Nouryon

Amaze™ XT polymer

Hair styling performance ... naturally

INCI: Dehydroxanthan Gum

Today's consumers are educated, driven to succeed and demanding. They want healthy hair that looks good and feels good. Individuality is very important – a driving factor in their quest for a look of their own. They use their hairstyles as forms of self-expression. And, they want their hair styling products to be as individual as they are, while providing exceptional performance.

Amaze XT styling polymer provides the benefits that meet these needs by offering unprecedented lasting hold with good feel and minimal flaking. It raises the bar on performance from hair styling gels like nothing before.

Recommended applications

Amaze XT polymer is a naturally derived, multifunctional styling polymer. It has been developed to provide outstanding long-lasting hold under highly humid conditions, without the tack and flaking often associated with gels.

Amaze XT polymer offers not only the fixative properties, but it also serves as the thickener, simplifying the formulation and manufacturing process. It is suitable for use in gels, glazes, spray gels, mousses, creams/lotions, pomades and other styling aids.

Features and benefits

- Readily water soluble
- Multi-functional: fixative and thickener/suspending agent
- Ease of use easily dispersed with no neutralization required
- Smooth feel
- Ease of detangling and combing (less mechanical hair damage)
- Minimal flaking
- Restylability

Suggested use levels, as supplied

Gel systems	1-2%, depending on hold level and desired viscosity
Styling aids, such as creams, lotions, and pomades	0.25-2.50%

Formulation guidelines

Supplied as a free-flowing powder, Amaze XT polymer is very simple to use. No heating is required and it goes into solution quickly, with no neutralization required. Typical usage levels are 0.25-2.50%.

Solubility

Amaze XT polymer is soluble in water and ethanol (< 30%). Clarity is maintained in hydroalcoholic solutions where the ethanol level is less than 30%.

Neutralization

Amaze XT polymer requires no neutralization.

Preservative systems

Glydant® Plus Liquid (DMDM Hydantoin and Iodopropynyl Butylcarbamate) is the most effective preservative system for Amaze XT polymer. A recommended starting level is 0.3% Glydant Plus on a liquid basis. Other recommended preservatives are Geogard® 221 (Dehydroacetic Acid and Benzyl Alcohol) and Natrulon™ PC-15 (Cinnamaldehyde and Potassium Sorbate). Paraben-based preservatives may reduce the viscosity of Amaze XT gel formulations.

Compatibility

Amaze XT polymer is anionic in nature and is compatible with a wide range of materials commonly used in gels, such as silicones, propylene glycol, glycerin, proteins, vitamins, disodium EDTA, tetrasodium EDTA, sodium phosphate and low levels of Flexan® II polymer (Sodium Polystyrene Sulfonate). A blend ratio of 3:1 Amaze XT:Flexan II polymer is recommended.

For emulsion products such as creams, lotions, and low viscosity glazes, Amaze XT polymer can be formulated with cationic polymers (e.g. < 0.5% Celquat® H-100 polymer).

It can be used with other styling polymers like acrylate (including the Amphomer® polymer, Balance® polymer series) polymers, polyurethane polymers (including DynamX® polymer), as well as with PVP and PVP/VA.

If desired, it can also be combined with additional thickeners (e.g. Carbomer®, Structure® XL starch, Structure 2001 polymer, Structure 3001 polymer, native xanthan gum, or hydroxyethylcellulose).

Performance properties

Amaze XT polymer offers unprecedented style retention under high humidity conditions compared to competitive polymers marketed for use in styling gels. Hair that is treated with Amaze XT polymer exhibits 95% curl retention after 24 hours at 70°F and 90% RH, a 40% improvement over the next best performing competitive polymer (figure 1).

Figure 1: High humidity curl retention

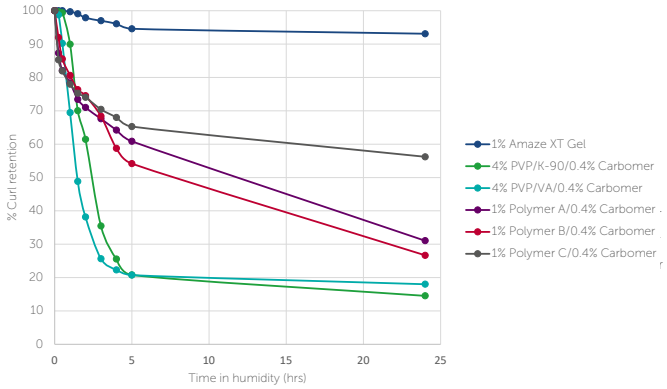


Figure 1: Amaze XT polymer gives unprecedented shape protection to curls, even in highly humid conditions, maintaining 95% curl retention after 24 hours.

Subjective study

Subjective evaluations were conducted by trained panelists on hair tresses to determine the performance of Amaze XT polymer compared to a traditional gel system. In this study, hair tresses were treated with a 1% Amaze XT gel, a 2% Amaze XT gel, or a 4% PVP K-90/Carbomer gel. The panelists evaluated the hair tresses both in a wet and a dry state.

As shown in figure 2, regardless of use level, the Amaze XT gel showed significant improvement over the PVP gel in dry comb, dry feel, dry detangling, and wet feel.

Stiffness is a performance benefit that can be altered by varying the level of Amaze XT polymer.

In this figure, the 1% Amaze XT gel is considered less stiff than the 4% PVP gel, while the 2% Amaze XT gel is considered similar in stiffness.

Figure 2: Subjective evaluation

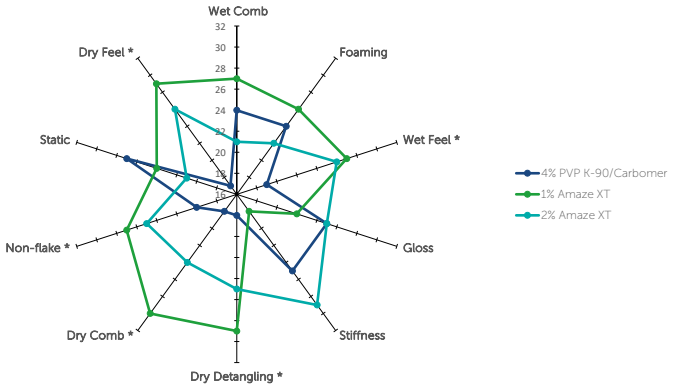


Figure 2: Amaze XT gel is significantly superior in wet and dry feel, dry detangling, dry combing and flaking compared to a traditional PVP gel.

It has been observed that the Amaze XT gels are not as tacky as traditional gels. To verify this, eight panelists were asked to apply a 1% Amaze XT gel into one hand and a 4% PVP K-90 gel into the other. The panelists rubbed the gels into the hands until dry and identified the hand/gel with more residual tacky feel. Unanimously, the panelists determined the Amaze XT gel to be less tacky (figure 3).

Figure 3: Superior hand feel – low residual tack

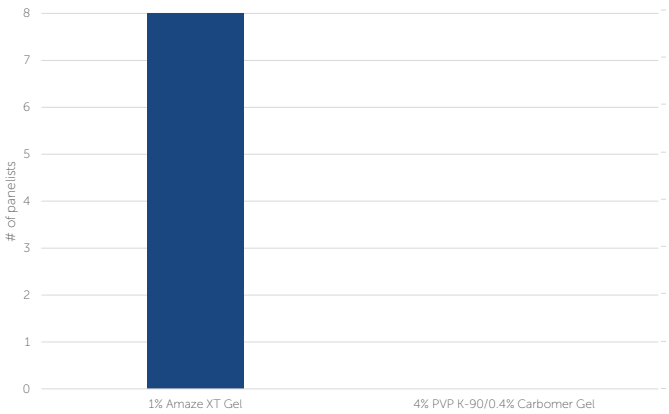


Figure 3: 8 out of 8 panelists feel significantly lower tack from Amaze XT polymer than PVP/Carbomer.

