

CLARIANT 

Taking anti-dandruff
shampoos to the next level
OCTOPIROX®



what is precious to you?

Taking anti-dandruff shampoos to the next level – Octopirox®

Piroctone olamine is one of the most efficient anti-dandruff actives available on the market today. Designed specifically to treat seborrheic dermatitis and dry scalp, piroctone olamine offers additional benefits: it is environmentally friendly, multifunctional (doubles as preserving agent), and can be used in various cosmetic formats. We present a key active ingredient from Clariant's product range for the personal care industry: Octopirox® – your best alternative.

Scalp Care Benefits

- Dandruff- and flake-free
- Itch-free
- Gentle on scalp

Formulation Features

- Transparent formulation
- Easy to formulate
- pH- and temperature-stable

Additional Benefits

- Low aquatic toxicity (no labeling required)
- Broad-spectrum preservation



Scalp Care DANDRUFF- & FLAKE-FREE



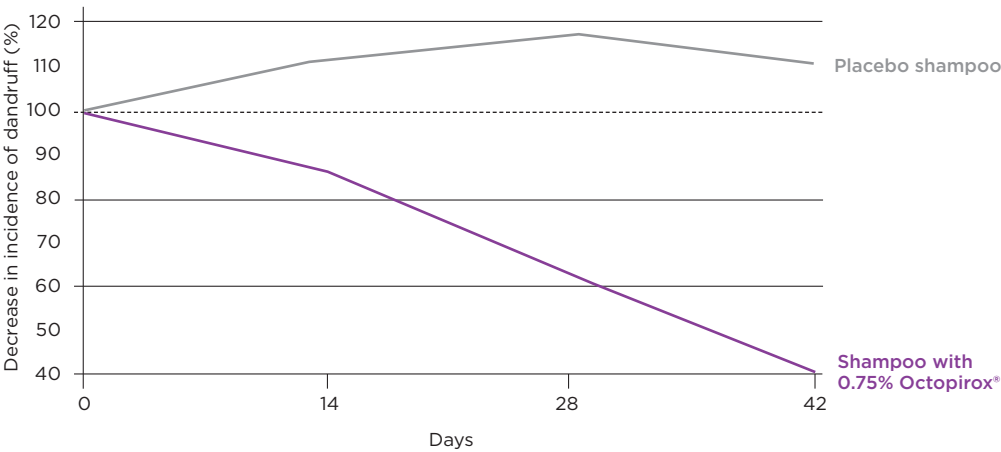
Octopirox® is an effective, nontoxic anti-dandruff active ingredient. It is particularly suitable for the manufacture of anti-dandruff shampoos and hair care products such as hair tonics and cream rinses.

Microorganisms such as *Malassezia furfur* produce enzymes which decompose fats into their respective fatty acids. These and other products of decomposition, such as lipo-peroxides, irritate the scalp. As a result, mitosis and production of keratinocytes increases, leading to desquamation and parakeratosis.¹

Octopirox® controls the growth of microorganisms effectively and directly targets the cause of dandruff. Use concentration can be between 0.1 and 1.0%, depending on the finished product. For leave-on products, the concentration can be lowered to between 0.05 and 0.1%.

STUDY: ANTI-DANDRUFF ACTION IN SHAMPOOS

In a study over the course of 1.5 months, a formulation with Octopirox® at a concentration of 0.75% showed clear decrease of dandruff compared to a placebo shampoo.



Source: Clariant

¹ Lüpke N.-P. "Wirkstoffe in Antischuppen-Kosmetika", Ärztliche Kosmetologie, 1979, 9, 174-180

