

Exactly your chemistry.



**Phenonip<sup>®</sup>**  
**Broad spectrum liquid  
preservative**





# Phenonip® - long established and popular in the cosmetic and toiletries industry

Phenonip® is the product of extensive research by Nipa into a Nipa Esters combination optimised in a convenient liquid form. The choice of an antimicrobial solvent in addition to the most effective ratio of esters maximises the spectrum of activity and minimises use concentrations.

Phenonip® is now one of the longest established and most popular proprietary preservative blends available to the cosmetics and toiletries industry.

## Benefits of Phenonip®

- Broad spectrum activity; effective against Gram-negative and Gram-positive bacteria, yeasts and moulds.
- Readily incorporated into formulations.
- Retains activity over the range pH 3.0 - 8.0.
- Compatible with a wide range of cosmetic raw materials.
- Non-volatile - there is no loss of preservative due to volatility even on prolonged storage.
- Highly stable - aqueous solutions of Phenonip® can withstand autoclave sterilisation with no loss of activity.
- Phenonip® has an excellent toxicological profile and is non-irritant to skin, eye and mucous membranes at normal use concentrations.
- The components of Phenonip® are biodegradable at the low concentrations found in effluent.

## Antimicrobial Activity

Minimum Inhibitory Concentration (%)

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Organism			% Phenonip
Pseudomonas aeruginosa	NCIB	8626	0.225
Escherichia coli	NCIB	8545	0.20
Proteus vulgaris	NCTC	4175	0.225
Salmonella enteritidis	NCTC	5188	0.225
Staphylococcus aureus	ATCC	6538	0.20
Enterococcus faecium	DVG	8582	0.20
Bacillus cereus	NCTC	7464	0.15
Candida albicans	NCPF	3179	0.15
Saccharomyces cerevisiae	NCYC	200	0.15
Aspergillus niger	IMI	149007	0.125
Penicillium purpurogenum	Nipa Stock	0340	0.10

- Phenonip® has not been tested on animals for over 10 years.
- The components of Phenonip® occur naturally in a variety of plants and animals.



## Applications

Phenonip® has been successfully used to protect most types of personal care products from microbial contamination. As with other preservations, the correct use concentration depends upon several factors including the chemical and physical nature of the product, its ability to support microbial growth and the likelihood of recontamination during use. Experience has shown that Phenonip® will preserve cosmetics and toiletries when incorporated at concentrations from 0.25% to 1.0%. The higher concentrations are generally required only for formulations which, by their nature, are particularly difficult to preserve. Shampoos and foam baths may be preserved with Phenonip® at concentrations typically between 0.25 - 0.65%. Products with a high protein content may require levels from 0.5% - 1.0%.

Other surfactant-based products, for example liquid dishwashing detergents, are generally preserved with Phenonip® over the range 0.2% - 0.6%.

Emulsified systems, both o/w and w/o types, may be effectively preserved by the addition of Phenonip® at 0.4 - 0.7%. Phenonip® can also be used to preserve emulsions based on nonionic surfactants, but slightly increased concentrations may be required, eg. 0.5 - 1.0%.

The table, below, illustrates the retention of microbiocidal activity of Phenonip® at 1% in the presence of 5% polysorbate 80.

Test species	Colony form units per ml after time:			
	0 day	1 day	2 days	7 days
Staphylococcus aureus	$3.5 \times 10^6$	$1.4 \times 10^3$	<10	<10
Pseudomonas fluorescens	$5.0 \times 10^6$	$3.9 \times 10^4$	<10	<10
Pseudomonas aeruginosa	$3.8 \times 10^6$	$2.8 \times 10^5$	<10	<10
Candida albicans	$2.4 \times 10^6$	<10	<10	<10
Penicillium expansum	$2.0 \times 10^6$	$1.0 \times 10^5$	300	<10

The effectiveness of Phenonip® in controlling Gram-negative bacteria has led to its use in some skin antiseptic products where the traditional antiseptic agents have a weakness in their spectrum of activity against these organisms.



## Incorporation of Phenonip®

Phenonip® can be added to the aqueous phase readily up to its limit of solubility.

The relatively low aqueous solubility of Phenonip® means that if the water content of the formulation is low, it may not be convenient to add the preservative directly to water during manufacture. Heating the water to 60 - 70°C prior to Phenonip® addition will, in most instances, allow the appropriate quantity to be dissolved.

For aqueous systems which cannot be heated, Phenonip® can be incorporated by preparing a concentrate in a suitable solvent, e.g. propylene glycol, and stirring this concentrate into the water to give a final Phenonip® concentration below its maximum water solubility.

In emulsified systems, Phenonip® is readily dissolved in the liquid phase prior to emulsification although it is often good practice to divide the Phenonip® content

between the aqueous and lipid phases during their preparation.

In surfactant and detergent based products Phenonip® can be dissolved in the surfactant prior to the addition of water and other ingredients.

Examples of the use of Phenonip® are given below:

Product Type	% Phenonip®	Time taken to achieve a complete microbiocidal effect				
		<i>Pseudomonas aeruginosa</i>	<i>Escherichia coli</i>	<i>Staphylococcus aureus</i>	<i>Candida albicans</i>	<i>Aspergillus niger</i>
Shampoo	0.3%	<1 day	<1 day	<1 day	<1 day	<1 day
Foam Bath	0.3%	<1 day	<1 day	<1 day	<1 day	<2 days
Skin Toner	0.4%	1 day	1 day	1 day	1 day	2 days

The following are examples of formulations subjected to the British Pharmacopoeia (1988) microbial challenge test:

Test species	Colony forming units per g after:				
	1 day	2 days	7 days	14 days	28 days
<b>0.3% Phenonip® in a hair conditioner</b>					
<i>P. aeruginosa</i>	<10	<10	<10	<10	<10
<i>S. aureus</i>	<10	<10	<10	<10	<10
<i>C. albicans</i>	<10	<10	<10	<10	<10
<i>A. niger</i>	$2.3 \times 10^2$	<10	<10	<10	<10
<b>0.5% Phenonip® in an o/w suntan cream</b>					
<i>P. aeruginosa</i>	<10	<10	<10	<10	<10
<i>S. aureus</i>	<10	<10	<10	<10	<10
<i>C. albicans</i>	$1.0 \times 10^3$	<10	<10	<10	<10
<i>A. niger</i>	$1.6 \times 10^4$	$1.2 \times 10^4$	$2.4 \times 10^3$	<10	<10
<b>1.0% Phenonip® in an o/w moisturising cream</b>					
<i>P. aeruginosa</i>	$1.8 \times 10^3$	<10	<10	<10	<10
<i>S. aureus</i>	$6.6 \times 10^6$	$2.6 \times 10^4$	<10	<10	<10
<i>C. albicans</i>	$2.5 \times 10^6$	90	<10	<10	<10
<i>A. niger</i>	$2.5 \times 10^5$	$3.3 \times 10^3$	<10	<10	<10



### Regulatory Status

Phenonip® is an optimised blend of paraben esters in phenoxyethanol.

INCI Name - phenoxyethanol, methylparaben, ethylparaben, butylparaben, propylparaben, isobutylparaben.

All the components are included in the EC Cosmetics Directive Annex VI list of permitted preservatives.

Phenonip® is also permitted for use as a preservative in the USA and Japan.

Methylparaben and propylparaben have GRAS (Generally Recognised As Safe) status in the USA.

