



NEOLONE™ 950 Preservative

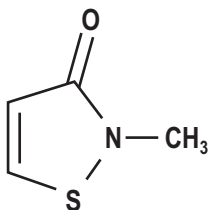
General

A Sustainable, Broad Spectrum Bactericide for the Preservation of Rinse-Off Haircare and Rinse-Off Skin-Care Products

Dow's unique knowledge of isothiazolinone chemistry and the personal care industry has resulted in the development of NEOLONE™ 950 Preservative. This broad spectrum bactericide is a sustainable solution for a range of personal care rinse-off formulations.

The active ingredient of NEOLONE 950 is an isothiazolinone identified by the INCI name Methylisothiazolinone.

Structure



Methylisothiazolinone
 C_4H_5NOS
 CAS No.: 2682-20-4

Formulation/ Stability

NEOLONE™ 950 Preservative is a precise formulation of 9.5% active ingredient in water. Every batch of NEOLONE 950 is manufactured to exact specifications, and a certificate of analysis can be provided with each order. This stable formulation has a three-year product shelf life.

Physical Properties

The following are typical properties of NEOLONE™ 950 Preservative; **they are not to be considered product specifications.**

Appearance: Clear liquid
 Color: APHA <100
 pH: 3 to 6
 Specific gravity: 1.02
 Solubility: Totally miscible in water, lower alcohols and glycols,
 low solubility in hydrocarbons

Applications

- Shampoos, including zinc pyrithione-containing shampoos
- Conditioners
- