

Functional Chemicals Division



Exactly your chemistry.

Your choice for Product Safety
Personal Care Preservatives

■ Edition 2007

Content

INTRODUCTION

Parabens	05
Paraben Sodium Salts	05
Piroctone Olamine	06
Imidazolidinyl and Diazolidinyl Urea	06
Dimethyl Dimethylol Hydantoin	06
2-Phenoxyethanol	07
Liquid Blends	07
JM ActiCare®	07

TABLE 1

08 – 17

This table contains the INCI-declaration (cosmetic name), the CAS-number (Chemical Abstract System), the EINECS-number (European Inventory of Existing Commercial Chemical Substances) and the chemical structure.

TABLE 2

18 – 19

This table shows the Minimum Inhibition Concentration (MIC) for the following species: *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Candida albicans*, *Aspergillus niger*.

TABLE 3

20 – 21

Based on this table suitable preservatives for specific formulations can be defined.

TABLE 4

22 – 23

This table gives a short overview on typical usage concentrations and basic physical properties, which are necessary for the formulator.

TABLE 5

24 – 34

This table lists the regulatory status of the different preservatives and blends in Europe, USA and Japan.



Your choice for Product Safety

As part of Clariant's acquisition of BTP in 2000, the activities of Nipa Laboratories were integrated into the Division Functional Chemicals. More than 70 years of experience with preservatives and a broad range of different actives and blends were combined with Clariant's broad range of personal care products, contributing to solve nearly every formulation problem a customer can imagine.

The range of preservatives, well known to the market under their brand names **Nipagin®**, **Nipasol®**, **Nipaguard®**, **Phenonip®**, **Nipa Biopure®** and others consist of

- Parabens
- Paraben Sodium Salts
- Piroctone Olamine
- Imidazolidinyl and Diazolidinyl Urea
- Dimethyl Dimethylol Hydantoin (DMDMH)
- 2-Phenoxyethanol
- Liquid Blends with high efficacy
- **JM ActiCare®**

Clariant personal care preservatives, a wealth of choice tailor made to solve every preservation problem within the world of personal care formulations.

PARABENS

It is more than 70 years ago since the discovery of the antimicrobial activity of esters of 4-hydrobenzoic acid – now universally known as parabens – was patented. Since that time parabens have grown in the frequency of their use and have become the most popular and most widely used preservatives in personal care products for now well over 20 years.

Clariant offers the following parabens: **Nipagin® M** (Methylparaben), **Nipagin® A** (Ethylparaben), **Nipasol® M** (Propylparaben) and **Nipabutyl®** (Butylparaben) as well as different blends of the known esters under the brand names **Nipasept®** and **Nipastat®**.

The list of benefits and advantages of parabens includes:

- broad spectrum of activity against bacteria and fungi
- low order of toxicity
- effectiveness at low concentrations
- stability over a broad pH-range
- biodegradability at environmental concentrations
- global acceptance in personal care applications

In many cases it is possible to use combinations of esters as the sole preservative system and, whilst there are obviously many advantages in the use of parabens as preservatives, in some instances blends with other actives are the preferred option.

All the esters have low aqueous solubility, but will dissolve in most systems at > 60°C. Parabens may be added in solid form either to the water or oil phase prior to emulsification, or pre-dissolved in non-aqueous components (e.g. alcohols, glycols) before addition.

Parabens in general are widely found in plants and spices. In fauna the well known Predacious Diving Beetle (*Dysticus marginalis*) is found to protect himself against mold by producing esters of the p-hydroxy benzoic acid (or parabens) in his own organism. This beetle lives permanently in moist environment and is found around lakes and ponds in Europe.

The starting product for synthesis of parabens (p-hydroxy-benzoic acid alkyl esters) is p-hydroxy-benzoic acid. p-Hydroxy-benzoic acid is a naturally occurring acid, for example, in raspberries and blackberries.

PARABEN SODIUM SALTS

All the parabens, and their proprietary blended combinations, are also available in sodium salt form:

Nipagin® M Sodium (Sodium Methylparaben), **Nipagin® A Sodium** (Sodium Ethylparaben), **Nipasol® M Sodium** (Sodium Propylparaben), **Nipabutyl® Sodium** (Sodium Butylparaben) as well as different blends known under the brand names **Nipasept® Sodium** and **Nipastat® Sodium**.

The major benefit offered by the sodium salts is their high solubility in cold water, thereby enabling the introduction of parabens without heating or pre-dissolving in solvents. Aqueous concentrates may be prepared up to 40% in strength. The concentrate may then be added to the process, preferably slowly and with rapid mixing. Due to the high pH of aqueous solutions of sodium parabens, the pH of the final product requires adjustment. The aqueous solution should be used within a short time of preparation as prolonged storage will result in alkaline hydrolysis of the esters.

It is important to note that, at the target pH of the formulation, the parabens will exist as the free esters and not as salts and, therefore, the solubility will also be that of the free esters. Use of the sodium salts will facilitate introduction of the parabens; it will not allow higher concentrations to be used compared with the free esters.

PIROCTONE OLAMINE

Piroctone Olamine is well known under the trade name Octopirox® as a highly effective antifungal and antidandruff agent, used over 30 years in the field of personal care formulations. In 1980 Piroctone Olamine was approved by the European Authorities with a maximum concentration of 1 % for rinse-off and 0.5 % for leave-on cosmetic formulations and is listed on the positive list for preservatives, Annex VI of the European Cosmetics Directive 76/768/EEC.

More than 35 years of experience with Piroctone Olamine and Clariant's wealth and knowledge of expertise have been used to develop the highly effective preservative blends for Personal Care formulations:

- Nipaguard® PO 5
- Nipaguard® POB
- Nipaguard® POM

These novel synergistic preservative blends are patented by Clariant under the patent numbers: DE 10 2005 005 009, DE 10 2005 030 762, WO 2006/081969

IMIDAZOLIDINYL AND DIAZOLIDINYL UREA

Nipa Biopure® 100 (Imidazolidinyl Urea) and Nipa Biopure® 200 (Diazolidinyl Urea) are highly effective, broad-spectrum antibacterial preservatives, with particularly good activity against Pseudomonas species.

They are non irritating to eyes, skin and mucous membranes at use levels. The products are highly water soluble and retain their activity in the presence of proteins and nonionic surfactants and most other common ingredients used in personal care formulations.

Both products may be added directly to aqueous systems without heating. In a hot process it is advisable to introduce Nipa Biopure® 100 and 200 during the cooling stage, certainly below 60°C and preferably below 40°C. Being hygroscopic, both products should be stored in tightly sealed containers when not in use.

DIMETHYL DIMETHYLOL HYDANTOIN

Nipaguard® DMDMH is a 55 % solution of dimethyl dimethylol hydantoin in water, which is particularly effective in detergent based formulations, combining the benefits of broad spectrum antimicrobial activity with the ease of liquid handling. At use levels Nipaguard® DMDMH is non irritating to eyes, skin and mucous membranes, retains its activity between pH 3 – 8 and is compatible with most personal care ingredients.

Nipaguard® DMDMH is highly water soluble and may be added directly to aqueous systems without heating. In a hot process it is advisable to introduce Nipaguard® DMDMH during the cooling stage, preferably below 60°C.

Nipa Biopure® 100, Nipa Biopure® 200 and Nipaguard® DMDMH belong to the preservative class of formaldehyde donors. Formaldehyde is found widely in nature, e.g. in fruits as apples and grapes. Human blood and the blood of every mammal contains 2 – 3 µg per liter formaldehyde, which is needed to produce other bodyowned substances. Every living cell produces Formaldehyde from the basic molecules of life: carbon, hydrogen and oxygen. Formaldehyde, the typical preservative in nature is effective at very low concentrations. The overdose was the issue in the past. Today an intelligent dose system resolves the problem: the formaldehyde donors. They release tiny amounts of formaldehyde only.

2-PHOXYETHANOL

Phenoxetol® is a versatile preservative with particularly good performance on gram-negative and gram-positive bacteria, but also against yeast and moulds. It has a wide range of uses from detergent based products such as foam baths through to skincare foundations and eye make up.

Clariant's Phenoxetol® offers many benefits to the formulator. It is approximately 2.4 % soluble in water, which is significantly above the typical use concentration. Phenoxetol® shows stable effectiveness over a wide pH range from 3 – 8.5 in presence of proteins and nonionic surfactants and other common ingredients. It is at the allowed concentration non-irritating to eyes, skin and mucous membranes and there is no evidence of skin sensitization. Further benefits of Phenoxetol® are its low volatility at ambient temperatures – no preservative loss, even on prolonged storage – and stability at elevated temperatures in excess of 80°C.

LIQUID BLENDS

There are many criteria for an ideal preservative or a preservative system. The most important are:

- broad spectrum of activity
- safe at use concentrations
- cost-effectiveness

All preservatives tend to have a gap or a weakness in their spectrum of activity (e.g. weakness of parabens against bacteria). In fact, no single molecule fulfills all the requirements of an ideal preservative. For this reason, two or more preservatives are often used in combination.

As it is preferable for various reasons to use these combinations in a liquid form, Clariant offers a broad variety of proprietary blends, combining the single actives to preservative systems fit for use in nearly every formulation of a personal care product, e.g. Phenoxetol®, Nipaguard® BPX, Nipaguard® TBK, Nipaguard® CMB, Nipaguard® PBI.

All blends have been carefully developed and are optimised in respect of their concentration and efficacy by extensive testing procedures in order to achieve excellent preservation results with lowest possible concentrations.

JM ACTICARE®

Clariant's range of personal care preservatives also offers a variety of special products such as JM ActiCare® and other tailor made products, to round up the offer to solve all your preservation problems.

JM ActiCare® is based on an inorganic composite of silver chloride and titanium dioxide. It is highly effective, with a broad spectrum and suitable for a lot of specific personal care applications, such as antiperspirants, skin and sun care.

JM ActiCare® is suitable for hypoallergenic formulations. At use concentrations it is non-hazardous, non-irritant and non-sensitizing.

INCI-declaration, CAS-number, EINECS-number, chemical structure

This table contains the INCI-declaration (cosmetic name), the CAS-number (Chemical Abstract System), the EINECS-number (European Inventory of Existing Commercial Chemical Substances) and the chemical structure.

Single preservatives are listed first, followed by the preservative blends.

SINGLE PRESERVATIVES	INCI	CAS	EINECS	Chemical name	Structure
Nipabutyl®	<i>Butylparaben</i>	94-26-8	202-318-7	<ul style="list-style-type: none"> • Benzoic Acid, 4-Hydroxy-, Butyl Ester • Butyl 4-Hydroxybenzoate • Butyl p-hydroxy benzoate (RIFM) • Butyl p-Hydroxybenzoate • Butyl Parahydroxybenzoate • Parahydroxybenzoate Ester 	
Nipagin® A	<i>Ethylparaben</i>	120-47-8	204-399-4	<ul style="list-style-type: none"> • Benzoic Acid, 4-Hydroxy-, Ethyl Ester • Ethyl 4-Hydroxybenzoate • Ethyl 4-hydroxybenzoate (RIFM) • Ethyl p-Hydroxybenzoate • Ethyl Parahydroxybenzoate • 4-Hydroxybenzoic Acid, Ethyl Ester • Parahydroxybenzoate Ester 	
Nipagin® M	<i>Methylparaben</i>	99-76-3	202-785-7	<ul style="list-style-type: none"> • Benzoic Acid, 4-Hydroxy-, Methyl Ester • p-Carbomryhoxyphenol • 4-Hydroxybenzoic Acid, Methyl Ester • p-Methoxycarbonylphenol • Methyl 4-Hydroxybenzoate • Methyl p-hydroxybenzoate (RIFM) • Methyl Parahydroxybenzoate • Parahydroxybenzoate Ester 	
Nipasol® M	<i>Propylparaben</i>	94-13-3	202-307-7	<ul style="list-style-type: none"> • Benzoic Acid, 4-Hydroxy-, Propyl Ester • 4-Hydroxybenzoic Acid, Propyl Ester • Parahydroxybenzoate Ester • Propyl p-Hydroxybenzoate • Propyl p-hydroxybenzoate (RIFM) • Propyl Parahydroxybenzoate 	

INCI-declaration, CAS-number, EINECS-number, chemical structure

SINGLE PRESERVATIVES	INCI	CAS	EINECS	Chemical name	Structure
Nipabutyl® Sodium	<i>Sodium Butylparaben</i>	36457-20-2	253-049-7	<ul style="list-style-type: none"> • <i>Benzoic Acid, 4-Hydroxy-, Butyl Ester, Sodium Salt</i> • <i>Butylparaben, Sodium Salt</i> • <i>4-Hydroxybenzoic Acid, Butyl Ester, Sodium Salt</i> 	
Nipagin® A Sodium	<i>Sodium Ethylparaben</i>	35285-68-8	252-487-6	<ul style="list-style-type: none"> • <i>Benzoic Acid, 4-Hydroxy-, Ethyl Ester, Sodium Salt</i> • <i>Ethyl p-Hydroxybenzoate Sodium Salt</i> • <i>Ethylparaben, Sodium Salt</i> • <i>4-Hydroxybenzoic Acid, Ethyl Ester, Sodium Salt</i> 	
Nipagin® M Sodium	<i>Sodium Methylparaben</i>	5026-62-0	225-714-1	<ul style="list-style-type: none"> • <i>Benzoic Acid, 4-Hydroxy-, Methyl Ester, Sodium Salt</i> • <i>Methylparaben, Sodium Salt</i> • <i>Sodium 4-Carbomethoxyphenolate</i> • <i>Sodium p-Methoxycarbonylphenoxide</i> • <i>Sodium Methyl p-Hydroxybenzoate</i> 	
Nipazol® M Sodium	<i>Sodium Propylparaben</i>	35285-69-9	252-488-1	<ul style="list-style-type: none"> • <i>Benzoic Acid, 4-Hydroxy-, Propyl Ester, Sodium Salt</i> • <i>4-Hydroxybenzoic Acid, Propyl Ester, Sodium Salt</i> • <i>Propyl p-Hydroxybenzoate Sodium Salt</i> • <i>Propylparaben, Sodium Salt</i> 	