Scalp Care

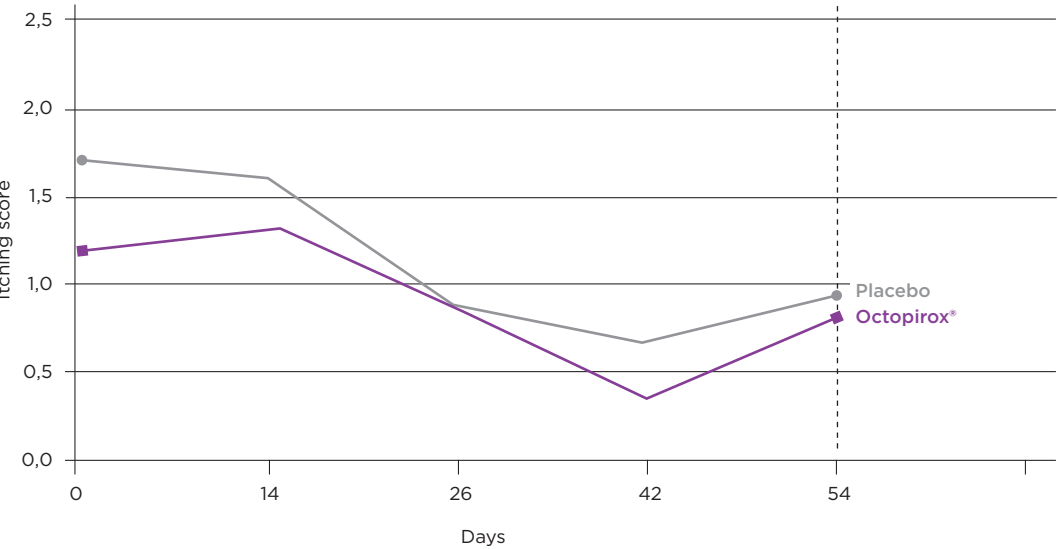
ITCH-FREE SCALP

They just can’t stop scratching their heads: Many people in the world suffer from an itchy scalp. Various conditions can lead to this nerve-racking feeling, but in most cases it is caused by dandruff. When the scalp becomes irritated by dandruff, it can start to feel itchy as skin sheds its outer layer in a bid to get rid of the irritant.



STUDY: ITCHING REDUCTION WITH SHAMPOO

In a comparison with a placebo it has been shown that a 0.5% concentration of Octopirox® helps relieve the itching within 54 days.



Source: Doctorate thesis 2005, Marcus Blömer, 262/5000, Double-blind, randomized, placebo-controlled.

Scalp Care

FORMULATION FEATURES

EASE OF FORMULATION

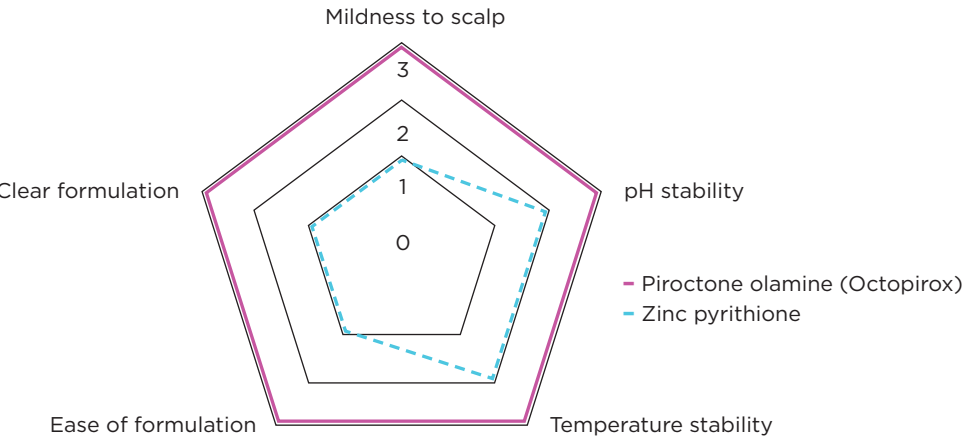
Piroctone olamine is extremely easy to formulate, giving a stable formulation with no effort. It is well soluble in surfactant systems and can increase the system’s viscosity. Zinc pyrithione requires a stabilizer and suspending agent to be dispersed (insoluble in water).



INFLUENCE OF THE PH VALUE AND THERMAL STABILITY

With a pKa value of ca. 7.4, Octopirox® is present as free acid in neutral solutions and is chemically stable over a wide pH range. It can be formulated in a pH range of 3-9. When used in a normal manner during production, temperatures of up to 80 °C do not cause decomposition of the product or loss of efficacy. Nevertheless, prolonged heating should be avoided.

VIISUAL COMPARISON OF OCTOPIROX® VERSUS ZINC PYRITHIONE



Formulating with Octopirox is easier and more efficient than zinc pyrithione.

Additional Benefits

NO AQUATIC TOXICITY LABELING

The cosmetic industry’s growing concern about the effect of its supply chain on the environment increases the need to ensure that the final product has a low environmental impact. Favorable ecotoxicity parameters of raw materials can allow more sustainable products to be developed, prioritizing substances with low environmental impact. Contrary to ZnPTO, Octopirox® has no environmental toxicity labeling.



