who enables a healthy, beautiful smile?

—

we do.

oral care product guide

Ashland™
always solving

ashland.com / efficacy usability allure integrity profitability™

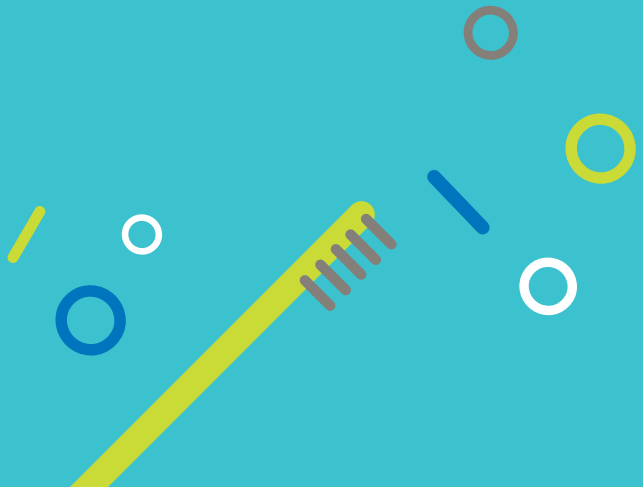
smile and the world smiles with you

At Ashland, we are committed to create innovative and sustainable technologies that improve the efficacy, usability and consumer appeal of oral care products. Toothpaste, mouthwash, and denture adhesives are just a few of the oral care products that benefit from the use of our ingredients. Today, Ashland's broad oral care ingredient portfolio includes bioadhesive polymers, teeth bleaching agents, stain removers, rheology modifiers, mouth moisturizers, multifunctional preservative boosters, preservatives, biofunctionals, and custom encapsulates.

Our success depends on your success and we stand ready to solve with you at every step from innovative ingredients to technical service and awareness of market trends. We do more than just manufacture innovative ingredients to demanding quality standards; our products are supported by dedicated oral care solvers. We are committed to helping you grow.

Get to know us and you'll see how Ashland keeps the world smiling.

contents



enhancing performance of oral care products

Ashland works to understand the properties of our ingredients and their performance in oral care formulations. With our global network of oral care laboratories staffed with experienced scientists, we routinely conduct *in vitro* performance evaluations of toothpaste, mouth rinse and denture adhesive formulations. We support all our ingredient solutions with formulation expertise and robust testing resources, including:

- **assessment of actives delivery and retention** to teeth and mucous membranes
- **measurement of rheology** and complex flow behavior using advanced techniques
- **formulation of laboratory-scale toothpaste, mouthwash and denture adhesive** batches and stability testing
- evaluation of **teeth cleaning/stain removal, stain prevention or whitening** by instrumental color measurement
- evaluation and formulation of **teeth whiteners**
- **assessment of toothpaste** using V-8 brushing machine on bovine enamel and artificial teeth
- *in vitro* **evaluation of denture adhesive formulations** performance as well as extensive formulation knowledge
- **consumer panel testing and preservative efficacy test** of toothpaste and mouthwash formulations

We can help solve difficult formulating challenges and bring new formulations to market faster. Ashland will work with you to find new and better ways to deliver oral health and create beautiful smiles.

global capabilities

- technical service scientists to help formulators bring new and improved formulations quickly to consumers
- oral care *in vitro* evaluation of ingredients and formulations to provide new and improved end-product benefits
- technical leadership in science of rheology and bioadhesion
- innovative starter formulations and new market concepts
- demonstration of consumer-perceivable benefits using consumer panels
- synthesis of new polymers and evaluation using advanced analytical and material science methods for understanding of structure function relationship

formulation solutions from Ashland

Ashland is a leading supplier of innovative ingredients that solve complex formulation challenges.

solutions for denture adhesives

For denture wearers, adhesives that hold dentures in place throughout the day are critical. Blanose™ carboxymethylcellulose (CMC) gives initial tack to denture adhesives while gantrez™ AN polymer salts provide duration of hold in denture adhesives.

solutions for delivery and retention of actives

Delivering and retaining actives in the mouth are key for improving efficacy of toothpaste and mouthwashes. The combination of gantrez™ S-97 polymer or gantrez™ soja delivery system with a surfactant greatly enhances the buccal retention of active materials that are water insoluble and emulsifiable by the surfactant such as antimicrobial agents and flavors to provide long-lasting benefits. Our scientists have also shown the *in-vitro* deposition of cationic actives, such as cetylpyridinium chloride, on hard and soft tissue

solutions for whiter teeth

With consumers around the world wanting whiter and brighter teeth, Ashland offers plasdone™ K-29/32 polymer to gently and effectively lift staining agents leaving teeth whiter. For teeth bleaching, Peroxydone™ complexes are very stable, powder complexes of hydrogen peroxide and polymers that release hydrogen peroxide on contact with saliva in the mouth.

solutions for gum care

Our new biofunctional, saffragyl™ biofunctional is extracted from upcyled saffron flowers to help prevent early gums problems and strengthen sensitive and irritated gums.

solutions to modify and control rheology

Ashland offers the widest range of cellulose ether-based rheology modifiers, with a natural origin content of up to 80%.[1] In addition, Ashland offers synthetic polymers capable of structuring a variety of solvent systems (both aqueous and non-aqueous/anhydrous) for rheology modification.