INCI-declaration, CAS-number, EINECS-number, chemical structure

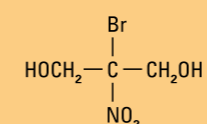
SINGLE PRESERVATIVES	INCI	CAS	EINECS	Chemical name	Structure
Nipa Biopure® 100	Imidazolidinyl Urea	39236-46-9	254-372-6	<ul style="list-style-type: none"> <i>N,N'</i>-Methylene-Bis[<i>N'</i>-[3-(Hydroxymethyl)-2,5-Dioxo-4-Imidazolidinyl]Urea] Urea, <i>N,N'</i>-Methylene-Bis[<i>N'</i>-[3-(Hydroxymethyl)-2,5-Dioxo-4-Imidazolidinyl]- 	
Nipa Biopure® 200	Diazolidinyl Urea	78491-02-8	278-928-2	<ul style="list-style-type: none"> <i>N</i>-[1,3-Bis(Hydroxymethyl)-2,5-Dioxo-4-Imidazolidinyl]-<i>N,N'</i>-Bis(Hydroxymethyl) Urea Urea, <i>N</i>-[1,3-Bis(Hydroxymethyl)-2,5-Dioxo-4-Imidazolidinyl]-<i>N,N'</i>-Bis(Hydroxymethyl) 	
Nipacide® BNPD	2-Bromo-2-Nitropropane-1,3-diol	52-51-7	200-143-0	<ul style="list-style-type: none"> 1,3-Propanediol, 2-Bromo-2-Nitro Bronopol 	
Nipaguard® DMDMH	DMDM Hydantoin	6440-58-0	229-222-8	<ul style="list-style-type: none"> 1,3-Bis(Hydroxymethyl)-5,5-Dimethylimidazolidine-2,4-dione(+) 1,3-Dimethylol-5,5-Dimethyl Hydantoin 2,4-Imidazolidinedione, 1,3-Bis(Hydroxymethyl)-5,5-Dimethyl- 	
Nipaguard® SMG	Sodium Hydroxymethylglycinate	70161-44-3	274-357-8	<ul style="list-style-type: none"> Glycine, <i>N</i>-(Hydroxymethyl)-, Monosodium Salt Glycine, <i>N</i>-(Hydroxymethyl)-, Sodium Salt <i>N</i>-(Hydroxymethyl)Glycine, Sodium Salt 	HOCH ₂ NHCH ₂ COONa
Phenoxetol®	Phenoxyethanol	122-99-6	204-589-7	<ul style="list-style-type: none"> Ethanol, 2-Phenoxy- Ethylene Glycol Monophenyl Ether 2-Hydroxyethyl Phenyl Ether 2-Phenoxyethanol 2-Phenoxyethanol (RIFM) 2-Phenoxyethyl Alcohol Phenoxytol 	
Propylene Phenoxetol®	Phenoxyisopropanol	770-35-4 4169-04-4	212-222-7 224-027-4	<ul style="list-style-type: none"> 2-Phenoxy-1-Methylethanol 1-Phenoxy-2-Propanol 1-Phenoxypropan-2-ol 2-Phenoxypropanol 	

INCI-declaration, CAS-number, EINECS-number, chemical structure

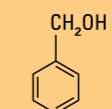
PRESERVATIVE BLENDS	INCI	CAS	EINECS
Nipasept®	Methylparaben	99-76-3	202-785-7
	Ethylparaben	120-47-8	204-399-4
	Propylparaben	94-13-3	202-307-7
Nipastat®	Methylparaben	99-76-3	202-785-7
	Butylparaben	94-26-8	202-318-7
	Ethylparaben	120-47-8	204-399-4
	Propylparaben	94-13-3	202-307-7
	Isobutylparaben	4247-02-3	224-208-8
Nipasept® Sodium	Sodium Methylparaben	5026-62-0	225-714-1
	Sodium Ethylparaben	35285-68-8	252-487-6
	Sodium Propylparaben	35285-69-9	252-488-1
Nipastat® Sodium	Sodium Methylparaben	5026-62-0	225-714-1
	Sodium Butylparaben	36457-20-2	253-049-7
	Sodium Ethylparaben	35285-68-8	252-487-6
	Sodium Propylparaben	35285-69-9	252-488-1
	Sodium Isobutylparaben	84930-15-4	284-595-4
Nipacide® A	Methylparaben	99-76-3	202-785-7
	Butylparaben	94-26-8	202-318-7
	Isobutylparaben	4247-02-3	224-208-8
Nipacide® A Sodium	Sodium Methylparaben	5026-62-0	225-714-1
	Sodium Butylparaben	36457-20-2	253-049-7
	Sodium Isobutylparaben	84930-15-4	284-595-4
Nipacombin® A	Sodium Propylparaben	35285-69-9	252-488-1
	Sodium Methylparaben	5026-62-0	225-714-1
	Sodium Ethylparaben	35285-68-8	252-487-6
	Sodium Benzoate	532-32-1	208-534-8
Nipacombin® SK	Sodium Propylparaben	35285-69-9	252-488-1
	Sodium Butylparaben	36457-20-2	253-049-7

PRESERVATIVE BLENDS	INCI	CAS	EINECS
Nipaguard® BPX	Phenoxyethanol	122-99-6	204-589-7
	Methylparaben	99-76-3	202-785-7
	Propylparaben	94-13-3	202-307-7
	2-Bromo-2-Nitropropane-1,3-diol ¹⁾	52-51-7	200-143-0
Nipaguard® CMB	Triethylene Glycol	112-27-6	203-953-2
	Benzyl Alcohol ²⁾	100-51-6	202-859-9
	Propylene Glycol	57-55-6	200-338-0
	Methylchloroisothiazolinone ³⁾ :	55965-84-9	247-500-7
	Methylisothiazolinone ⁴⁾ (3:1)		
Nipaguard® IPF	PEG- 4 Laurate	9004-81-3 9005-02-1	
	Iodopropynyl Butylcarbamate ⁵⁾	55406-53-6	259-627-5
Nipaguard® IPP2	Phenoxyethanol	122-99-6	204-589-7
	Iodopropynyl Butylcarbamate ⁵⁾	55406-53-6	259-627-5
Nipaguard® MPA	Benzyl Alcohol ²⁾	100-51-6	202-859-9
	Methylparaben	99-76-3	202-785-7
	Propylparaben	94-13-3	202-307-7