Amaze XT polymer is unique in that it serves as both the fixative and the thickener, allowing for the production of a hair styling gel with only one ingredient. It easily disperses into water, reducing the gel manufacturing time significantly compared to PVP/carbomer. To demonstrate this, 100 g batches were made side-by-side in the laboratory. The time required to put the PVP K-90 into solution and hydrate the carbomer was nearly six times longer than that required to disperse the Amaze XT polymer (figure 4).

Figure 4: Multi-functionality and ease of use

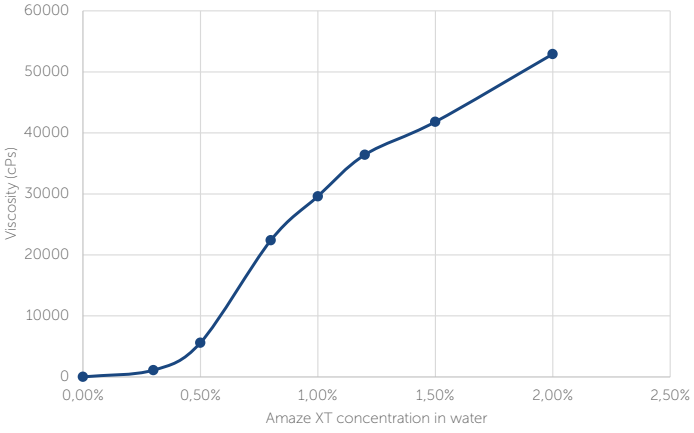
Ingredients	% w/w	% w/w
Part A		
PVP-K-90	4.0	
Deionized water	40.0	
Triethanolamine	0.3	
Part B		
Carbopol® 940	0.4	
Amaze XT polymer		1.0
Deionized water	55.0	98.7
Glydant® Plus liquid	0.3	0.3
Total	100.0	100.0
Formulation time (100 g lab batch)	50 minutes PVP/Carbomer	10 minutes Amaze XT polymer

Figure 4. Amaze XT polymer, which is easy to disperse in water and requires no neutralization, allows for the manufacture of gel in one step and reduces the production time by up to 80% compared to traditional PVP/Carbomer systems.

Solution properties

Because Amaze XT polymer is multi-functional, it is important to understand its solution properties. As shown in figure 5, the solution viscosity increases with increasing concentrations of Amaze XT polymer.

Figure 5: Viscosity profile



* Viscosity was measured at 23°C using Brookfield DV-I, spindle #6 @ 10rpm

Figure 5: Viscosity increases with increasing use levels of Amaze XT polymer.

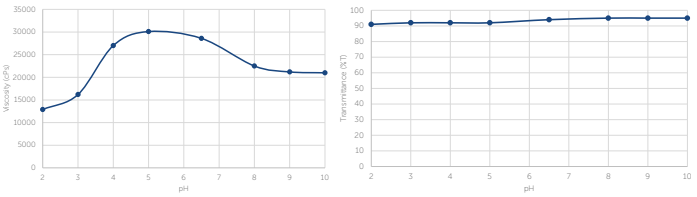
To better understand the flow properties of Amaze XT polymer, several experiments were conducted to determine the effect of shear on the gel. The 1% Amaze XT gel was compared to a leading commercial gel (PVP/carbomer based). The viscosity of the gels was monitored while increasing rates of shear were applied. Amaze XT gel has shear thinning pseudoplastic rheological flow, similar to the commercial gel.

In addition to flow properties, it is equally important to know the gel behavior once the shear is removed. The viscosities of the 1% Amaze XT gel and the commercial (PVP/carbomer) gel are evaluated first at low shear, followed by high shear and then low shear once again. The Amaze XT gel demonstrates that it is shear thinning, and recovers quickly following high shear.

In addition to its thickening abilities, Amaze XT polymer acts as a suspending agent. When a 1% Amaze XT gel is subjected to low levels of stress, it remains relatively undisturbed. It has a high elastic/storage modulus (G'), indicating good suspending ability.