[1] natural origin content defined by the ISO 16128- 2:2017

solutions for mouth lubrication and moisturization

With the increasing use of medications around the world and average world-wide life expectancy on the rise, a growing number of consumers seek solutions to address dry mouth. Ashland offers a range of ingredient solutions for these formulations, including lubrajel® ba hydrogel.

solutions for antimicrobial protection

Ashland's antimicrobial solutions are designed to effectively protect formulations and to help manufacturers comply with regulatory requirements. Our global team of solvers supports you with extensive technical lab service, in-depth microbiological expertise and application know-how.

natural

meets ISO 16128-2:2017 100% natural origin content standard

nature-derived

meets ISO 16128-2:2017 50% - 99% natural origin content standard

Ashland oral care ingredient portfolio overview

we invite formulators to explore our commercial ingredients

		application					function												
		toothpaste	mouthwash	denture care	teeth whiteners	mouth moisturizers	actives/flavors delivery	bioadhesion	foam enhancement	hydration	oxidative whitening	protectant	rheology modification	stain removal	tablet binding	tartar control	visual enhancement	antimicrobial	antioxidant
polymers: synthetic	**flexithix**™ polymers	●		●									●						
	gantrez™ AN polymers			●				●											
	gantrez™ S polymers	●	●	●		●	●	●				●				●			
	plasdone™ K polymers	●	●	●	●	●		●					●	●	●				
	plasdone™ S-630 polymer	●	●	●		●		●				●		●	●				
	polyplasdone™ polymers	●		●									●						
	peroxydone™ complexes	●		●	●		●	●			●		●	●					
polymers: cellulose ethers	**blanose**™ sodium carboxymethylcellulose	●		●		●		●					●						
	benecel™ hydroxpropylmethylcellulose	●							●										
	klucel™ hydroxypropylcellulose	●	●			●							●		●				
	natrosol™ hydroxyethyl cellulose	●	●			●							●						
encapsulation technology	**captivates**™ HC encapsulates †	●	●	●			●										●		
	captivates™ GL encapsulates †	●					●										●		
hydrogels	**lubrajel**® BA hydrogel	●	●			●				●			●						
biofunctionals	**saffragyl**™ biofunctional	●	●	●		●						●							
antimicrobial solutions	**euxyl**™ **pe 9010** preservative	●	●			●												●	
	euxyl™ **k 712** preservative	●	●			●												●	
	phyteq™ **raspberry** multifunctional	●	●	●	●	●												●	●
other	**allantoin**	●	●	●		●						●							
	gantrez™ **soja** delivery system	●	●	●		●													
	hyalurotech™ sodium hyaluronate	●	●							●		●							

*Lubrajel is a registered trademark of United-Guardian, Inc.
† naturality is grade dependent based on capsule inner phase

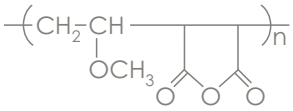
Ashland™ always solving

an introduction to Ashland oral care ingredient portfolio

gantrez™ AN polymers

Gantrez™ polymers are a family of synthetic copolymers based on methyl vinyl ether (MVE) and maleic anhydride that offer excellent bioadhesive properties. The anhydride powders (AN grades) are the base polymer for making polymer salts used in denture adhesive applications. The AN grades are available in a range of molecular weights, but are not used directly in oral care applications and must be processed before adding to a finished formula.

vegan

grade	structure
AN-169	

gantrez™ S polymers

INCI name: PVM/MA copolymer

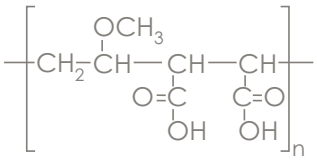
Gantrez™ S polymers are the free acid form of copolymers of MVE and maleic anhydride utilized for their excellent film-forming properties; highly-effective chelation and exceptional bioadhesive performance in wet environments. Gantrez™ S polymers are available in a range of molecular weights.

toothpastes and mouthwashes

Gantrez™ S polymers are an excellent mucosal adhesive for delivery and retention of antimicrobial agents, colors and flavors. In addition, gantrez™ s polymers impart tartar control and dentin tubule flow reduction. Gantrez™ S polymers are available as aqueous solutions and/or powder, depending on the grade.

denture cleansers

In denture cleansers, gantrez™ s polymers provide active and flavor delivery.

grade	structure
S-97	
S-96	

key benefits:

- offers bioadhesion to enable delivery of actives to mucous membranes and teeth
- delivery of oral care actives in the mouth for extended period of time
- holds flavors, botanicals, colors, coolants and other water-insoluble actives in the mouth
- gives tartar control
- forms film to reduce flow to dentin tubule
- deposits cetylpyridinium chloride (CPC) on hard and soft tissue soft tissue

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gantrez™ soja delivery system

INCI name: sodium maleated soybean oil

Gantrez™ soja delivery system is a water-soluble, nature-derived and biodegradable active delivery system. Derived from non-GMO soybean oil using a clean process with no waste generated, it is a sodium salt of maleated soybean oil that is substantive to oral mucosa and enamel. It is available as ~70% solids in water.

toothpaste and mouthwashes

Gantrez™ soja delivery system is a sustainable ingredient for delivery and retention of antimicrobial agents, colors and flavors. In-vitro studies have demonstrated the retention of a wide range of actives to artificial teeth.

key benefits:

- enhances the in-vitro retention of anti-plaque and antibacterial active agents in the mouth
- retains antibacterials in the mouth to kill germs between brushings
- holds flavors for long-lasting freshness

nature-derived[a] | biodegradable[b] | vegan

plasdone™ and flexithix™ polymers

INCI Name: PVP

Plasdone™ polymers are pharmaceutical-grade homopolymers of N-vinyl-2-pyrrolidone (VP) supplied as white, free flowing powders. Available in a range of molecular weights, they are characterized by K-value. PVP polymers are soluble in water, highly adhesive and form glossy, transparent, oxygen permeable films. Flexithix™ polymer is a novel, lightly cross-linked polymer based on PVP.

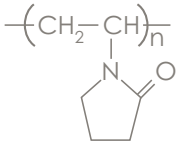
toothpastes and mouthwashes

Plasdone™ K-29/32 polymer delivers non-abrasive and non-oxidaitve teeth whitening for brighter, whiter smiles. Plasdone™ K-29/32 polymer will form complexes with many of the chemicals that cause teeth stains resulting in a water-soluble complex that is easily removed during rinsing.

