Novel Preservative Blends Based on Piroctone Olamine

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Introduction

As most cosmetic formulations contain a high amount of water they are by nature prone to contamination by microorganisms, as water is a main prerequisite for life. In addition, many ingredients like herbal extracts, proteins or vitamins serve as nutrients for microorganisms and can increase the potential of microbial growth. Other components like Xanthan or Guar gum can bear spores of microorganisms thereby introducing bacteria and fungi to the formulation. In order to control the growth of microorganisms and to protect the consumer's health it is necessary to add a preservative or a preservative blend to cosmetic formulations.

The preservatives that have been used most frequently are the Parabens, Formaldehyde-releasing substances like DMDM Hydantoin or Imidazolidinyl Urea or halogenated molecules like Chloromethylisothiazolinone or Iodopropynyl Butylcarbamate. All of these compounds show a high antimicrobial efficacy. In addition to their effectiveness, the experience gained over many years of handling these substances has resulted in their presence in virtually every kind of cosmetic product. Despite widespread use, for different reasons the safety of these preservative classes is in discussion and more scientific data has been requested to verify their safe use.

The result of this scrutiny has left the industry longing for new antimicrobial actives which do not show any or only very low irritation or sensitisation potential, are mild to the consumer's hair and skin, are easy to handle, highly efficient and show a broad-spectrum activity. Many new ingredients found in the market often lack one of the above mentioned properties and very often long-term studies of their safe use are missing.

However, there is an active out on the market which can be used as a preservative (listed in the ANNEX VI of the European Cosmetic Directive) fulfilling all of the above mentioned properties. This active is called Piroctone Olamine.

Piroctone Olamine has been used as an anti-dandruff agent for more than 30 years and has shown an excellent safety record and efficacy. Besides its splendid anti-fungal efficacy it is also highly efficient against both Gram-positive and Gram-negative bacteria. It is temperature tolerant up to 80°C, can be used within a pH range between 4-9 and clear formulations can be prepared with this active as well. As an additional benefit Piroctone Olamine is not halogenated and does not release Formaldehyde (see Figure 1), so it does not belong to any of the above mentioned groups that are currently in discussion. These properties make Piroctone Olamine an ideal choice if one does not want to use the classical preservatives. What is often neglected is the fact that Piroctone Olamine cannot only be used as a preservative in rinse-off formulations, but also for leave-on formulations like creams or body lotions.

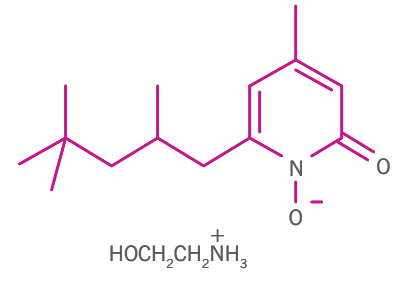

Figure 1: Molecular structure of Piroctone Olamine.

In its pure form Piroctone Olamine is a solid with low water solubility. As it is very often easier to handle liquids rather than solids, we developed three different liquid blends to ease its handling. In all of the blends the alcohol Phenoxyethanol is used to dissolve the Piroctone Olamine while its presence offers the added benefit in that it is especially active against the often hard to control Gram-negative bacteria, like *Pseudomonas aeruginosa*. This combination often helps to use a lower amount of the preservative blend and is offered by our company under the trade name Nipaguard® PO 5. To further increase the efficacy of Piroctone Olamine blends we added Benzoic Acid (Nipaguard® POB) and Methylparaben (Nipaguard® POM) respectively. These combinations further increase the synergistic effect, making these blends highly efficient against both bacteria and fungi at a pH range from 4-9. While Nipaguard® POB is also quite strong at pH values higher than 6 it is extremely powerful at pH $\leq$ 6 as the Benzoic