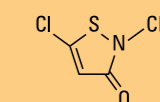
¹⁾ Bronopol,
2-Bromo-2-Nitropropane-1,3-diol



²⁾ Benzyl Alcohol



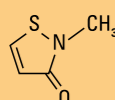
³⁾ Methylchloroisothiazolinone



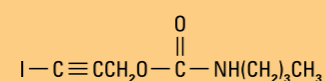
INCI-declaration, CAS-number, EINECS-number, chemical structure

PRESERVATIVE BLENDS	INCI	CAS	EINECS
Nipaguard® MPS	Methylparaben	99-76-3	202-785-7
	Propylparaben	94-13-3	202-307-7
	Propylene Glycol	57-55-6	200-338-0
Nipaguard® PBI	Iodopropynyl Butylcarbamate ⁵⁾	55406-53-6	259-627-5
	Phenoxyethanol	122-99-6	204-589-7
	2-Bromo-2-Nitropropane-1,3-diol ¹⁾	52-51-7	200-143-0
Nipaguard® PDU	Propylene Glycol	57-55-6	200-338-0
	Diazolidinyl Urea	78491-02-8	278-928-2
	Methylparaben	99-76-3	202-785-7
	Propylparaben	94-13-3	202-307-7
Nipaguard® PO 5	Phenoxyethanol	122-99-6	204-589-7
	Piroctone Olamine	68890-66-4	272-574-2
Nipaguard® POB	Phenoxyethanol	122-99-6	204-589-7
	Benzoic Acid	65-85-0	200-618-2
	Piroctone Olamine	68890-66-4	272-574-2
Nipaguard® POM	Phenoxyethanol	122-99-6	204-589-7
	Methylparaben	99-76-3	202-785-7
	Piroctone Olamine	68890-66-4	272-574-2
JM ActiCare®	Silver Chloride ⁶⁾	7783-90-6	232-033-3
	Titanium Dioxide ⁶⁾	13463-67-7	236-675-5
	Diethylhexyl Sodium Sulfosuccinate	577-11-7	209-406-4
	Propylene Glycol	57-55-6	200-338-0

4) Methylisothiazolinone

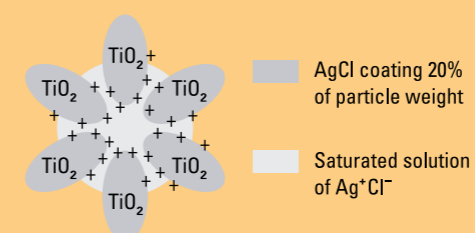


5) Iodopropynyl Butylcarbamate



PRESERVATIVE BLENDS	INCI	CAS	EINECS
Phenonip®	Phenoxyethanol	122-99-6	204-589-7
	Methylparaben	99-76-3	202-785-7
	Ethylparaben	120-47-8	204-399-4
	Butylparaben	94-26-8	202-318-7
	Propylparaben	94-13-3	202-307-7
	Isobutylparaben	4247-02-3	224-208-8
Phenonip® ME	Phenoxyethanol	122-99-6	204-589-7
	Methylparaben	99-76-3	202-785-7
	Ethylparaben	120-47-8	204-399-4
Phenonip® XB	Phenoxyethanol	122-99-6	204-589-7
	Methylparaben	99-76-3	202-785-7
	Ethylparaben	120-47-8	204-399-4
	Propylparaben	94-13-3	202-307-7

6) Silver Chloride On Titaniumdioxide



Minimum Inhibition Concentration

This table shows the Minimum Inhibition Concentration (MIC) for the following species:
Pseudomonas aeruginosa (gram-negative bacterium), *Staphylococcus aureus* (gram-positive bacterium), *Candida albicans* (yeast), *Aspergillus niger* (mould).

SINGLE PRESERVATIVES	Minimum Inhibition Concentration			
	<i>Pseudomonas Aeruginosa</i>	<i>Staphylococcus Aureus</i>	<i>Candida Albicans</i>	<i>Aspergillus Niger</i>
Nipabutyl®	> 0.02 %	0.015 %	0.013 %	0.020 %
Nipagin® A	0.1 %	0.07 %	0.07 %	0.04 %
Nipagin® M	0.2 %	0.15 %	0.1 %	0.1 %
Nipazol® M	0.08 %	0.04 %	0.013 %	0.02 %
Nipabutyl® Sodium	> 0.022 %	0.016 %	0.014 %	0.022 %
Nipagin A® Sodium	0.113 %	0.079 %	0.079 %	0.045 %
Nipagin M® Sodium	0.228 %	0.17 %	0.114 %	0.114 %
Nipazol M® Sodium	0.019 %	0.045 %	0.015 %	0.022 %
Nipa Biopure® 100	0.1 %	0.08 %	0.8 %*	0.8 %*
Nipa Biopure® 200	0.1 %	0.08 %	> 0.6 %	0.3 %
Nipacide® BNPD	0.005 %	0.005 %	0.1 %	0.2 %
Nipaguard® DDMH	0.05 %	0.025 %	0.1 %*	0.15 %*
Nipaguard® SMG	0.125 %	0.125 %	0.8 %	0.275 %
Phenoxetol®	0.5 %	1 %	0.5 %	0.25 %
Propylene Phenoxetol®	0.5 %	0.5 %	0.25 %	0.063 %

* Literature source:
*Microbicides for the protection of materials –
 a handbook by Wilfried Paulus, ISBN 0-412- 53450-9*

PRESERVATIVE BLENDS	Minimum Inhibition Concentration			
	<i>Pseudomonas Aeruginosa</i>	<i>Staphylococcus Aureus</i>	<i>Candida Albicans</i>	<i>Aspergillus Niger</i>
Nipasept®	0.16 %	0.14 %	0.06 %	0.08 %
Nipastat®	0.14 %	0.05 %	0.025 %	0.05 %
Nipasept® Sodium	0.2 %	0.2 %	0.1 %	0.013 %
Nipastat® Sodium	0.155 %	0.055 %	0.085 %	0.013 %
Nipacide® A	0.2 %	0.05 %	0.05 %	0.025 %
Nipacide® A Sodium	0.2 %	0.05 %	0.05 %	0.025 %
Nipacombin® A	0.4 %	0.2 %	0.013 %	0.013 %
Nipacombin® SK	0.1 %	0.05 %	0.025 %	0.002 %
Nipaguard® BPX	0.1 %	0.15 %	0.2 %	0.175 %
Nipaguard® CMB	0.08 %	0.1 %	0.08 %	0.06 %
Nipaguard® IPF	0.62 %	0.15 %	0.04 %	0.01 %
Nipaguard® IPP2	0.5 %	0.3 %	0.02 %	< 0.01 %
Nipaguard® MPA	0.35 %	0.175 %	0.15 %	0.15 %
Nipaguard® MPS	0.5 %	0.175 %	0.125 %	0.175 %
Nipaguard® PBI	0.005 %	0.021 %	< 0.001 %	0.021 %
Nipaguard® PDU	0.1 %	0.1 %	0.4 %	0.35 %
Nipaguard® PO 5	0.125 %	0.125 %	0.125 %	0.125 %
Nipaguard® POB	0.08 %	0.08 %	0.08 %	0.08 %
Nipaguard® POM	0.063 %	0.063 %	0.063 %	0.063 %
JM ActiCare®	≥ 0.2 %	0.15 %	0.15 %	> 0.15 %
Phenonip®	0.225 %	0.2 %	0.15 %	0.125 %
Phenonip® ME	0.375 %	0.375 %	0.047 %	0.047 %
Phenonip® XB	0.375 %	0.375 %	0.047 %	0.047 %

Suitability for specific formulations

For easily to preserve formulations there might be no need of combination or for some specific formulations one preservative can be sufficiently effective. Whereas weak preservatives, e.g. Phenoxetol need to be blended in most cases.