Flexithix™ polymer is a versatile rheology modifier for thickening challenging formulations. It is a good choice for anhydrous toothpaste formulations.

denture cleansers

Plasdone™ polymers are highly effective tablet binders for denture cleanser tablets.

grade	structure	typical weight averages molecular weight[†]
K-29/32		58,000
K-90		1,300,000

Additional grades are available.
[†] absolute molecular weight (SEC/MALLS)

key benefits:

flexithix™ polymers

- provides improved toothpaste structure resulting in better toothpaste ribbon stand-up with less stringiness
- improves formula robustness over acrylate thickeners alone

plasdone™ polymers

- complexes with common staining agents to whiten teeth
- reduces *in vitro* teeth staining from cationic antibacterial and stannous compounds
- acts as a tablet binder resulting in tablets with high breaking force and low friability
- modifies solution viscosity
- forms water-soluble films
- adds lubricity

halal | vegan

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plasdone™ S-630 polymer

INCI name: VP/VA copolymer

Plasdone™ S-630 polymer is a pharmaceutical-grade 60:40 linear, random copolymer of VP and vinyl acetate. The addition of vinyl acetate to the vinylpyrrolidone polymer chain reduces hydrophilicity and glass transition temperature (Tg) of the copolymer relative to PVP. As a result, Plasdone™ S-630 polymer is an excellent adhesive material and a tougher, more flexible film former than PVP.

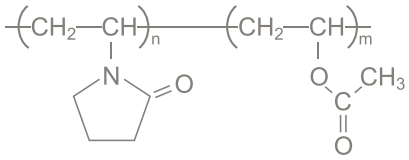
toothpaste and mouth washes

This copolymer of VP and vinyl acetate can provide nonoxidative teeth whitening and stain removal. It works like PVP, to form complexes and remove staining agents.

denture cleansers

Plasdone™ S-630 polymer is a highly effective tablet binder for denture cleanser tablets. Because of their large size and high inorganic content, denture cleanser tablets need a highly adhesive tablet binder to increase tablet breaking force and reduce friability.

In addition, the binder should be water soluble so that the consumer experiences, a clear, haze-free solution, upon tablet dissolution. Plasdone™ S-630 polymer delivers the performance required.

grade	structure	typical weight averages molecular weight†
S-630		47,000

Technical grades are also available. † absolute molecular weight (SEC/MALLS)

key benefits:

- acts as a tablet binder resulting in tablets with high breaking force and low friability
- forms tough, clear, flexible films with high substantivity to skin
- complexes with common staining agents to whiten teeth

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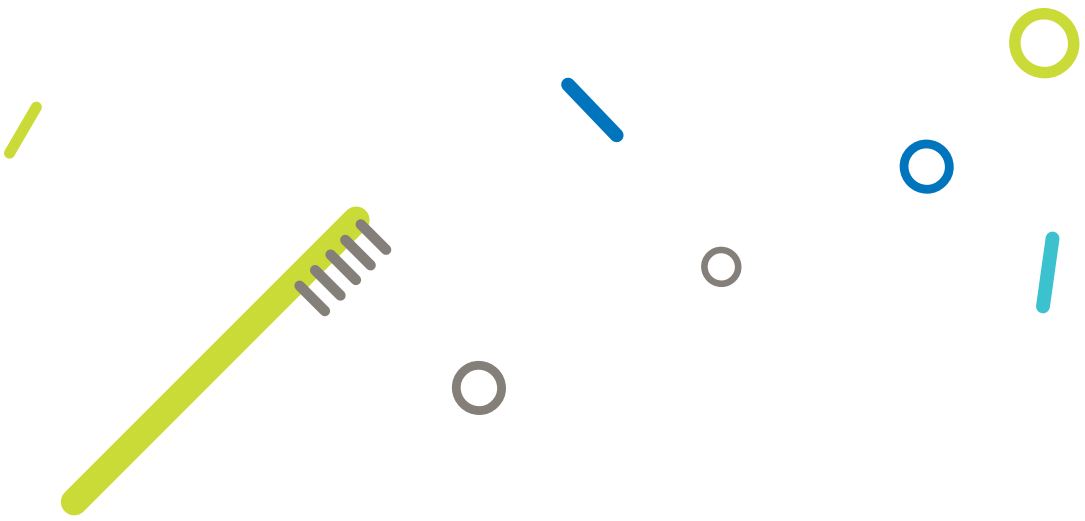


polyplasdone™ polymers

INCI name: PVP

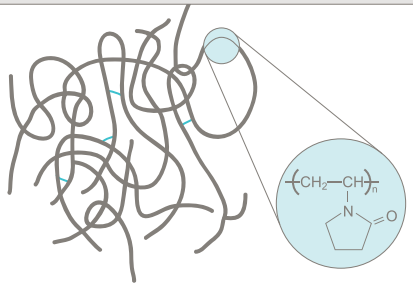
Polyplasdone™ polymers are insoluble, crosslinked homopolymers of NVP that differ by particle size. The nonionic polymer swells on contact with water.

toothpastes

With the increasing number of active ingredients that are not compatible with water, there is a growing need for thickeners for anhydrous systems. Polyplasdone™ polymer is an excellent choice for modifying rheology of an anhydrous toothpaste system.

denture cleansers

Polyplasdone™ polymers combine multiple mechanisms to achieve rapid tablet disintegration at low use levels.

product/trade name	structure	typical average particle size (microns)
XL		110–140
XL-10		25–40

key benefits:

- swells on contact with water and solvents to modify rheology
- thickens anhydrous systems
- acts as rapid tablet disintegrant

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blanose™
sodium carboxymethylcellulose (CMC)

INCI name: cellulose gum

Blanose™ CMC is an anionic, water-soluble cellulose ether, produced by reacting alkali cellulose with monochloroacetic acid under controlled conditions. A variety of grades with different degrees of substitution(DS), viscosities and particle sizes to meet specific formulation requirements are available. Based on the local regulatory requirements of the final product formulation, grades that comply to food and pharmaceutical requirements are offered.

