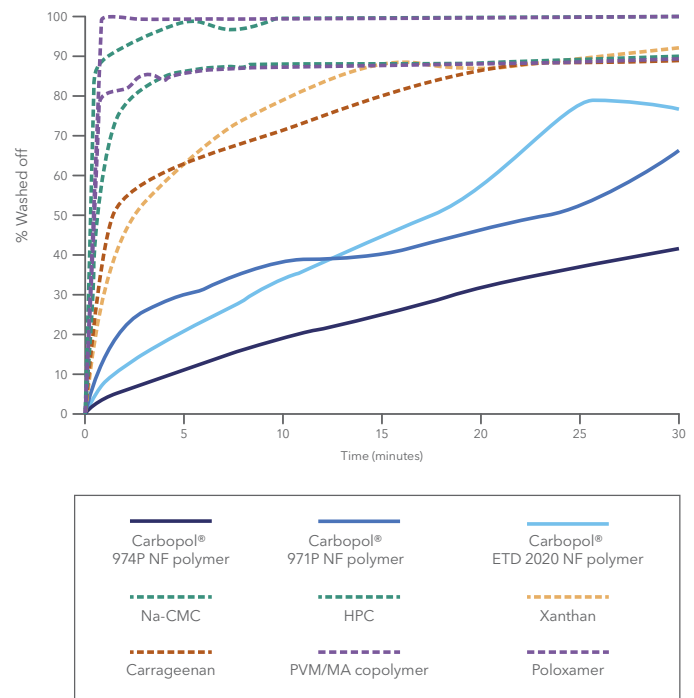


Figure 1: In vitro evaluation of 1% retention of polymer over 30 minutes

View our [oral care infographic](#) to learn more about why long-lasting properties are vital to consumers, and how [Carbopol® polymers](#) can enable long lasting products.

CARBOPOL® POLYMERS VS GANTREZ™ POLYMERS FOR ACTIVE RETENTION

To further compare Carbopol® and Gantrez™ polymers' active retention capabilities an elution study was conducted, leveraging LLS Health's proprietary *in vitro* oesophageal retention (IVOR) model. The aim was to compare the deposition and retention of formulations with the active ingredient zinc salt. Gantrez™ polymer-based gels had much lower viscosity than Carbopol® polymers when used at similar concentrations. In order to eliminate any potential effect of viscosity on mucoadhesion, 1% carboxymethyl cellulose (CMC) was included on Gantrez™ dispersions to polymer gels.

- In the IVOR elution studies with Zn salt, **Carbopol® polymers' mucoadhesive properties showed a clear advantage over Gantrez™ polymers, providing 3-6 times higher active retention** (1% Carbopol® polymer vs. 3 or 6% Gantrez™ polymer).
- The high efficiency of Carbopol® polymers demonstrates the **potential for cost savings**, through high active retention levels at low usage levels.

CONCLUSION

Carbopol® Polymers provide a better solution for long lasting oral care products with their superior mucoadhesive properties compared to other materials, including maleic anhydride polymers, such as Gantrez™.

- Enhanced retention time of an active ingredient can lead to improved efficacy - providing an important differentiation in a crowded market for the end product.
- Carbopol® Polymers provide higher retention at much lower usage levels, compared to other materials.
- Lower usage levels with enhanced retention time improves efficacy and enables reduction in the polymer concentration required - thus creating a tremendous potential for cost savings.

Carbopol® Polymers provide higher active retention at much lower concentrations

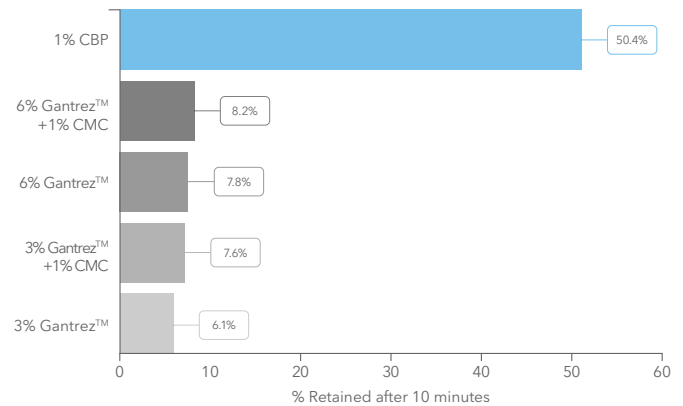


Figure 2: Effect of polymer on zinc salt *in vitro* elution testing.

WORK WITH THE EXPERTS IN EXCIPIENT TECHNOLOGIES

LLS Health provides worldwide technical and application support and dedicated global regulatory and quality assurance to enable the success of your oral care formulation.

To find out more about using Carbopol® polymers in your oral care product, [contact us today.](#)

Lubrizol.com/Health

9911 Brecksville Road, Cleveland, OH 44141-3201 USA

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 particular applications or the results to be obtained. The information often is based on laboratory work with small-scale equipment and does not necessarily indicate end-product performance or reproducibility. Formulations presented may not have been tested for stability and should be used only as a suggested starting point. Because of the variations in methods, conditions and equipment used commercially in processing these materials, no warranties or guarantees are made as to the suitability of the products for the applications disclosed. Full-scale testing and end-product performance are the responsibility of the user. Lubrizol Advanced Materials, Inc., shall not be liable for and the customer assumes all risk and liability for any use or handling of any material beyond Lubrizol Advanced Materials, Inc.'s direct control. The SELLER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Nothing contained herein is to be considered as permission, recommendation nor as an inducement to practice any patented invention without permission of the patent owner. Lubrizol Advanced Materials, Inc., is a wholly owned subsidiary of The Lubrizol Corporation.

©2022 The Lubrizol Corporation, all rights reserved. All marks are the property of The Lubrizol Corporation. The Lubrizol Corporation is a Berkshire Hathaway company - Gantrez™ polymers are a registered trademark of or licensed by Ashland Specialty Ingredients.

 LUBRIZOL
LIFE SCIENCE

22-0001816