SINGLE PRESERVATIVES	Shampoo, Showergel, Foam Bath, liquid Soap	Hair Conditioner rinse off	Oral Care	Cream, Lotion	Eye and Lip Care	Baby Care	Wet wipe	Gel leave on	Sunscreen
Nipabutyl®	F	F	BF*	BF**	BF**	BF**	F	F	F
Nipagin® A	F	F	BF*	BF**	BF**	BF**	F	F	F
Nipagin® M	F	F	BF*	BF**	BF**	BF**	F	F	F
Nipasol® M	F	F	BF*	BF**	BF**	BF**	F	F	F
Nipabutyl® Sodium	F	F	BF**	BF**	BF**	BF**	F	F	F
Nipagin® A Sodium	F	F	BF**	BF**	BF**	BF**	F	F	F
Nipagin® M Sodium	F	F	BF**	BF**	BF**	BF**	F	F	F
Nipasol® M Sodium	F	F	BF**	BF**	BF**	BF**	F	F	F
Nipa Biopure® 100	BF*	B		B	B	B	B	BF*	B
Nipa Biopure® 200	BF*	B		B	B	B	B	BF*	B
Nipacide® BNPD	BF**	BF**		BF*	BF*	BF*	BF**	BF*	BF**
Nipaguard® DMDMH	BF**	B		B	B	B	B	BF*	B
Nipacide® SMG	B	B		B	B	B	B	B	B
Phenoxetol®	B	B		B	B	B	B	B	B
Propylene Phenoxetol®	B	B							

- not suitable because of regulatory status (based on EU legislation)
- not recommended, because: not effective as single component, safety issue, stability issue
- suitable, based on formulation compatibility
- more suitable, based on formulation compatibility
- best suitable, based on formulation compatibility

- B** good against Bacteria (use in combination with F)
- F** good against Fungi (use in combination with B)
- BF*** good against Bacteria and Fungi, suitable for this kind of formulation
- BF**** good against Bacteria and Fungi, more suitable for this kind of formulation
- BF***** excellent against Bacteria and Fungi, best suitable for this kind of formulation

PRESERVATIVE BLENDS	Shampoo, Showergel, Foam Bath, liquid Soap	Hair Conditioner rinse off	Oral Care	Cream, Lotion	Eye and Lip Care	Baby Care	Wet wipe	Gel leave on	Sunscreen
Nipasept®	BF*	F	BF**	BF***	BF***	BF***	F	F	F
Nipastat®	BF*	F	BF**	BF***	BF***	BF***	F	F	F
Nipasept® Sodium	BF*	F	BF***	BF***	BF***	BF***	F	F	F
Nipastat® Sodium	BF*	F	BF***	BF***	BF***	BF***	F	F	F
Nipacide® A	BF*	F	BF**	BF***	BF***	BF***	F	F	F
Nipacombin® A	BF*	F	BF***	BF***	BF***	BF***	F	F	F
Nipaguard® BPX	BF***	BF*		BF***	BF***		BF***	BF*	BF***
Nipaguard® CMB	BF***	BF***		BF*			BF**	BF***	BF**
Nipaguard® IPF	BF**	BF*		BF***			F		F
Nipaguard® IPP2	BF**	BF*		BF***			BF***	BF**	BF***
Nipaguard® MPA	BF**	BF*		BF***			BF**	BF***	BF**
Nipaguard® MPS	BF*	F	BF**	F	BF**	F	F	F	F
Nipaguard® PBI	BF***	BF*		BF***			BF***	BF**	BF***
Nipaguard® PDU	BF*	BF*		BF***	BF*	BF**	BF**	BF*	BF**
Nipaguard® PO 5	BF***	BF*		BF*	BF*	BF*	BF*	BF*	BF*
Nipaguard® POB	BF***	BF**		BF**	BF**	BF**	BF**	BF**	BF**
Nipaguard® POM	BF***	BF**		BF***	BF**	BF***	BF**	BF***	BF**
JM ActiCare®	BF*	BF*		BF***			BF**		BF**
Phenonip®	BF*	F		BF***	BF**	BF***	BF*	BF*	BF*
Phenonip® ME	BF*	F		BF***	BF**	BF***	BF*	BF*	BF*
Phenonip® XB	BF*	F		BF***	BF**	BF***	BF*	BF*	BF*

Usage concentrations and basic physical properties

This table gives a short overview on typical usage concentrations and basic physical properties, which are necessary for the formulator.

SINGLE PRESERVATIVES	Typical usage concentration	Solubility in water	Appearance	recommended pH range for efficacy	recommended max. handling temperature
Nipabutyl®	0.1 – 0.3 %	approx. 0.02 %	white or almost white crystalline powder	4.0 – 8.0	approx. 80°C
Nipagin® A	0.1 – 0.3 %	approx. 0.11 %	white or almost white crystalline powder	4.0 – 8.0	approx. 80°C
Nipagin® M	0.1 – 0.3 %	approx. 0.25 %	white crystalline powder	4.0 – 8.0	approx. 80°C
Nipasol® M	0.1 – 0.3 %	approx. 0.04 %	white or almost white crystalline powder	4.0 – 8.0	approx. 80°C
Nipabutyl® Sodium	0.1 – 0.3 %	approx. 50 %	white crystalline powder	3.0 – 11.0	approx. 80°C
Nipagin® A Sodium	0.1 – 0.3 %	max. 50 %	white crystalline powder	3.0 – 11.0	approx. 80°C
Nipagin® M Sodium	0.1 – 0.3 %	approx. 33 %	white powder	3.0 – 11.0	approx. 80°C
Nipasol® M Sodium	0.1 – 0.3 %	max. 50 %	white powder	3.0 – 11.0	approx. 80°C
Nipa Biopure® 100	0.1 – 0.3 %	> 70 %	white crystalline powder	3.0 – 8.5	max. 60°C
Nipa Biopure® 200	0.1 – 0.3 %	> 60 %	white crystalline powder	3.0 – 8.5	max. 40°C
Nipacide® BNPD	0.01 – 0.1 %	280 g/l	white or almost white crystals or crystalline powder	3.0 – 7.0	max. 40°C
Nipaguard® DMDMH	0.15 – 0.4 %	highly soluble	clear, colourless liquid	4.0 – 8.0	max. 60°C
Nipaguard® SMG	0.1 – 0.5 %	> 50 %	colourless, pale yellow liquid	3.5 – 12.0	max. 60°C
Phenoxetol®	0.5 – 1 %	approx. 2.4 %	colourless viscous liquid	3.0 – 8.5	max. 80°C
Propylene Phenoxetol®	0.5 – 1 %	approx. 1 %	clear colourless liquid	3.0 – 8.5	max. 80°C