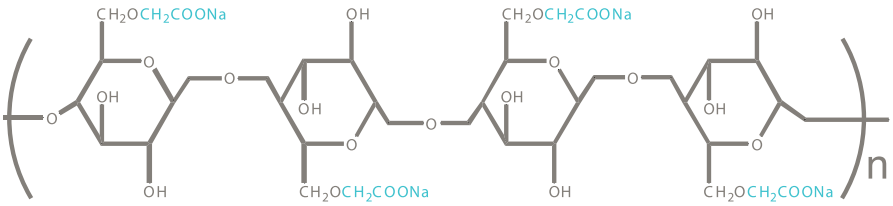
toothpastes

Blanose™ CMC is used to modify rheology, bind water for the prevention of syneresis and impart desirable flow properties to the formulation. CMC provides excellent rheology properties such as shear thinning for ease of filling tubes and dispensing onto brush as well as excellent stand up, clean ribbon cut-off, easy dispersal of toothpaste upon brushing, and smooth non-stringy appearance.

Selecting the Blanose™ CMC grade for your formulation will depend on the desired properties of the toothpaste formulation. Many different grades are available to help achieve desired toothpaste properties and to improve formula stability and processibility. In general, blanose™ 9M31F or 9M31XF CMC are good starting points. The Ashland team can help you select the optimal grade of Blanose™ CMC to meet your formulation needs.

denture adhesives

In denture adhesive powders and creams, CMC provides the initial wet tack necessary for holding dentures in place. To get started, blanose™ 7H3SXF CMC is suggested.



blanose™ CMC grade	degree of substitution (nominal)	typical Brookfield viscosity (mPa.s) at 25 °C	suggested application
7MF, 7MXF	0.7	400–800 (2%)[1]	cream or liquid toothpaste
7H3SXF	0.7	1,000–2,800 (1%)[2]	denture adhesives
9M31F, 9M31XF	0.9	1,500–3,100 (2%)[2]	all toothpaste types
9H4F, 9H4XF	0.9	2,500 -6,000. (1%)[3]	cream toothpastes
12M31F, 12M31P, 12M31XP	1.2	800–3,100 (2%)[2]	clear, cream, and baking soda toothpaste

Structure is idealized structure of CMC with degree of substitution (DS) of 1.0. Grades designated with "X" have finer particle size. Viscosity in aqueous solution with concentrations noted (). Additional grades are available. The above chart lists common grades.
[1] Spindle number 2, 30 rpm
[2] Spindle number 3, 30 rpm
[3] Spindle number 4, 30 rpm

key benefits:

- acts as a thickener for aqueous systems
- provides shear-thinning and thixotropic rheology properties
- inhibits syneresis formation
- provides initial wet tack to denture adhesive
- "COSMOS* validated"

nature-derived[a] | biodegradable[b] | vegan | halal | COSMOS validated

benecel™ HPMC

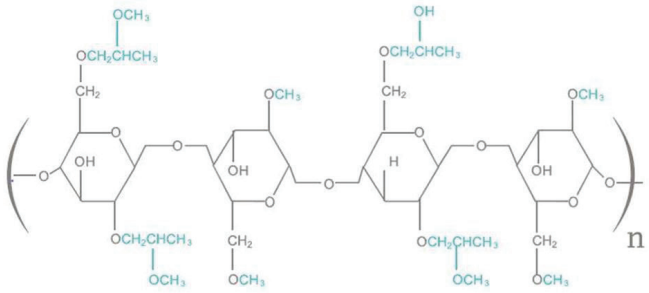
INCI name: hydroxypropylmethylcellulose

Benecel™ HPMC is high-purity, water-soluble, nonionic cellulose ether designed for use as a thickener, foam enhancer, foam stabilizer, water-binder, film former, as well as a co-suspending and co-emulsifying agent.

halal | nature-derived[1] | vegan

key benefits:

- acts as highly efficient foam booster and stabilizer
- forms stable foam (higher wall elasticity)
- improves foam volume
- enhances the brushing experience by enhancing foam texture
- builds creamy and dense foam

Grade	structure	typical Brookfield viscosity (mPa.s) at 20° C[1]
E4M		2,700–5,040

[1]2% aqueous solution, RVT viscometer, 20 rpm

klucel™ HPC

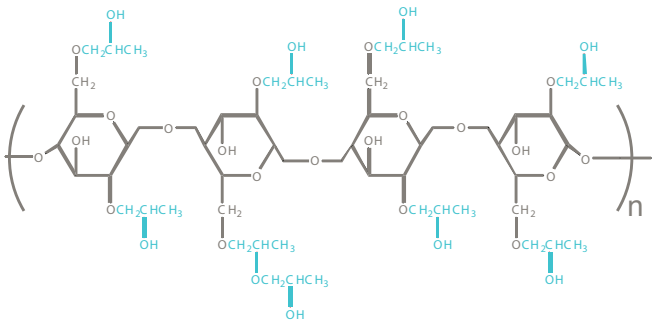
INCI name: hydroxypropylcellulose

Klucel™ HPC is a nonionic water-soluble cellulose ether with a remarkable combination of properties. It combines organic solvent solubility, thermoplasticity, and surface activity with the aqueous thickening and stabilizing properties characteristic of other water-soluble cellulose polymers. HPC films are flexible without plasticizers and non-tacky at high humidity. **Klucel nutra™ modified cellulose** is the preferred grade to use as a binder for creating robust toothpaste tablets with high breaking force and low friability. It offers an exceptional combination of properties for direct compression tablet processes.

