Incroquat Behenyl TMS

Cetearyl alcohol and behentrimonium methosulfate

Incroquat Behenyl TMS is an exceptionally effective cationic self-emulsifying wax and quaternary conditioner for both hair and skin care applications. As a behenyl derivative, its longer chain fatty moiety (C22) offers distinct formulating advantages over the more traditional lauryl- to stearyl-based quaternaries. Incroquat Behenyl TMS provides enhanced conditioning and emulsifying properties in combination with the greater mildness demanded by cosmetic formulations today.

Benefits

- Substantive to hair and skin
- Confers excellent wet combability
- Outstanding conditioning agent
- Improved mildness/reduced irritation potential
- Low CMC
- Primary emulsifier
- Thickening agent/stabiliser
- Emulsifies high levels of silicone
- Vegetable-derived
- Easy-to-handle pastille form

Incroquat Behenyl TMS is a quaternary amine salt derived from the natural plant oil Colza, commonly known as Rapeseed oil, and is supplied as a 25% active pastillated form. As a multifunctional ingredient it is recommended in a variety of personal care applications.

Applications

- Leave-on and rinse-off conditioners
- Hair detanglers
- Hair bodying conditioners
- Skin creams and lotions
- Protective silicone emulsions
- Hair relaxer creams/ethnic hair conditioners
- Antiperspirant/deodorant sticks

Conditioning

As a long chain C22 surfactant, Incroquat Behenyl TMS is more hydrophobic in nature than conventional quaternaries and so confers superior detangling, conditioning and thickening properties in performance hair care formulations. Exhibiting exceptional mildness, Incroquat Behenyl TMS is ideal for incorporating in leave-on conditioners and cream rinses as well as a broad range of skin care preparations including moisturisers, nourishing creams, lotions, sun/baby care products and makeup bases.

Incroquat Behenyl TMS is substantive to both hair and skin. In hair care preparations it imparts excellent wet combability and manageability, reducing static and leaving hair feeling lightly conditioned without the build-up often associated with polymeric quats.

Figure 1 depicts the reduction of wet combing forces by Incroquat Behenyl TMS compared to two other quaternary conditioning agents. Results are expressed as mean ± standard deviation.
Figure 1  Reduction of wet combing forces by various quats (2% active)

Wet combing force measurements were performed on six washed European hair swatches using a Diastron Tensile Tester with a 2000g load cell. Full details of the test protocol and results are available on request1.

In skin creams and lotions, Incroquat Behenyl TMS confers conditioning and skin softening effects, imparting a pleasant cushioned afterfeel.

Emulsification
Incroquat Behenyl TMS is a powerful primary emulsifier and can produce stable cationic emulsions even at low inclusion levels. When used as the only oil phase ingredient and emulsifier in low solids formulations, it facilitates the production of stable cost-effective emulsions without compromising performance standards.

In addition, Incroquat Behenyl TMS can emulsify high levels of silicone eg dimethicone, cyclomethicone, materials which can be difficult to incorporate into emulsion systems. Silicones are typically used in hair conditioning products for their hydrophobicity, as restoring the hair’s water repellency after chemical treatments (perming, colouring, relaxing) is an important part of the conditioning process. Protective silicone skin creams also function on this basis. By incorporating Incroquat Behenyl TMS into silicone systems a pronounced conditioning effect is obtained, enhancing both product performance as well as aesthetics.

Mildness
A two stage independent study was conducted to evaluate irritancy and skin care benefits of Incroquat Behenyl TMS compared to a series of other cationic surfactants. Testing consisted of an in vitro bioassay for cytotoxicity using a reconstituted skin model and an in vivo clinical trial for evaluation of irritancy.

The in vitro study used normal human-derived epidermal keratinocytes to measure the relative cytotoxicity of the various test lotions at 1% active surfactant. Results indicate that the Incroquat Behenyl TMS lotion shows greater cell viability and therefore lower irritation compared to other commonly used conditioning quaternaries, including cetrimonium chloride. Additionally, the scores for Incroquat Behenyl TMS are comparable to a standard nonionic emulsifying wax NF which is generally considered to be non-irritating2.
Figure 2 shows the results of a further *in vitro* safety test, comparing Incroquat Behenyl TMS and stearalkonium chloride at equal activities. Cell viability scores correlate with previous tests to reinforce the lower irritation potential of this innovative quat.

![Diagram of in vitro mildness test - comparative cytotoxicity](image)

**Figure 2**  *In vitro* mildness test – comparative cytotoxicity

It is believed this lack of irritation is due to the much lower critical micelle concentration (CMC) that characterises the methosulfate form of the behenyl quat. A low CMC indicates that a small fraction of a surfactant is present in its momomeric form which can penetrate skin tissue and cause irritation.

*In vivo* clinical testing of Incroquat Behenyl TMS consisted of the topical treatment of test lotions to both forearms of human subjects in an 18-member panel. Skin sites were evaluated for evidence of irritation including erythema, flaking, roughness and barrier dysfunction. Results demonstrate that Incroquat Behenyl TMS is non-irritating and does not compromise the barrier function of the skin.

**INCI name**
Cetearyl Alcohol and Behentrimonium Methosulfate

**Health and safety**
Both *in vitro* and *in vivo* studies have demonstrated that Incroquat Behenyl TMS is non-irritating at in-use dilutions, and as with other quaternaries it is expected to be irritating to skin and eyes as supplied. Incroquat Behenyl TMS is non-toxic on ingestion.

**References**
1. Incroquat Behenyl TMS - effect on wet combing forces of hair, (V020), Croda technical report
2. Evaluation of the mildness of Incroquat Behenyl TMS in topical leave-on preparations, (V073), Croda technical report

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