PRESERVATIVE BLENDS	Typical usage concentration	Solubility in water	Appearance	recommended pH range for efficacy	recommended max. handling temperature
Nipasept®	0.05 – 0.3 %	0.2 %	white fine powder	4.0 – 8.0	approx. 80°C
Nipastat®	0.05 – 0.3 %	0.14 %	white fine powder	4.0 – 8.0	approx. 80°C
Nipasept® Sodium	0.05 – 0.3 %	approx. 80 %	white or almost white powder	3.0 – 11.0	approx. 80°C
Nipastat® Sodium	0.05 – 0.3 %	max. 60 %	white or almost white powder	3.0 – 11.0	approx. 80°C
Nipacide® A	0.05 – 0.3 %	< 0.01 %	white fine powder	4.0 – 8.0	approx. 80°C
Nipacide® A Sodium	0.05 – 0.3 %	max. 47 %	white fine powder	3.0 – 11.0	approx. 80°C
Nipacombin® A	0.05 – 0.3 %	max. 80 %	white or almost white powder	3.0 – 11.0	approx. 80°C
Nipacombin® SK	0.05 – 0.3 %	approx. 100 %	white or almost white powder	3.0 – 11.0	approx. 80°C
Nipaguard® BPX	0.3 – 0.7 %	max. 0.7 %	slightly yellow clear viscous liquid	4.5 – 8.5	max. 40°C
Nipaguard® CMB	0.03 – 0.15 %	> 20 %	clear yellow liquid	up to 8.0	max. 40°C
Nipaguard® IPF	0.1 – 0.5 %	approx. 0.2 %	clear, yellow liquid	4.5 – 8.5	max. 40°C
Nipaguard® IPP2	0.6 – 1 %	approx. 1 %	clear, pale yellow liquid	4.5 – 8.5	max. 40°C
Nipaguard® MPA	0.3 – 0.8 %	approx. 0.5 %	clear, pale yellow liquid	4.5 – 8.0	max. 40°C
Nipaguard® MPS	0.3 – 0.6 %	approx. 0.5 %	clear viscous liquid	4.5 – 8.5	max. 80°C
Nipaguard® PBI	0.05 – 0.3 %	approx. 1.5 %	colourless liquid	4.5 – 8.5	max. 40°C
Nipaguard® PDU	0.3 – 1 %	1 %	clear, pale yellow liquid	up to 8.0	max. 40°C
Nipaguard® PO 5	0.3 – 1 %	max. 0.1 %	clear, pale yellow liquid	4.0 – 10.0	max. 80°C
Nipaguard® POB	0.3 – 1 %	not soluble	clear, pale yellow liquid	4.0 – 10.0	max. 80°C
Nipaguard® POM	0.3 – 1 %	not soluble	clear, pale yellow liquid	4.0 – 10.0	max. 80°C
JM ActiCare®	250 – 1000 ppm	dispersable	white/pale grey dispersion	3.0 – 12.0	up to 100°C
Phenonip®	0.25 – 1 %	approx. 0.5 %	practically colourless to light straw viscous liquid	3.0 – 8.0	1)
Phenonip® ME	0.25 – 1 %	approx. 0.7 %	clear, pale yellow liquid	3.0 – 8.0	1)
Phenonip® XB	0.25 – 1 %	approx. 0.2 %	clear, pale yellow liquid	3.0 – 8.0	1)

¹⁾ highly stable, aqueous solutions can withstand autoclave sterilisation with no loss of activity

Regulatory status in Europe, USA and Japan

Regulatory status of the different preservatives and blends in Europe, USA and Japan is listed.

SINGLE PRESERVATIVES	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Nipabutyl®	Maximum concentration 0.4 % (acid) for 1 ester and 0.8 % (acid) for mixtures of esters, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
Nipagin® A			
Nipagin® M			
Nipasol® M			
Nipabutyl® Sodium			
Nipagin® A Sodium			
Nipagin® M Sodium			
Nipasol® M Sodium			
Nipa Biopure® 100	Maximum concentration 0.6 % in cosmetic product, no restrictions	Maximum concentration 0.3 % in cosmetic product, which are rinsed off and not used for mucous membranes	Considered safe as used (2003)
Nipa Biopure® 200	Maximum concentration 0.5 % in cosmetic product, no restrictions	Not permitted	Considered safe as used up to a maximum concentration of 0.5 % (2006)
Nipacide® BNPD	Maximum concentration 0.1 % in cosmetic product, avoid formation of nitrosamines	Not permitted	Considered safe as used up to a maximum concentration of 0.1 % except under circumstances where its action with amines or amides can result in the formation of nitrosamines or nitrosamides (1984)
Nipaguard® DMDMH	Maximum concentration 0.6 % in cosmetic product, no restrictions	Maximum concentration 0.3 % in cosmetic product, which are rinsed off and not used for mucous membranes	Considered safe as used (2005)
Nipaguard® SMG	Maximum concentration 0.5 % in cosmetic product, no restrictions	Not permitted	Not available
Phenoxetol®	Maximum concentration 1 % in cosmetic product, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions Considered safe as used (1990)	Considered safe as used (1990)
Propylene Phenoxetol®	Maximum concentration 1 % in cosmetic product, rinse off only	Not permitted	Not available

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Nipasept®	Maximum concentration 0.55 % in cosmetic product, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
<i>single actives</i>			
<i>Methylparaben/ Ethylparaben/ Propylparaben</i>	Maximum concentration 0.4 % (acid) for 1 ester and 0.8 % (acid) for mixtures of esters, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
Nipastat®	Maximum concentration 0.7 % in cosmetic product, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
<i>single actives</i>			
<i>Methylparaben/ Ethylparaben/ Propylparaben/ Butylparaben/ Isobutylparaben</i>	Maximum concentration 0.4 % (acid) for 1 ester and 0.8 % (acid) for mixtures of esters, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
Nipasept® Sodium	Maximum concentration 0.53 % in cosmetic product, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
<i>single actives</i>			
<i>Sodium Methylparaben/ Sodium Ethylparaben/ Sodium Propylparaben</i>	Maximum concentration 0.4 % (acid) for 1 ester and 0.8 % (acid) for mixtures of esters, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
Nipastat® Sodium	Maximum concentration 0.7 % in cosmetic product, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
<i>single actives</i>			
<i>Sodium Methylparaben/ Sodium Ethylparaben/ Sodium Propylparaben/ Sodium Butylparaben/ Sodium Isobutylparaben</i>	Maximum concentration 0.4 % (acid) for 1 ester and 0.8 % (acid) for mixtures of esters, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)

Regulatory status in Europe, USA and Japan

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Nipacide® A <i>single actives</i>	Maximum concentration 0.8% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2006)
Methylparaben/ Butylparaben/ Isobutylparaben	Maximum concentration 0.4% (acid) for 1 ester and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2006)
Nipacide® A Sodium <i>single actives</i>	Maximum concentration 0.8% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2006)
Sodium Methylparaben/ Sodium Butylparaben/ Sodium Isobutylparaben	Maximum concentration 0.4% (acid) for 1 ester and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2006)
Nipacombin® A <i>single actives</i>	Maximum concentration 0.8% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2001, 2006)
Sodium Methylparaben/ Sodium Ethylparaben/ Sodium Propylparaben	Maximum concentration 0.4% (acid) for 1 ester and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2006)
Sodium Benzoate	Maximum concentration 0.5% (acid), no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2001)
Nipacombin® SK <i>single actives</i>	Maximum concentration 0.8% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2006)
Sodium Propylparaben/ Sodium Butylparaben	Maximum concentration 0.4% (acid) for 1 ester and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2006)

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Nipaguard® BPX <i>single actives</i>	Maximum concentration 1.3% in cosmetic product, avoid formation of nitrosamines	Not permitted	Considered safe as used up to a maximum concentration of 2%, avoid formation of nitrosamines (1984, 1990, 2006)
2-Bromo-2-Nitropropane-1,3-diol	Maximum concentration 0.1% in cosmetic product, avoid formation of nitrosamines	Not permitted	Considered safe as used up to a maximum concentration of 0.1% except under circumstances where its action with amines or amides can result in the formation of nitrosamines or nitrosamides (1984)
Phenoxyethanol	Maximum concentration 1% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1990)
Methylparaben/ Propylparaben	Maximum concentration 0.4% (acid) for 1 ester and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2006)
Nipaguard® CMB <i>single actives</i>	Maximum concentration 0.2% in cosmetic product, no restrictions	Not permitted	Considered safe as used up to a maximum concentration of 0.1% for leave on and 0.2% for rinse off (1992, 2001)
3:1 mixture of 5-chloro-2-methylisothiazol-3 (2H)-one and 2-methylisothiazol-3 (2H)-one	Maximum concentration 0.0015%, no restrictions	Maximum concentration 0.1% in cosmetic product not used to mucous membrane and are washed off after applying	Methylisothiazolinone/ Methylchloroisothiazolinone may be safely used in "rinse-off" products at a concentration not to exceed 15 ppm and in "leave-on" cosmetic products at a concentration not to exceed 7.5 ppm. The stated safe use concentration refers to a mixture containing 23.3% Methylisothiazolinone and 76.7% Methylchloroisothiazolinone. (1992)
Benzyl Alcohol	Maximum concentration 1%, no restrictions	Not permitted	Considered safe as used up to a maximum concentration of 5% (2001)

Regulatory status in Europe, USA and Japan

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Nipaguard® IPF	<p>Maximum concentration 0.18 % for rinse-off products, not to be used in preparations for children under three years of age, except in bath products/shower gels and shampoo.</p> <p>Maximum concentration 0.09 % for leave-on products, not to be used in body lotion and body cream and not to be used in preparations for children under three years of age.</p> <p>Maximum concentration 0.068 % for deodorants/antiperspirants.</p> <p>Not for use in oral hygiene and lip care products.</p> <p>Requires labelling: Not to be used for children under three years of age.</p>	<p>Maximum concentration 0.18 % in cosmetic product; not for use in aerosols</p>	<p>Considered safe as used up to a maximum concentration of 1 % (1998), not be used in products intended to be aerosolized</p>
<i>single actives</i>			
Iodopropynyl Butylcarbamate	<p>Maximum concentration 0.02 % for rinse-off, not to be used in preparations for children under three years of age, except in bath products/shower gels and shampoo.</p> <p>Maximum concentration 0.01 % for leave-on products, not to be used in body lotion and body cream and not to be used in preparations for children under three years of age.</p> <p>Maximum concentration for deodorants/antiperspirants: 0.0075 %.</p> <p>Not for use in oral hygiene and lip care products.</p> <p>Requires labelling: Not to be used for children under three years of age.</p>	<p>Maximum concentration 0.02 % in cosmetic product; not for use in aerosols</p>	<p>Considered safe as used up to a maximum concentration of ≤ 0.1 % (1998), IPBC should not be used in products intended to be aerosolized.</p>

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Nipaguard® IPP2	<p>Maximum concentration 0.9 % for rinse-off products, not to be used in preparations for children under three years of age, except in bath products/shower gels and shampoo.</p> <p>Maximum concentration 0.45 % for leave-on products, not to be used in body lotion and body cream and not to be used in preparations for children under three years of age.</p> <p>Maximum concentration 0.34 % for deodorants/antiperspirants.</p> <p>Not for use in oral hygiene and lip care products.</p> <p>Requires labelling: Not to be used for children under three years of age.</p>	<p>Maximum concentration 0.9 % in cosmetic product; not for use in aerosols</p>	<p>Considered safe as used up to a maximum concentration of 5 % (1990, 1998), not be used in products intended to be aerosolized</p>
<i>single actives</i>			
Iodopropynyl Butylcarbamate	<p>Maximum concentration 0.02 % for rinse-off products, not to be used in preparations for children under three years of age, except in bath products/shower gels and shampoo.</p> <p>Maximum concentration 0.01 % for leave-on products, not to be used in body lotion and body cream and not to be used in preparations for children under three years of age.</p> <p>Maximum concentration for deodorants/antiperspirants: 0.0075 %.</p> <p>Not for use in oral hygiene and lip care products.</p> <p>Requires labelling: Not to be used for children under three years of age.</p>	<p>Maximum concentration 0.02 % in cosmetic product; not for use in aerosols</p>	<p>Considered safe as used up to a maximum concentration of ≤ 0.1 % (1998), IPBC should not be used in products intended to be aerosolized.</p>
Phenoxyethanol	<p>Maximum concentration 1 % in cosmetic product, no restrictions</p>	<p>Maximum concentration 1 % in cosmetic product, no restrictions</p>	<p>Considered safe as used (1990)</p>

Regulatory status in Europe, USA and Japan

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Nipaguard® MPA <i>single actives</i>	Maximum concentration 1.31 % in cosmetic product, no restrictions	Not permitted	Considered safe as used up to a maximum concentration of 6.5 % (2001, 2006)
<i>Benzyl Alcohol</i>	Maximum concentration 1 %, no restrictions	Not permitted	Considered safe as used up to a maximum concentration of 5 % (2001)
<i>Methylparaben/ Propylparaben</i>	Maximum concentration 0.4 % (acid) for 1 ester and 0.8 % (acid) for mixtures of esters, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)
Nipaguard® MPS <i>single actives</i>	Maximum concentration 2.6 % in cosmetic product, no restrictions	Maximum concentration 3.3 % in cosmetic product, no restrictions	Considered safe as used (2006)
<i>Methylparaben/ Propylparaben</i>	Maximum concentration 0.4 % (acid) for 1 ester and 0.8 % (acid) for mixtures of esters, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (2006)

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Nipaguard® PBI <i>single actives</i>	Maximum concentration 0.61 % in cosmetic product, not to be used in oral hygiene and lip care products. Not to be used for children under three years of age except in bath products, shower gels and shampoos. Not to be used in body lotions and body creams. Avoid formation of nitrosamines. Requires labelling: Not to be used for children under three years of age.	Not permitted	Considered safe as used up to a maximum concentration of 0.66 %; avoid formation of nitrosamines, should not be used in products intended to be aerosolized (1990, 1980, 1984, 1998)
<i>Phenoxyethanol</i>	Maximum concentration 1 % in cosmetic product, no restrictions	Maximum concentration 1 % in cosmetic product, no restrictions	Considered safe as used (1990)
<i>Iodopropynyl Butylcarbamate</i>	Maximum concentration 0.02 % for rinse-off products, not to be used in preparations for children under three years of age, except in bath products/shower gels and shampoo. Maximum concentration 0.01 % for leave-on products, not to be used in body lotion and body cream and not to be used in preparations for children under three years of age. Maximum concentration for deodorants/antiperspirants: 0.0075 %. Not for use in oral hygiene and lip care products. Requires labelling: Not to be used for children under three years of age.	Maximum concentration 0.02 %; not for use in aerosols	Considered safe as used up to a maximum concentration of ≤ 0.1 % (1998), IPBC should not be used in products intended to be aerosolized

Regulatory status in Europe, USA and Japan

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
2-Bromo-2-Nitropropane-1,3-diol	Maximum concentration 0.1% in cosmetic product, avoid formation of nitrosamines	Not permitted	Considered safe as used up to a maximum concentration of 0.1% except under circumstances where its action with amines or amides can result in the formation of nitrosamines or nitrosamides (1980, 1984)
Nipaguard® PDU	Maximum concentration 1.42% in cosmetic product, no restrictions	Not permitted	Considered safe as used (1984, 1994, 1990, 2006) calculated maximum concentration based on above mentioned CIR
<i>single actives</i>			
Diazolidinyl Urea	Maximum concentration 0.5% in cosmetic product, no restrictions	Not permitted	Considered safe as used up to a maximum concentration of 0.5% (1990)
Methylparaben/ Propylparaben	Maximum concentration 0.4% (acid) for 1 ester, and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1984, 2006)
Nipaguard® PO 5	Maximum concentration 1.05% in cosmetic product, no restrictions	Not permitted	Permitted
<i>single actives</i>			
Piroctone Olamine	Maximum concentration 1% for rinse-off and 0.5% for leave-on	Not permitted	Not available
Phenoxyethanol	Maximum concentration 1% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1990)
Nipaguard® POB	Maximum concentration 1.25% in cosmetic product, no restrictions	Not permitted	Permitted
<i>single actives</i>			
Piroctone Olamine	Maximum concentration 1% for rinse-off and 0.5% for leave-on	Not permitted	Not available

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
Phenoxyethanol	Maximum concentration 1% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1990)
Benzoic Acid	Maximum concentration (acid) 0.5% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (2001)
Nipaguard® POM	Maximum concentration 1.25% in cosmetic product, no restrictions	Not permitted	Permitted
<i>single actives</i>			
Piroctone Olamine	Maximum concentration 1% for rinse-off and 0.5% for leave-on	Not permitted	Not available
Phenoxyethanol	Maximum concentration 1% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1990)
Methylparaben	Maximum concentration 0.4% (acid) for 1 ester, and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1984, 2006)
JM ActiCare®	Maximum concentration 2000 ppm in cosmetic product, prohibited for children under three years of age, in oral hygiene products and in products used around the eyes and on the lips	Not permitted	Not available
Phenonip®	Maximum concentration 1.33% in cosmetic product, no restrictions	Maximum concentration 1.33% in cosmetic product, no restrictions	Considered safe as used (1984, 1990, 1995, 2006)
<i>single actives</i>			

Regulatory status in Europe, USA and Japan

PRESERVATIVE BLENDS	EU Annex VI, 76/768/EEC	Japan	USA Cosmetic Ingredient Review
<i>Phenoxyethanol</i>	Maximum concentration 1% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1990)
<i>Methylparaben/ Ethylparaben/ Propylparaben/ Butylparaben/ Isobutylparaben</i>	Maximum concentration 0.4% (acid) for 1 ester, and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1984, 1995, 2006)
Phenonip ME <i>single actives</i>	Maximum concentration 1.29% in cosmetic product, no restrictions	Maximum concentration 1.29% in cosmetic product, no restrictions	Considered safe as used (1984, 1990, 1995, 2006)
<i>Phenoxyethanol</i>	Maximum concentration 1% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1990)
<i>Methylparaben/ Ethylparaben</i>	Maximum concentration 0.4% (acid) for 1 ester, and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1984, 2006)
Phenonip XB <i>single actives</i>	Maximum concentration 1.35% in cosmetic product, no restrictions	Maximum concentration 1.35% in cosmetic product, no restrictions	Considered safe as used (1984, 1990, 1995, 2006)
<i>Phenoxyethanol</i>	Maximum concentration 1% in cosmetic product, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1990)
<i>Methylparaben/ Ethylparaben/ Propylparaben</i>	Maximum concentration 0.4% (acid) for 1 ester, and 0.8% (acid) for mixtures of esters, no restrictions	Maximum concentration 1% in cosmetic product, no restrictions	Considered safe as used (1984, 2006)



Exactly your chemistry.

www.clariant.com

Clariant International Ltd.
Functional Chemicals Division
BL Personal Care

4132 Muttenz
Switzerland

Marketing:

Phone +41 61 469 77 56
Fax +41 61 469 75 85

Research and Development:

Phone +49 69 30 51 81 00
Fax +49 69 31 84 35

www.clariant-personalcare.com

This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should not therefore be construed as guaranteeing specific properties of the products described or their suitability for a particular application. Any existing industrial property rights must be observed. The quality of our products is guaranteed under our General Conditions of Sale.

® Trademark of Clariant registered in numerous countries.
© 2007 Clariant International AG, Rothausstrasse 61, 4132 Muttenz, Switzerland