key benefits:

- thickens anhydrous systems (good starting point is mxf grade)
- provides desirable sensory cue for mouth protection in anhydrous toothpaste
- binds tablets

halal | vegan

Grade	structure	typical Brookfield viscosity (mPa.s) at 25 °C	approximate weight average molecular weight
H		1,500–3,000 (1%)[1]	1,150,000
M		4,000–6,500 (2%)[2]	850,000
G		150–400 (2%)[3]	370,000
J		150–400 (5%)[3]	140,000
L		75–150 (5%)[4]	95,000
E		300–600 (10%)[5]	80,000

Small and regular particle size grades availability. Viscosity in aqueous solutions with concentration noted (). Additional grades are available. The above chart lists common grades.
[1]Spindle number 3, 30 rpm [2]Spindle number 4, 60 rpm [3]Spindle number 2, 60 rpm [4]Spindle number 1, 30 rpm [5]Spindle number 2, 30 rpm

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natrosol™ HEC

INCI name: hydroxyethylcellulose

Natrosol™ 250 HEC, a nonionic, water-soluble polymer, is derivatized from cellulose. Dispersible in polyols and completely soluble in water, Natrosol™ 250 HEC is available in a wide variety of molecular weights.

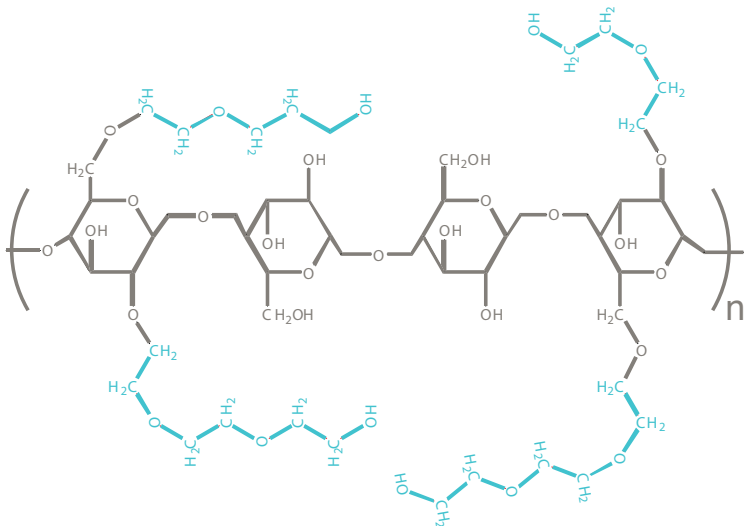
toothpastes

Natrosol™ 250 HEC is used as an effective rheology modifier and syneresis control agent where high di- and tri-valent salt tolerance is required. In addition, Natrosol™ HEC is stable with quaternary salts and other cationic actives such as Olaflur. In general, Natrosol™ 250 M PHARM HEC and Natrosol™ 250 H PHARM HEC are good starting points.

halal | biodegradable[c] | nature-derived[5] | vegan

key benefits:

- offers excellent tolerance to mono-, di-, and tri-valent cations
- provides rheology properties such as shear-thinning for ease of filling tubes during manufacture and ease of dispensing onto brush
- imparts glossy, smooth ribbon appearance
- inhibits syneresis formation
- is nonionic resulting in compatibility with wide range of actives including cationic actives

grade	structure	typical Brookfield viscosity (mPa.s) at 25 °C	approximate molecular weight
HH, HHX		3,500–5,500 (1%)[1]	1.3 x 10^6
H, HX		1,500–2500 (1%)[2]	1.0 x 10^6
M		4,500–6,500 (2%)[3]	7.2 x 10^5
G		150–400 (2%)[4]	3.0 x 10^5
L		75–150 (5%)[5]	9.0 x 10^4

The structure shown above is idealized chemical structure of Natrosol HEC with 2.5 degree of molar substitution (MS).
Natrosol HEC grades designated with "PHARM" are compliant with the monograph requirements of the USP, EP and JPE.
X = Smaller particle size grades. Viscosity in aqueous solutions with concentration noted in ().0
[1]Spindle number 4, 30 rpm
[2]Spindle number 3, 30 rpm
[3]Spindle number 4, 60 rpm
[4]Spindle number 2, 60 rpm
[5]Spindle number 1, 30 rpm

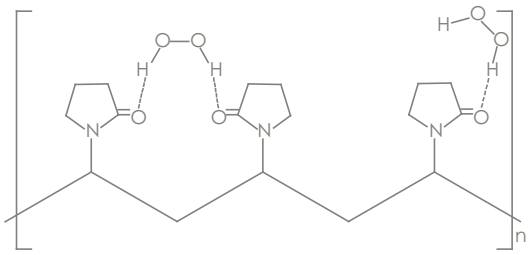
peroxydone™ complexes

INCI name: PVP [and] hydrogen peroxide

Peroxydone™ complexes are a family of stable, hydrogen-bonded complexes on vinyl pyrrolidone-based polymers with hydrogen peroxide. Peroxydone™ complexes are very stable, solid complexes that release hydrogen peroxide on contact with water or saliva in the mouth to provide oxidative teeth whitening. As Peroxydone™ complexes retain the properties of the base polymer, these unique complexes offer a range of solubility, substantivity, viscosity and film-forming benefits.

toothpastes and teeth whiteners

Consumers want whiter and brighter teeth, but not all stains can be brushed away. Bleaching products that penetrate into and oxidatively whiten teeth provide effective results and, therefore, are popular with consumers. Peroxydone complexes are the logical choice for delivery of hydrogen peroxide to teeth. They provide excellent substantivity, bioadhesion, film-forming and thickening with excellent formulation stability without odor or taste, unlike other solid forms of hydrogen peroxide. Peroxydone complexes can be formulated into a wide variety of product forms, including liquids, gels, tablets, strips, pastes and films.