AQUATIC TOXICITY

Compared to zinc pyrithione, Octopirox® showed lower environmental impact

	ZINC PYRITHIONE	PIROCTONE OLAMINE (99% ACTIVE)	COMPARISON
Fish	LC50 (Pimephales promelas (fathead minnow)): 2.6 µg/l	LC50 (Danio rerio (zebra fish)): 1.89 mg/l	Piroctone olamine better
Daphnia	LC50 (Daphnia magna (water flea)): 8.2 µg/l	EC50 (Daphnia magna (water flea)): 1.8 mg/l	Piroctone olamine better
Algae	EC50 (Navicula pelliculosa (freshwater diatom)): 4.1 µg/l	EC50 (Desmodesmus subspicatus (green algae)): 6.7 mg/l	Piroctone olamine better

Source: Safety data sheets piroctone olamine & zinc pyrithione

Additional Benefits

BROAD-SPECTRUM PRESERVATION

Preservatives are added to most personal care products today in order to inhibit growth of bacteria and fungi. Piroctone olamine and blends thereof have been successfully used as preservatives for over 30 years because of their formulation compatibility, antimicrobial functionality and long shelf life.

Under the trade names Octopirox® and Nipaguard® PO blends, Clariant offers broad-spectrum efficacy over a wide pH range.



OCTOPIROX® - A RELIABLE WELL-KNOWN SOURCE

PRODUCT	INCI	FORM	APPLICATIONS	pH RANGE	MAX. TEMP.	REC. USE LEVEL (%)	EU (%)	US (%)	JP (%)	MICROBIOLOGICAL EFFICACY			
Single Active			  							G- G+ Y M			
Octopirox®	Piroctone Olamine	Powder	  	4.0 – 10.0	< 80 °C	0.05 – 0.1	1.0* 0.5**	no restrictions	0.05	++	++	++	++

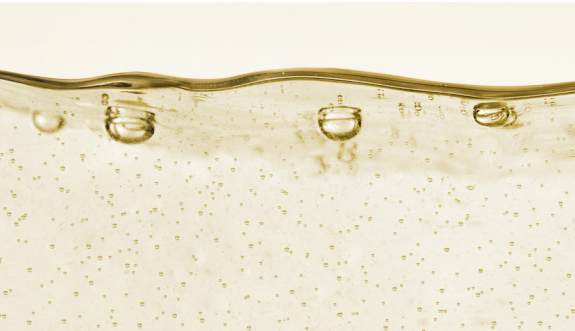
* Rinse-off ** All others

NIPAGUARD® PO BLENDS - BROAD-SPECTRUM EFFICACY OVER A WIDE PH RANGE

PRODUCT	INCI	FORM	APPLICATIONS	pH RANGE	MAX. TEMP.	REC. USE LEVEL (%)	EU (%)	US (%)	JP (%)	MICROBIOLOGICAL EFFICACY			
Blends-Liquid			  							G- G+ Y M			
Nipaguard® PO5	Phenoxyethanol (and) Piroctone Olamine	Liquid	  	4.0 – 10.0	< 80 °C	0.3 – 1.0	1.0	1.0	1.0	++	++	++	++
Nipaguard® POB	Phenoxyethanol (and) Benzoic Acid (and) Piroctone Olamine	Liquid	  	4.0 – 6.0	< 80 °C	0.3 – 1.0	1.2	1.2	1.0	++	++	++	++
Nipaguard® POM	Phenoxyethanol (and) Methylparaben (and) Piroctone Olamine	Liquid	  	4.0 – 8.0	< 80 °C	0.3 – 1.0	1.2	1.2	1.0	++	++	++	++

 Leave-on  Rinse-off  Wet wipes
G-: Gram- Bacteria / G+: Gram+ Bacteria / Y: Yeast / M: Mold
++: good / +: medium / O: none

Offering FORMULATION FREEDOM



**TYPICAL CONCENTRATIONS FOR
PERSONAL CARE PRODUCTS ARE:**

- Hair shampoos 0.3 – 1.0%
- Hair tonics 0.05 – 0.1%
- Hair conditioners 0.1 – 0.3%
- Setting lotions / hair gels 0.05 – 0.2%
- Hair creams 0.1 – 0.3%
- Deodorants 0.1 – 0.3%
- Anti-acne leave-on: up to 0.2%

COMPATIBILITY WITH COSMETIC RAW MATERIALS

Octopirox® is compatible with most surfactants, additives and active ingredients used in cosmetics. Compatibility with perfume oils with aldehyde and ketone functionality may be limited in some cases.

