Gimar Distribution, inc.

POLYQUATERNIUMS

GimarQuat

Technology in the field of cosmetic chemistry is well understood which makes it difficult to develop impactful innovations. From a performance standpoint, there isn't much room for innovation in the areas of surfactants or emollients. Sure, there are still new compounds to try, but most of the main lines of investigation have been done and it's unlikely we will find new compounds that lead to consumer perceptible differences for these classes of molecules. Consumers are just not very observant.

But there is still room for new molecule innovation in the cosmetic industry. The most significant innovations will most likely be found in the area of polymers. Currently, our command over polymers is primitive being able to only swap out monomers and adjust ratios. However, much more complex molecules are possible and could prove useful in the creation of cosmetic products. In fact, all of biology is based on proteins and enzymes which are just biopolymers made with different sequences of amino acid monomers.

One kind of polymer that has already found great use in cosmetic formulating are Polyquaterniums.

These versatile polymers offer a variety of benefits when incorporated into cosmetic formulas. Let's look at the different Polyquats available and discuss some of their properties, functions and uses.

Polyquaternium chemistry

Polyquats are a class of cationic polymers used in both skincare and hair care formulas. They can be derived by chemically modifying natural polymers, such as cellulose, guar or chitosan, through the addition of quaternary ammonium compounds side chains. They can also be created from various organic monomers like acrylamide and diallyldimethylammonium chloride, vinylpyrrolidone and diallyldimethylammonium chloride and others.

However they are made, the resulting polymers will have a long carbon chain with a number of positive charged groups that allows them to bond with the negatively charged surfaces of hair and skin. This characteristic helps the polymer stay on the surface, set up a film and resist rinse-off.

How it works

One of the primary formulation challenges in making hair and skin products is that you need a way to ensure that beneficial ingredients stay on the surface even after the rinse-off phase. Strangely, some shampoos contain ingredients like proteins, vitamins, and oils which are simply washed away during use. Certainly, those might work as good claims ingredients but without a mechanism by which they deposit on the surface, most of it just ends up down the drain.

However, polyquaternium compounds don't have this problem because they do have two mechanisms through which they can remain on hair even through the washing and rinsing phase. One method is through electrostatic bonding and another is through the dilution/deposition mechanism.

Electrostatic bonding is easy enough to understand. The Polyquat molecules contain numerous positive charges and they are attracted to the negatively charged sites on the surface of hair. This bonding inhibits rinse-off.

The dilution/deposition mechanism works like this.

- Before use: In the product, polyquaterniums are generally highly concentrated. They remain in the solution, evenly dispersed and fully dissolved due to their water-soluble nature.
- During use: When a consumer applies the product to hair or skin and adds water (diluting it), the situation changes. The concentration of the polyquaterniums decreases, altering their behavior.
- Deposition: At a certain concentration, triggered by the dilution, the polyquaterniums become less soluble. They fall out of solution and form a layer (or deposit) on the surface. This layer resists rinse off and remains on the hair.

This remaining polymeric film can provide a number of noticeable benefits.

Benefits of polyquaternium in use

In hair products, there are a number of benefits a polyquat can provide.

Enhanced Conditioning: The polyquaternium film provides noticeable conditioning properties. It smoothens the cuticles, reducing frizz, and improving hair manageability. This results in softer, silkier, and more manageable hair.

Improved Detangling: The cationic nature of Polyquaternium aids in detangling hair by reducing inter-fiber friction. This makes combing easier and helps prevent hair breakage, especially in wet hair conditions.

Style Retention: When used in styling products like mousses, gels, or sprays, Polyquats can help improve style retention properties by maintaining hair shape, volume, and hold, while ensuring longer-lasting styles.

Heat Protection: Polyquaternium polymers may also offer some heat protection. They form a protective barrier on the hair shaft, reducing damage caused by heat-styling tools like blow dryers, curling irons, and straighteners.

Polyquats in Skin Care

Polyquaternium's use is not limited to hair care alone as it can also be used for various skin care benefits.

Moisturization and Hydration: Some polyquats acts as a humectant, attracting moisture from the environment and binding it to the skin. This helps to improve skin hydration, keeping it supple and reducing the appearance of dryness and fine lines.

Skin Conditioning: The film-forming properties of Polyquats allow them to create a protective barrier on the skin's surface, minimizing water loss and protecting against environmental irritants. This, combined with occlusive agents, can lead to smoother, softer, and more conditioned skin.

Formulation Benefits

In addition to the performance benefits, polyquaternium compounds can also positively affect a formula. For example, they can provide stabilization of emulsion-based formulas by interacting with both the oil and water phases and preventing separation. This can also improve the overall texture and feel of the product upon application. They can also improve the spreadability of skin care products, allowing for easier application and better coverage on the surface.

Finally, this class of ingredient has been evaluated by the Cosmetic Ingredient Review (CIR) Expert Panel, and are generally considered safe.

Environmental concerns

While polyquats are safe for human use, some are concerned about their impact on the environment. In general, they are not easily biodegradable so may accumulate in the aquatic environment after being washed down the drain. This could potentially pose a risk to aquatic organisms, however, the large molecular size of the compounds makes it less likely. As with most environmental questions, more research is needed in this area.

GimarQuat PQ 6PF - INCI: Polyquaternium 6

Viscosity	pH	Solids	Dosage
5.000 – 12.000 cP	5,0 –7,0	39 -42%	0,3 –5,0%

Pro pert ies

- DADMAC Homopolymer.
- 100% cationic.
- High substantive power.
- Compatible with cationic, non-ionic and amphoteric surfactants.
- It imparts a smooth and velvety touch on the skin contributing greatly to maintain a maximum degree of hydration.
- Easy to dosage due to its solubility in water.
- Very high molecular weight polymer.

GimarQuat 6PF - INCI: Polyquaternium 6

Application

HAIR CARE PRODUCTS

Used in Hair Relaxers, Bleaches, Dyes, Shampoos, Conditioners. It provides:

1. A luster and a soft, silky feel
2. Excellent slip, lubricity and snag-free wet compatibility.
3. Excellent dry combability and reduces static.

SKIN CARE PRODUCTS Used in Moisturizing Creams, Lotions, Bath Gels, Liquid Soaps, Soap Bars, Shaving Products, Antiperspirants and Deodorants. It provides:

1.A smooth, velvety feel; reduces tightness after drying skin.

2.Excellent moisturization.

3.Lubricity which can help make skin care products easier to apply.

4.Enhances spreadability of creams and lotions.

INCI: Polyquaternium 7

:

PQ7 SERIES
GimarQuat PQ7PF 10% actives

Properties:

Acrylamide / DADMAC copolymer. All PQ7 are Parabens Free. PQ7 is an aqueous cationic polymer compatible with cationic, non-ionic, anionic and amphoteric surfactants. It provides transparent and colorless cosmetic products. It contributes to luster and soft, silky feel to skin and hair.

Imparts Excellent wet and dry combability.
It provides dense and creamy foam.

GimarQuat PQ 7PF INCI: Polyquaternium 7

Application

HAIR CARE PRODUCTS Used in Shampoos, Dyes,

Conditioners, Styling products. It provides:

1. Creamy foam to shampoos.
2. Soft and silky hair. Hair softener and wet hair feeling during washing.
3. Excellent dry combability.
4. Snag-free wet combability.

SKIN CARE PRODUCTS

Used in Lotions, Bath Gels, Liquid soaps, bar soaps, deodorants, shaving products, moisturing creams.
It provides:

1. Smoothness and reduces tightness sensation.
2. Lubricity in order to be easier to apply.
3. Excellent moisturization.

GimarQuat PQ 22PF - INCI: Polyquaternium 22

Viscosity	pH	Solids	Dosage
3.000 –6.000 cP	4,0 –5,5	39 -43%	1 to 3%

Properties

- Acrylic acid / DADMAC copolymer.
- Compatible with cationic, non-ionic, anionic and amphoteric surfactants.
- Substantively properties to skin and hair (PQ22 is mainly used in hair care formulations due to its high cationicity).
- It provides stable, rich and dense foam.
- Preservative system is sodium benzoate.

GimarQuat PQ 22PF - INCI: Polyquaternium 22

Application HAIR CARE PRODUCTS

Used in shampoos, conditioners, styling products. It provides:

1. Conditioning properties for products with extreme range of pH.
2. No hair color affect and Soft and silky feeling.
3. Excellent dry combability.
4. Compatible with most anionic and amphoteric surfactants.
5. Snag-free wet combability.

SKIN CARE PRODUCTS

Used in Moisturizing Creams, Lotions, Bath Gels, Liquid Soaps, Soap Bars, Shaving Products, Antiperspirants and Deodorants. It provides:

1. A smooth, velvety feel; reduces tightness after drying skin.
2. Provides excellent moisturization.
3. Contributes lubricity which can help make skin care products easier to apply.

GimarQuat PQ 22PF - INCI: Polyquaternium 22

Viscosity	pH	Solids	Dosage
3.500 –9.000 cP	4,0 –5,5	36 -40%	1 to 3%

Pro pert ies

- Acrylic acid / DADMAC copolymer. Demonstrates
- ampholytic characteristics. Excellent stability in
- extreme pH applications making it ideally suited for use in products for dry or chemically treated hair.
- Recommended for ethnic hair care as well as skin care applications.
- Preservative Free.

GimarQuat PQ 22PF - INCI: Polyquaternium 22

Application

Hair Care Products

Used in shampoos, conditioners, styling products. It provides:

1. Conditioning properties for products with extreme range of pH.
2. No hair color affect and Soft and silky feeling.
3. Excellent dry combability.
4. Excellent slip, lubricity and snag-free wet combability.
5. Compatible with most anionic and amphoteric surfactants.
6. Non-flaking.

SKIN CARE PRODUCTS

Used in Moisturizing Creams, Lotions, Bath Gels, Liquid Soaps, Soap Bars, Shaving Products, Antiperspirants and Deodorants. It provides: 1.A smooth, velvety feel; reduces tightness after drying skin.