grade	base polymer	structure
K-30	PVP	
XL-10	Crosslinked PVP	

key benefits:

- releases hydrogen peroxide for oxidative whitening
- are supplied as very stable powders
- no flavor or odor
- act as excellent film formers, tablet binders or disintegrants
- provides a range of solubilities, substantivity and viscosities

vegan

captivates™ HC encapsulates

Captivates™ HC encapsulates are small particles that deliver an active ingredient as well as providing exciting visuals to products. Captivates™ HC encapsulates have a core-shell morphology, the shell materials are natural, biodegradable and derived from tree-sap and food waste. During brushing when pressure is applied, the capsules break to release the core material. Capsule wall thickness, color, capsule size and core material can be customized to meet the desired properties of the applications.

toothpastes

Captivates™ HC encapsulates can be used to create striking visuals and deliver a flavor change or boost to a toothpaste formulation. As a starting point, the following grade is available.

grade	function	appearance
hc0004	provides peppermint flavor burst	750-1000 µm, pearlescent capsule

key benefits:

- adds exciting visual effect
- delivers flavors
- isolates and protects ingredients

nature-derived[a]

biodegradable[b]

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captivates™ GL encapsulates

Captivates™ GL encapsulates series are small particles that contain materials dispersed in a continuous hydrogel matrix. The matrix is formed from biodegradable and naturally derived bioploymers such as alginate and carrageenan, which can be used to entrap insoluble powders, oils and insoluble vitamins. Captivates™ GL encapsulates are made using the Jetcutter technology which produces uniformly sized matrix particles ranging from 250 to 3000 microns. Trigger release mechanisms range from dilution to pressure and temperature, this will depend on selected matrix biopolymers.

toothpastes

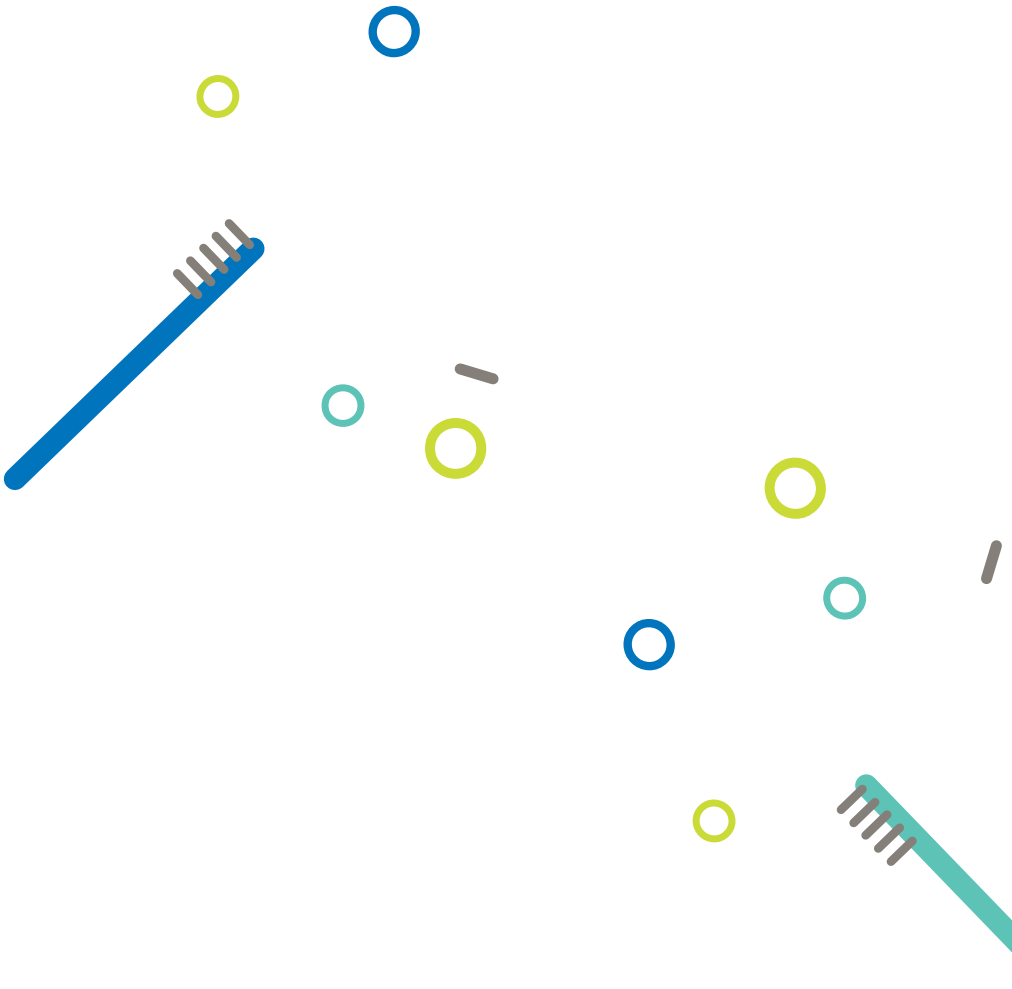
Captivates™ GL encapsulates enable the use of color in new and unexpected ways in toothpaste. These encapsulates can be designed to slowly soften and release color during brushing providing a gradual color-changing signal.

grade	function	appearance
gl22220	gives color change during brushing	800 µm, blue (with pigment blue 15)

key benefits:

- adds exciting visual effect
- delivers color for signals during brushing

nature-derived[n] | biodegradable[b] | vegan | halal



saffragyl™ biofunctional

INCI name: aqua [and] propanediol [and] crocus sativus flower extract

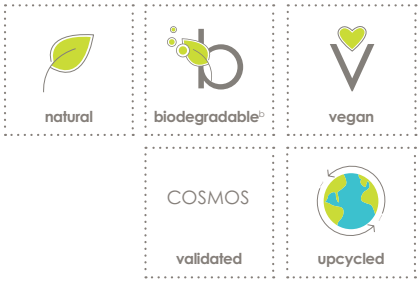
Saffragyl™ biofunctional is a patented natural biofunctional selected to inhibit the gingipain activity, the toxic virulence factor of p. gingivalis. Extracted from upcyled saffron flowers from the spice handcraft, this 100% natural and COSMOS*-validated extract helps prevent early gum problems and strengthen sensitive and irritated gums. Can be used daily for leave-on gum care and oral beauty routine

mouthwashes and treatment products

When formulated into leave-on oral care products, such as gels, serums and rinses, Saffragyl™ biofunctional helps soothe and protect gums. It is water soluble.

key benefits:

- helps soothe and protect gums from signs of gingivitis
- helps reinforce gum barrier
- improves gingival health
- helps limit bacterial adhesion related to plaque build-up
- microbiome- and gum-friendly
- compatible with daily use
- sustainably sourced



euxyl™ **k 712** preservative

INCI name: sodium benzoate, potassium sorbate, aqua (water)

Euxyl™ k 712 preservative is based on sodium benzoate and potassium sorbate, two organic acids that are also commonly used in the food industry. This mild liquid blend works best in cosmetic applications up to pH 5.5 and is fully effective in anionic, cationic and nonionic systems.

toothpastes and mouthwashes

Euxyl™ k 712 preservative was developed for cosmetic applications and also meets the requirements for certified natural cosmetics. With its strong broad-spectrum effect against bacteria, yeast and mold, it is an ideal antimicrobial concept for preserving toothpastes and mouthwashes.

key benefits:

- broad-spectrum efficacy against bacteria, yeast and mold
- cost-effective
- contains nature-inspired ingredients
- ideal for certified natural formulations: COSMOS & NaTrue compliant

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euxyl™ pe 9010 preservative

INCI name: phenoxyethanol [and] ethylhexylglycerin

euxyl™ pe 9010 preservative is a mild liquid cosmetic preservative based on the aromatic alcohol phenoxyethanol and the preservative booster ethylhexylglycerin. The addition of ethylhexylglycerin affects the interfacial tension at the cell membrane of microorganisms, improving the preservative activity of phenoxyethanol.

toothpastes and mouthwashes

In the recommended use-concentration, euxyl™ pe 9010 preservative is equally effective against bacteria, yeasts and molds. It is temperature stable and effective in pH-ranges up to 12. The blend is clearly soluble in solutions and an ideal cosmetic preservative for transparent gels.

key benefits:

- broad-spectrum efficacy against bacteria, yeast and mold
- market-leading preservative blend
- contains ethylhexylglycerin as performance booster
- proven to being microbiome gentle
- stable to hydrolysis, temperature and pH
- ideal solution for transparent oral care products

phyteq™ raspberry multifunctional

INCI name: raspberry ketone

Phyteq™ raspberry multifunctional is based on raspberry ketone, a naturally-occuring phenolic compound occuring in red raspberry and a variety of plants. Available as a white crystalline powder with neutral taste and odor it is compatible with a wide range of oral care formulations.

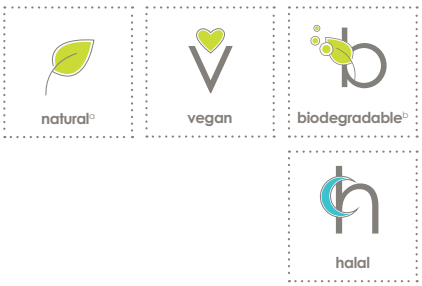
toothpastes and mouthwashes

Phyteq™ raspberry multifunctional can enhance the performance of toothpastes and mouthwashes without impacting taste or odor. It boosts preservative efficacy in formulations within pH 4-8. Phyteq™ raspberry multifunctional has strong synergy with perservatives, but also with antimicrobial agents commonly used in oral care for controlling bad breath and improving oral health. As an antioxidant, it can protect tissue from water-soluble and water-insoluble reactive oxygen species and has been shown to reduce the expression of certain inflammatory markers.

grade	chemical description
n	100% natural origin version with low environmental impact in sourcing and manufacturing
i	synthetic origin inspired by nature

key benefits:

- provides preservation boosting effect
- shows synergy with oral care antimicrobials and common preservatives
- strong antioxidant benefits for healthy gums
- neutral to faint raspberry taste and smell

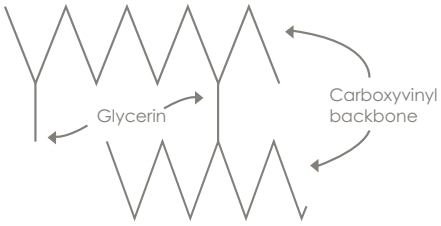


lubrajel* BA hydrogel

Lubrajel* BA hydrogel is a clathrate of glyceryl acrylate and glyceryl polyacrylate that encloses water molecules via hydrogen bonding and Van der Waals forces. As supplied, this unique hydrogel contains about 50% water.

mouth moisturizers and mouthwashes

As it binds moisture, Lubrajel* BA hydrogel helps provide relief from the feeling of a dry mouth. It imparts a combination of high mucoadhesion, hydration, and non-Newtonian rheological properties to mouth rinses, gels and sprays.

grade	chemical description	theoretical structure
BA	water, glycerin, butylene glycol, sodium polyacrylate, polyacrylic acid, benzoic acid, EDTA	

*Lubrajel is a registered trademark of United-Guardian, Inc.

key benefits:

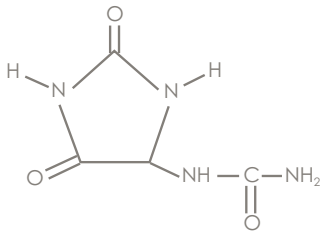
- provides hydration
- adds shear thinning characteristics, just like natural saliva
- enhances mucoadhesion to help hold moisture in the mouth
- provides cohesive rheological properties
- supplies lubricity for pleasant saliva-like mouth feel

nature-derived[a] | biodegradable[b] | vegan

allantoin

INCI Name: allantoin

Allantoin, a white odorless crystalline powder, has been widely used in various dental preparations, such as toothpastes and mouthwashes. Allantoin is a skin protectant agent with both soothing and moisturizing properties.

grade	chemical description	theoretical structure
allantoin USP	glyoxyldiureide	

key benefits:

- promotes a healthy environment
- provides emollient properties
- protects mucous membranes

halal | vegan

hyalurotech™ sodium hyaluronate

INCI Name: sodium hyaluronate

Natural to the human body, hyalurotech™ sodium hyaluronate is a linear, water-soluble, high molecular weight polysaccharide with enormous water-binding capacity. It is well-known hydrating polymer that organizes connective tissue and helps hydrate.

grade	molecular weight (kDa)
1800	>1800
1000/1800	1000 to 1800
10/1000	10 to 1000
200/400	200 to 400

All grades available as 100% active, white powder

key benefits:

- hydrates
- promotes healthy gums
- produced by fermentation

natural

COSMOS validated

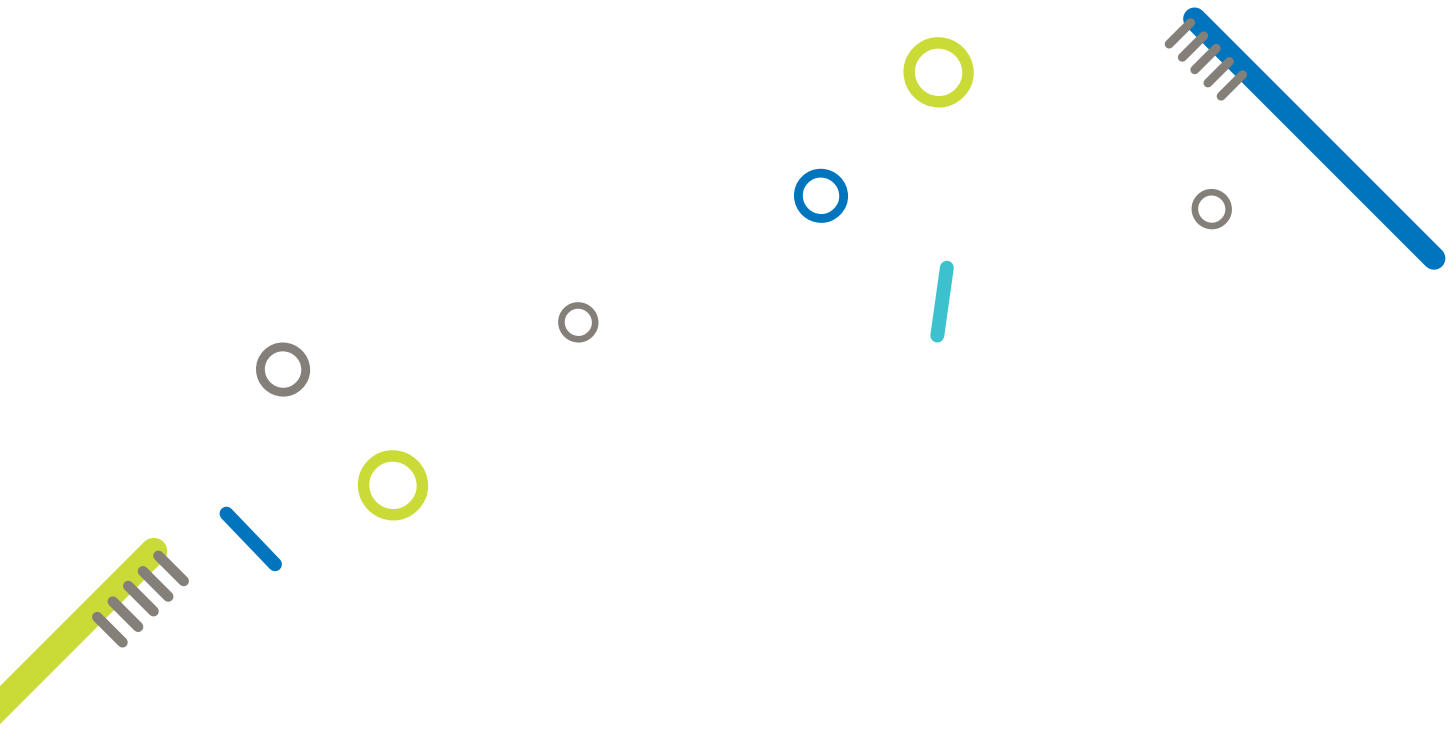
vegan

halal

toothpastes and mouthwashes

Hyalurotech™ sodium hyaluronate can be formulated in toothpastes and mouth rinses, at up to 0.5 wt.%, to enhance hydration and gum health.

[a] meets ISO 16128-2:2017 50-99% natural origin content standard
[b] Has attained a sufficient level of biodegradation that meets the requirements for 'ready' or 'inherent' according to OECD or related methods such as, 301, 302, or 306. Or product has been assessed as being biodegradable based on a read-across to a chemical with similar structure or the product components have been analyzed for biodegradation potential.
[c] Defined a level of biodegradation within standard OECD methods where there is evidence of ongoing biodegradation such that we are confident that the substance is not expected to persist in the environment. For example, if there is evidence for ongoing biodegradation on timescales beyond the standard OECD methodologies.



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