Despite the anionic character of the active ingredient molecule, Octopirox® can be used together with most cationic surfactants (quaternary ammonium compounds) and cationic active ingredients. In some cases, the solubility of Octopirox® in water will be increased. Nevertheless, it is advisable to carry out compatibility and stability tests when using these substances.

Attention must be drawn to the product’s propensity to form complexes with metal ions, especially iron and copper ions. For example, with mere traces of iron (1 ppm Fe) a clearly visible yellow iron complex is formed. Adding the usual complexing agents does not prevent this complex from forming (see section on processing information).

INFLUENCE ON VISCOSITY IN SURFACTANT SYSTEMS

In some surfactant systems, Octopirox® may cause an increase in viscosity which can be leveraged to economize on consistency modifiers during formulation development.

SOLUBILITY

Generally, the solubility of Octopirox® is highly dependent on the pH value of the solution. As a rule of thumb, it is better dissolved in neutral and slightly alkaline aqueous solutions than in acidic solutions. It can be dissolved at levels of pH=5 to pH=8 in surfactant solutions and alcohol/water mixtures.

- readily soluble in alcohol (10%),
- soluble in aqueous surfactant solutions
- soluble in water/alcohol mixtures (1 – 10%),
- slightly soluble in water (ca. 0.05%) and oils (0.05 – 0.1%)



LIGHT STABILITY

Octopirox® is sensitive to UV light and may decompose depending on the degree of exposure. Therefore formulations should be protected from direct strong sunlight.

STORAGE

Octopirox® should be stored in its original container at ambient temperature protected from moisture. If stored correctly in its original sealed container, Octopirox® can be kept for at least five years. A safety data sheet is available on request.

MSDS available on [Clariant.com/octopirox](https://www.clariant.com/octopirox)

General Information

OCTOPIROX®

PROCESS INFORMATION FOR OCTOPIROX®

Due to the good solubility in aqueous surfactant systems as well as alcohol/water mixtures, Octopirox® is especially suitable for formulating of clear products. Aqueous or alcoholic solutions of Octopirox® have a pH of 9-10, which can be adjusted using organic acids like citric acid or lactic acid.

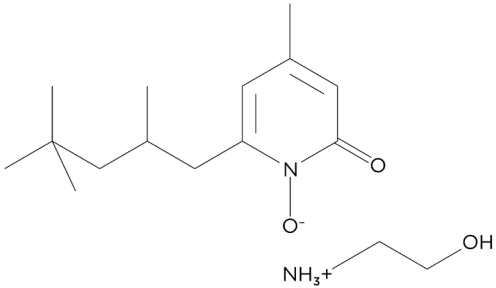
During the formulation process, Octopirox® can be heated up to 80 °C if necessary, but should not exceed this temperature for a longer time period.

QUALITY STANDARD

pH value	OCP 052 AS 00000 C	8.5 - 10.0
Related substances (TLC) By-products, single	OCP 062 AS 00000 C	max. 0.5%
Heavy metals	OCP 081 AS 00000 C	max. 10.0 µg/g
Loss on drying	OCP 091 AS 00000 C	max. 0.3%
Sulphated ash	OCP 101 AS 00000 C	max. 0.2%
Content of monoethanolamine (potentiometry)	OCP 122 AS 00000 C	20.1 - 20.9% calculated with reference to the dried substance
Content (potentiometry)	OCP 131 AS 00000 C	98.0 - 101.5% calculated with reference to the dried substance



ACTIVE INGREDIENT	
Chemical name	1-Hydroxy-4-methyl-6-(2,4,4-trimethylpentyl)-2(1H)-pyridone; combination with 2-aminoethanol (1:1)
International nonproprietary name (USAN, WHO, INCI)	Piroctone olamine
Molar mass	298.4 g/mol
Appearance	White to faintly yellowish-white crystalline powder
Odor	Faint characteristic odor
Active ingredient content	Min. 99.0%
Loss on drying	Max. 0.3%
Sulphate ash	Max. 0.2%
pH	(1 % aqueous suspension, 20 °C) 8.5 – 10.0



APPLICATIONS	
Anti-dandruff / anti-itch	Shampoo, conditioner, scalp tonic, cream rinse
Deodorants	Roll-on, spray, foot deodorant cream, stick
Anti-acne products	Gel, lotion, cleanser

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