AkzoNobel Surface Chemistry

Incredibly clear.
Naturally better.

BIOSTYLE® Polymers

AkzoNobel

Clear

Create sparkling clear gels in a more natural way with a unique innovation that combines the best of synthetic performance and sustainable technology in one polymer.

Sustainable

BIOSTYLE polymers are unique hybrid fixatives and are environmentally responsible choices for today's natural formulating needs.

BIOSTYLE® CGP and BIOSTYLE® XH Polymers

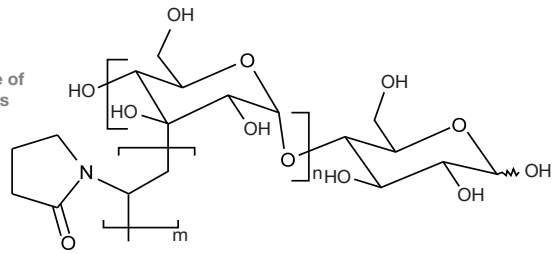
INCI: Maltodextrin/VP Copolymer

- New film-former options to satisfy customer and consumer demands for natural and more sustainable working styling products
- Partial natural content provides for a more sustainable formulating option
- BIOSTYLE polymers provide equal or better performance to traditional styling gel polymers with exceptional gel clarity and robust Carbomer compatibility
  - BIOSTYLE CGP polymer ~ PVP K-30 and PVP/VA systems
  - BIOSTYLE XH polymer ~ PVP K-90 systems

Hybrid polymer chemistry

Formed through the suspension polymerization of maltodextrin (a natural and renewable homopolymer of glucose) with n-vinyl pyrrolidone, they are supplied as a liquid in water at approximately 24-25% solids.

Proposed Structure of BIOSTYLE Polymers



Features and benefits of BIOSTYLE polymers

- Excellent performance in gels, mousses and styling aids
- Improved hair volume boosting vs. PVP and PVP/VA copolymers
- Excellent product and gel clarity
- Compatible with commonly used formulation ingredients
- Improved sustainability profile vs. PVP and other synthetic fixative polymers
- Easy to handle, low viscosity liquid
- No perceptible differences in gel texture or rheology
- Globally acceptable preservative system

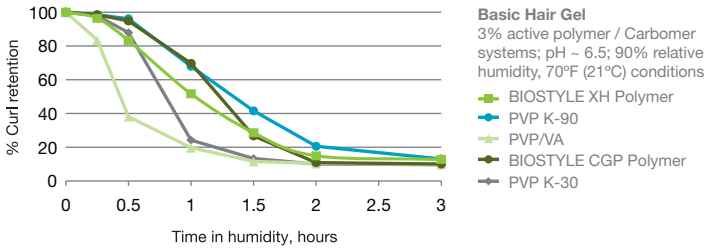
Use BIOSTYLE Polymers in:

- Clear hair gels
- Spray gels
- Creams
- Lotions
- Mousses
- Serums
- Spritz
- Pomades
- Waxes

Biostyle™
POLYMERS FOR PERSONAL CARE

Performance with Clear Sustainability: BIOSTYLE Polymers

High humidity gel curl retention with BIOSTYLE polymers



Tests using a basic hair gel formulation indicate both BIOSTYLE polymers perform as well as commonly used synthetic polymers.

Clarity and viscosity of gels formulated with BIOSTYLE polymers

BIOSTYLE polymers have robust compatibility with Carbomer and other thickeners and form crystal clear gels with high viscosity and excellent stability.

Gel property comparison*

Description	pH	Viscosity (cps)	Turbidity (ntu)
PVP K-30 Gel	6.29	42,700	9
PVP/VA Gel	6.15	43,000	15
BIOSTYLE CGP Gel	6.34	45,500	12
BIOSTYLE XH Gel	6.08	44,000	16
PVP K-90 Gel	6.40	46,140	19

*3.0% active polymer, Carbomer neutralized w/AMP, pH adjusted to 6.0 – 6.5
0.5% Carbomer used for PVP K-30, PVP/VA, BIOSTYLE CGP systems
0.3% Carbomer used for BIOSTYLE XH and PVP K-90 systems

Gels featuring the BIOSTYLE polymers using Carbomer as the rheology modifier can be formulated using aminomethyl propanol (AMP) or triethanolamine (TEA) neutralization. This comparison shows that crystal clear styling gels, as indicated by the low turbidity values, can be formulated using the BIOSTYLE polymers without compromising viscosity or overall performance. High clarity gels and solutions using naturally-derived fixatives are now possible with the BIOSTYLE polymer technology.