### Physico-chemical Properties

**Appearance** - colourless liquid

**Odour** - slight

**Specific gravity** - 1.124

**Solubility in water** - approximately 0.5%

**Solubility in organic solvents**

ethanol - miscible

ethanol/water (50/50) - >95.0%

isopropanol - miscible

acetone - miscible

propylene glycol - miscible

isopropyl myristate - miscible

peanut oil - 25.0%

liquid paraffin - <0.1%

glycerol - 10.0%

triethanolamine - miscible

polysorbate 80 - miscible

triethanolamine lauryl sulphate (40%) - 35.0%

### Toxicological Information

Under the scope of the UK CHIP Regulations (1997) and European Directive 91/155/EC Phenonip®, as supplied, is classified as 'irritating to eyes and skin'. At normal use concentrations, however, Phenonip® is not an irritant.

Details of the toxicology of Phenonip® and its constituents are available on request from Clariant.

*Whilst the information contained herein is accurate to the best of our knowledge, no warranty is either expressed or implied. It is the responsibility of the individual to ensure that their products will remain preserved over the anticipated shelf life.*

## About Clariant

Clariant is a leading global speciality chemicals company with more than 30,000 employees and annual sales of over CHF 10 billion. The company resulted from the merging of the Sandoz chemicals division and the Hoechst speciality chemicals business. Clariant is domiciled and headquartered in Muttenz near Basle, Switzerland and operates worldwide with Group companies in more than 60 countries. Clariant comprises of five divisions: Textile, Leather & Paper Chemicals; Pigments & Additives; Masterbatches; Functional Chemicals and Life Science & Electronic Chemicals which, together, offer a broad range of speciality chemicals for all major applications.

## Technical Service

At our global network of well-equipped technical service laboratories, our dedicated and experienced microbiologists support the full Nipa product range with shelf-life stability tests along with biocide efficacy studies. Our expert advice and guidance is well known and respected by chemists wherever a biocide or preservative is needed.

Nipa Biocides is a business unit within the Functional Chemicals Division of Clariant. The company was originally established in 1924 to commercialise paraben esters as antimicrobial preservatives and gallate esters as antioxidants. Nipa held the original patents on these applications and today the

company enjoys a worldwide reputation for the quality of its preservatives for the cosmetics, toiletries and pharmaceutical markets. Strong emphasis on the quality of its products and the reliance on highly trained staff and modern equipment maintain our position as a respected market leader.

## Nipa Preservative Products are listed below:

NIPA Product	INCI Name
Nipagin M*	methylparaben
Nipagin A*	ethylparaben
Nipasol M*	propylparaben
Nipabutyl*	butylparaben
Nipastat*	methylparaben, butylparaben, ethylparaben, propylparaben, isobutylparaben
Nipasept*	methylparaben, ethylparaben, propylparaben
Phenonip	phenoxyethanol, methylparaben, ethylparaben, butylparaben, propylparaben, isobutylparaben
Phenoxetol	phenoxyethanol
Nipa Biopure 100	imidazolidinyl urea
Nipa Biopure 200	diazolidinyl urea
Nipaguard CMB	triethylene glycol, benzyl alcohol, propylene glycol, chloromethylisothiazolinone, methylisothiazolinone
Nipaguard PDU	propylene glycol, diazolidinyl urea, methylparaben, propylparaben
Nipaguard SMG	sodium hydroxymethylglycinate
Nipaguard BPX	phenoxyethanol, methylparaben, propylparaben, 2-bromo-2-nitropropane-1, 3-diol
Nipaguard DCB	phenoxyethanol, methyl dibromo glutaronitrile
Nipaguard DMDMH	DMDM hydantoin
Nipaguard MPA	benzyl alcohol, methylparaben, propylparaben
Nipaguard TBK	phenoxyethanol, methyl dibromo glutaronitrile, 2-bromo-2-nitropropane-1, 3-diol, butylparaben, isobutylparaben
Nipaguard IPF	PEG-4 laurate, iodopropynyl butylcarbamate

\* These products are also available as the sodium salts of the esters.



Clariant UK Ltd, Functional Chemicals Division, Calverley Lane, Horsforth, Leeds LS18 4RP United Kingdom

Tel: +44 (0) 113 239 8822 Fax: +44 (0) 113 239 8810 [www.clariant.com](http://www.clariant.com)