

Examination of a new cationic maltose oligosaccharide and its effect on skin moisturization and hair conditioning.

Authors: James V. Gruber, Sarah Jindal, Christopher H. Johnson, Lisa M. Lods, Christopher West

Introduction

Carbohydrates, one of the four major classes of biomolecules (including proteins, lipids and nucleic acids), are by far the most abundant on earth. These organic compounds boast multiple biochemical roles in plants and animals including metabolic fuel, energy stores and structural elements.

Nature offers us innumerable varieties of carbohydrates, many of which are easily taken for granted. Simple sugars like glucose and mannose are among the most recognizable. Simple sugars can bind together into larger chains of sugars called polysaccharides. The paper on which this information is printed is derived from the world's most abundant carbohydrate-cellulose, a polymeric sugar derived from many glucose molecules.

Plant oligosaccharides are molecular chains of sugars that occupy a unique range of molecular weights existing somewhere between simple sugars (monosaccharides) such as glucose, and high molecular weight sugar polymers (polysaccharides) such as starch and cellulose.

Increasing Molecular Weight Sugars

Monosaccharide → Oligosaccharide → Polysaccharide

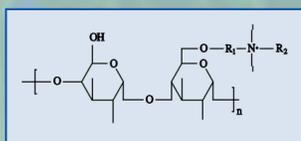
As such, these oligomeric sugars have considerable water-retaining capabilities, like simple sugars, due to multiple sites where water can hydrogen bond to the sugar backbone. Unlike polysaccharides, however, the lower molecular weight of the oligosaccharides allows the materials to be readily water-soluble and to target sites of damage on hair and skin to help carry moisture into the stratum corneum where it is most needed.

However, just simply having a low molecular weight sugar polymer is not enough to make a product effective in surfactant-containing systems such as shampoos and body washes. Under normal washing conditions, the surfactants would simply wash the sugar off the hair and skin. To overcome this possibility, Arch Personal Care modifies sugarcane plant oligosaccharides through proprietary

quaternization technology to place a cationic charge on the oligosaccharide. This affords a product that retains the extraordinary moisture-binding properties of simple sugars, but also is extremely substantive to the hair and skin, a property most commonly associated with high molecular weight polysaccharides.

Product Information

Oligoquat M represents a new generation of naturally derived, efficacious quaternaries for personal care. The presence of an oligosaccharide determines the improved performance and functionality of this material over more common quaternized materials.



Oligoquat M is ideal for rinse off and leave-on applications for hair and skin. The sub-

stantive, moisture-providing layer is retained on the hair and skin after rinsing providing excellent humectant and softening properties.

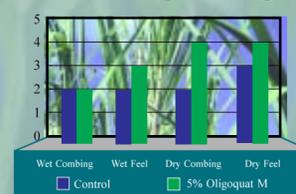
Technical Data

Oligoquat M was evaluated for substantivity using the Rubine Red Dye Substantivity Measurement. In this evaluation, an anionic dye complexes with cationics deposited on standard wool test fabric. The intensity and shade of the resultant stain on the fabric are indicative of the cationic strength and nature of the test material. 1% active solutions of known cationics and **Oligoquat M** were prepared in demineralized water. No adjustments for pH were made. **Oligoquat M** was compared to quaternized wheat proteins and stearyltrimonium chloride. At 1%, **Oligoquat M** was shown to be more substantive than both quaternized wheat proteins and stearyltrimonium chloride.

A Hair Tress Study was performed using a basic shampoo formulation, with and without **Oligoquat M**, to evaluate the wet and dry combability and feel of hair after washing and drying. 24 damaged blonde hair tresses were used with 12 panelists conducting blinded evaluations. The tresses were divided into groups of 2; each tress was then washed with

one of the shampoo formulations, one with **Oligoquat M** and one without. Wet evaluations were conducted immediately following washing. The results were graded on a scale of 1 to 5 with 5 being the best for feel and combability. The tresses were evaluated again after drying for the same parameters using the same grading scale. Results are shown in the graph.

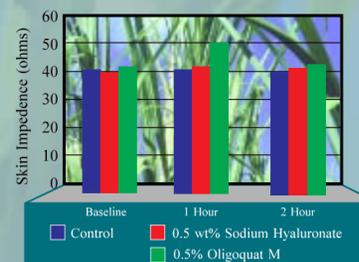
Hair Tress Study Damaged Hair



A 14-subject panel was used to determine the effect of a cosmetic product on skin moisturization using the Corneometer. **Oligoquat M** was used as compared to sodium hyaluronate (0.5%). After a 6-day conditioning period, subjects were acclimated to ambient temperature and relative humidity for 30 minutes before readings were taken.

Three test sites were defined on the volar forearms of the subjects. Baseline measurements were taken in triplicate with the Corneometer. Following baseline measurements, 0.1 gram of each test material (**Oligoquat M** and sodium hyaluronate) was applied to the assigned site. The control site remained untreated. Triplicate Corneometer readings were taken from each test site at 1 hour and 2 hours from the time of test material application. As can be seen from the graph below, **Oligoquat M** was able to increase skin moisturization over time performing better than sodium hyaluronate, a well-known skin moisturizer.

In-Vivo Skin Moisturization Study



Conclusion

Consumer demands put upon the manufacturers of personal care products drive the trend to develop value added improvements to the performance of hair and body care formulations. **Oligoquat M** is a naturally derived, quaternized oligosaccharide that is ideal for use in rinse-off and leave-on skin and hair care applications. Its extensive moisture-binding properties and excellent substantivity provide moisturizing and softening to skin and hair.

Oligoquat M can help to smooth and repair damaged hair cuticles leaving a brilliant, healthy shine on the hair. When used in body washes, it will leave the skin feeling smooth, moist and supple. **Oligoquat M** is a novel, affordable and substantive moisturizing agent that will noticeably improve the functionality of shampoos and conditioners, body washes and lotions to satisfy the ever-increasing performance needs of our customers.

Applications

- **Hair care products** -- Moisturizing shampoos, conditioners, leave-in and sprayable treatments
- **Skin care products** -- Moisturizing body washes, body lotions, post-shave treatments

Typical Properties

- **Proposed INCI Name** -- Soy Dihydroxypropyldimonium Oligosaccharides & Propylene Glycol
- **Appearance** -- Clear to slightly hazy viscous liquid
- **Color** -- Clear to light yellow
- **Use levels** -- 3.0 -- 5.0%
- **Avg. Molecular Wt.** -- 25,000-50,000



Arch Personal Care Products, L.P.

Cosmetic Ingredients & Ideas®