2.Provides excellent moisturization.

3.Contributes lubricity which can help make skin care products easier to apply.

4.Liquid cleansing products acquire richer foam with improved stability.

GimarQuat PQ 37PF - INCI: Polyquaternium 37

Viscosity	pH	Solids	Dosage
2.000 –8.000 cP	3,0 –4,5	9 -11%	2 to 5%

Pro pert ies

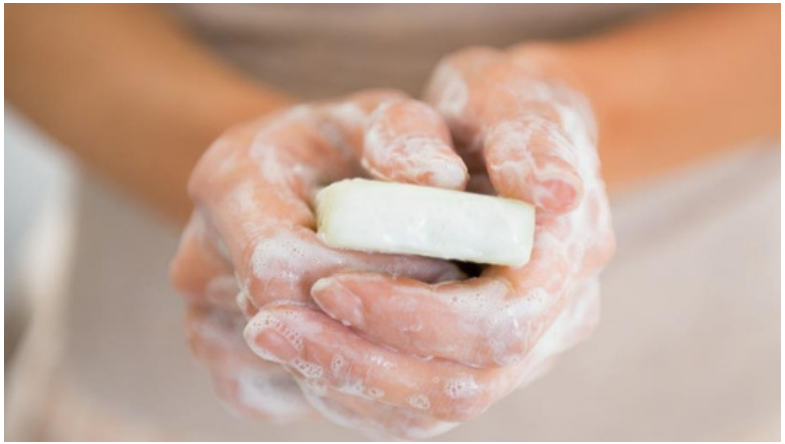
- Dimethylaminoethyl Methacrylate Methyl Chloride (MADAMQUAT) Homopolymer.
  Quaternary ammonium polymer commonly used as an
- ingredient in many hair care products such as shampoos, conditioners, masks, and styling products due to its conditioning, protective, and antistatic properties.

INCI: Polyquaternium 39

Product	V isc o sit y	pH	Solids	Dosage
GimarQuat 39PF	1.000-6.000 cP	3,3 –4,5	10,2 –11,5%	Suggested starting dosage at 1% (K39PF) or 0,25% (K439PF)
GimarQuat 439PF	7.000-17.000 cP	3,0 –4,1	39 -41%	

Properties

- Acrylamide / Acrylic Acid / DADMAC terpolymer.
- Amphoteric terpolymer suited for liquid cleansing products.
- Compatible with cationic, non-ionic, anionic and amphoteric surfactants.
- Preserved with Sodium Benzoate as an alternative to parabens.



INCI: Polyquaternium 39

GimarQuat 39PF & GimarQuat 439PF

Application

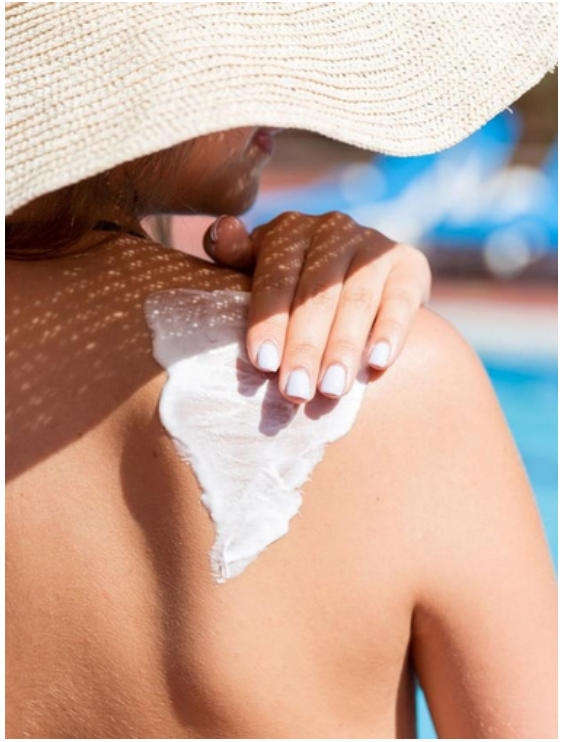
- Imparts a smooth, velvety feel.
- Reduces tightness after drying skin.
- Reduces irritation from liquid skin cleansing products.
- Liquid cleansing products acquire richer, thicker foam with improved stability.

HAIR CARE PRODUCTS

Used in Curl Activators, Bleaches, Dyes, Shampoos, Conditioners.

SKIN CARE PRODUCTS

Used in Moisturizing Creams, Lotions, Bath Gels, Liquid Soaps, Soap Bars, Shaving Products, Antiperspirants, Deodorants and Sun Care Products.



POLYQUATERNIUMS

SUMMARY

Product	Main Use
PQ6	Hair Care (100% cationic)
PQ7	Hair & Skin Care
PQ22	Hair Care
PQ37	Hair Care
PQ39	Hair Care (Curl activators)

Thank you for your attention!

Gimar Distribution, inc.

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