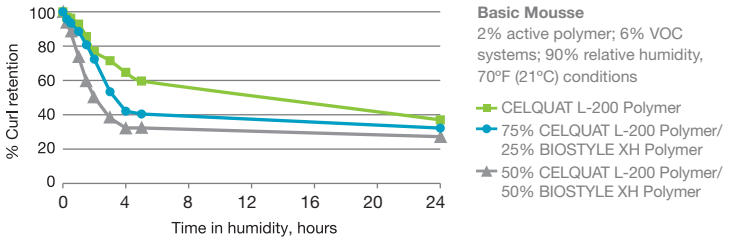
Performance in Mousse Systems

BIOSTYLE polymers are clear and compatible with cationic polymers, such as Polyquaternium-4, and are a more affordable choice for high performance mousse systems. When investigating blends of BIOSTYLE XH and CELQUAT® L-200 polymers compared to a CELQUAT L-200 polymer control, test results indicated that:

- 25% of the CELQUAT L-200 polymer could be replaced with BIOSTYLE XH polymer without any significant performance differences in wet properties (wet combing, wet feel) or dry on-hair properties (gloss, stiffness, dry combing, flaking, anti-static or dry feel).

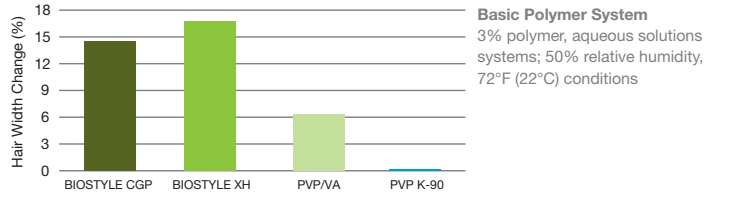
- 50% of the CELQUAT L-200 polymer could also be replaced with BIOSTYLE XH polymer without any significant performance differences in wet properties (wet combing, wet feel). For the dry on-hair properties, stiffness was inferior with the blend while all other attributes showed no significant performance differences.
- BIOSTYLE polymer utility in mousse can offer high performance with significant formula cost savings, while adding a greener touch to your products.

High humidity mousse curl retention with BIOSTYLE polymers



No statistically significant differences were detected in humidity resistance at the 24 hour period when comparing BIOSTYLE XH / CELQUAT L-200 polymer blends vs. CELQUAT L-200 polymer alone.

Volume Enhancement with BIOSTYLE polymers



Both BIOSTYLE polymer versions build more than twice the volume compared to PVP/VA and PVP K-90 polymers.

Ingredient Compatibility

BIOSTYLE polymers are compatible with most common formulation ingredients including, but not limited to panthenol, glycerin, silicones, sorbitol, EDTA, GLDA, polyethylene glycols and polypropylene glycols.

BIOSTYLE polymers are also compatible with Carbomer and many other rheology modifiers, including STRUCTURE® 2001 (Acrylates/ Steareth-20 Itaconate Copolymer), BALANCE® RCFg (Acrylates Copolymer) and AMAZE™ XT (Dehydroxanthan Gum) polymers.

Blends with other fixative polymers may be achieved to tailor performance properties. BIOSTYLE polymers are compatible with other fixatives including AMPHOMER® (Octylacrylamide / Acrylates / Butylaminoethyl Methacrylate Copolymer), FLEXAN® II (Sodium Polystyrene Sulfonate), DYNAMX® (Polyurethane-14 (and) AMP-Acrylates Copolymer) and CELQUAT L-200, CELQUAT® H-100 (Polyquaternium-4).

Styling

BIOSTYLE polymers provide a more natural option for high performing styling products.

Formulating Suggestions

BIOSTYLE polymers are versatile ingredients that can be used in a wide range of product forms where they lend a more natural element to your styling systems. Visit akzonobel.com/personalcare for complete details.

Ultimate Volume Styling Gel — 2609-40A

This clear styling gel provides extreme volume building power and lasting control while using a more sustainable fixative polymer partially derived from maltodextrin.

TRADE NAME, SUPPLIER	INCI NAME	% W/W
Deionized Water	Water (Aqua)	80.09%
BIOSTYLE XH polymer (25% active), AkzoNobel	**Maltodextrin/VP Copolymer**	**16.00%**
CELQUAT H-100 polymer, AkzoNobel	**Polyquaternium-4**	**0.25%**
AMP-Ultra™ PC 2000, Angus Chemical	Aminomethyl Propanol	0.20%
Carbopol® 980, Lubrizol Advanced Materials	Carbomer	0.35%
Sorbitol Solution (70%), Lipo Chemicals	Sorbitol (and) Water	2.00%
Glycerin	Glycerin	0.50%
Xiameter® OFX-0193 Fluid, Dow Corning	PEG-12 Dimethicone	0.04%
Ritapan-DL, Rita Corporation	Panthenol	0.05%
DISSOLVINE® NA2-S chelate, AkzoNobel	**Disodium EDTA**	**0.02%**
Sensiva® PA 40, Schülke & Mayr GmbH	Phenylpropanol (and) Propanediol (and) Caprylyl Glycol (and) Tocopherol	0.50%
	Total:	**100.00%**

Natural Volumizing Mousse — 2422-27.c

The maltodextrin-derived BIOSTYLE CGP polymer and cellulose-based CELQUAT H-100 polymer used together provide styling properties, hold and a conditioned dry feel.

TRADE NAME, SUPPLIER	INCI NAME	% W/W
Concentrate Phase		
Deionized Water	Water (Aqua)	84.67%
CELQUAT H-100 polymer, AkzoNobel	**Polyquaternium-4**	**0.10%**
BIOSTYLE CGP polymer (24% active), AkzoNobel	**Maltodextrin/ VP Copolymer**	**8.33%**
TWEEN™ 20, Croda, Inc.	Polysorbate 20	0.40%
Glydant Plus™ Liquid, Lonza	DMDM Hydantoin (and) Iodopropynyl Butylcarbamate	0.50%
Propellant Phase		
A-46	Isobutane (and) Propane	6.00%
	Total:	**100.00%**

Curl Boosting Spray — 2609-2.D

This pump spray formulated with the maltodextrin-derived BIOSTYLE polymers boosts volume and defines curls.

TRADE NAME, SUPPLIER	INCI NAME	% W/W
Deionized Water	Water (Aqua)	76.00%
Ethanol Anhydrous 40-B	SD Alcohol 40-B	20.00%
BIOSTYLE CGP polymer (24% active), AkzoNobel	**Maltodextrin/ VP Copolymer**	**2.00%**
BIOSTYLE XH polymer (25% active), AkzoNobel	**Maltodextrin/ VP Copolymer**	**0.50%**
FLEXAN II polymer, AkzoNobel	**Sodium Polystyrene Sulfonate**	**1.00%**
DISSOLVINE NA2-S chelate, AkzoNobel	**Disodium EDTA**	**0.05%**
Xiameter OFX-0193 Fluid, Dow Corning	PEG-12 Dimethicone	0.15%
Ritapan-DL, Rita Corporation	Panthenol	0.10%
Pelemol® G7A, Phoenix Chemical	Glycereth-7 Triacetate	0.15%
Geropon® SS-O-75, Solvay	Dioctyl Sodium Sulfosuccinate	0.05%
	Total:	**100.00%**

*This product has not been evaluated for safety clearance for use in pumps and/or aerosols with particle sizes less than 50 microns.

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AkzoNobel creates everyday essentials to make people's lives more liveable and inspiring. As a leading global paints and coatings company and a major producer of specialty chemicals, we supply essential ingredients, essential protection and essential color to industries and consumers worldwide. Backed by a pioneering heritage, our innovative products and sustainable technologies are designed to meet the growing demands of our fast-changing planet, while making life easier. Headquartered in Amsterdam, the Netherlands, we have approximately 45,000 people in around 80 countries, while our portfolio includes well-known brands such as Dulux, Sikkens, International, Interpon and Eka. Consistently ranked as a leader in sustainability, we are dedicated to energizing cities and communities while creating a protected, colorful world where life is improved by what we do.

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