Amaze XT gels are affected by varying pH (figure 6a, b) and by the addition of high levels of salt (figure 7a, b). The peak viscosity can be achieved at pH 4.5-6. As the pH decreases, the gel clarity is reduced, and conversely, the gel clarity improves slightly with increasing pH. The addition of monovalent salt (>0.25%) to an Amaze XT gel causes the viscosity to decrease. Although a gel structure is still maintained, it can reduce the clarity of the system. Lower levels of monovalent salt (e.g. sodium chloride) or divalent salt (e.g. calcium acetate) at less than 0.1% will not affect the viscosity or clarity of an Amaze XT gel.

Figure 6: Effect of pH on 1% Amaze XT viscosity and clarity

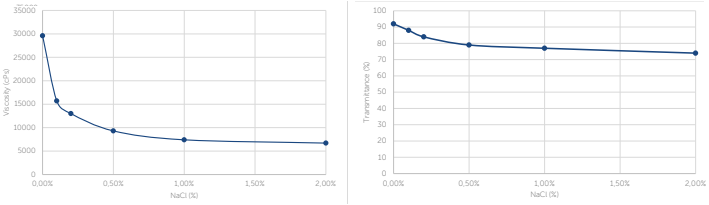


* Viscosity was measured at 23°C using Brookfield DV-I, spindle #6 @ 10 rpm
** Transmittance (%) was measured at 600nm after 3 weeks of gel preparation

Figure 6a (top): Peak viscosity is achievable at pH 4.5-6.0

Figure 6b (bottom): Clarity improves slightly with increasing pH

Figure 7: Effect of monovalent salt on 1% Amaze XT viscosity and clarity



* Viscosity was measured at 23°C using Brookfield DV-I, spindle #6 @ 10 rpm
** Transmittance (%) was measured at 600nm after 3 weeks of gel preparation

Figure 7a (top): The addition of > 0.25% monovalent salt reduces the viscosity of an Amaze XT gel. Levels of monovalent salt below 0.1% have minimal effect on Amaze XT gel viscosity.

Figure 7b (bottom): The addition of > 0.25% monovalent salt reduces the clarity of an Amaze XT gel. Levels of monovalent salt below 0.1% have minimal effect on Amaze XT gel clarity.

Product texture

Homogenization of an Amaze XT gel can provide a smoother texture and improve the gel clarity by approximately 10% transmittance. A homogenization speed of 300-600 rpm is recommended.

UV stability

Another factor to consider regarding gels is the impact of UV light. Typically, a UV filter is added to traditional PVP/carbomer systems to protect the gel integrity from the damaging effect of UV light. To better understand the UV stability of Amaze XT gels a study was conducted whereby an Amaze XT gel and a PVP/carbomer gel, with no UV filters, were exposed to UV light in a controlled chamber for 4 weeks. After the exposure period, the gels were removed from the chamber. The PVP/carbomer gel showed a color change from water white to yellow, and it exhibited a destruction of the gel structure, with a significant loss of viscosity. The Amaze XT gel showed good stability under UV light with no change in color, clarity or viscosity. Unlike PVP/carbomer systems, Amaze XT gels do not require the addition of sunscreen forprotection of the gel integrity.

Storage and handling

Amaze XT polymer can be stored under ambient conditions without undergoing decomposition or degradation. This product is supplied in fibre containers. When not in use, the container should be kept covered to prevent dirt, dust, or moisture pick-up. Store in a cool, dry area.

Health and safety

Information on Amaze XT polymer relating to the EU Cosmetics Directive 76/768/EEC is available onrequest.

Contact us directly for detailed product information and sample request
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Nouryon

Nouryon is a global, specialty chemicals leader. Markets and consumers worldwide rely on our essential solutions to manufacture everyday products, such as personal care, cleaning goods, paints and coatings, agriculture and food, pharmaceuticals, and building products. Furthermore, the dedication of more than 7,900 employees with a shared commitment to our customers, business growth, safety, sustainability and innovation has resulted in a consistently strong financial performance. We operate in over 80 countries around the world with a portfolio of industry-leading brands. Visit our website and follow us @Nouryon and on LinkedIn.

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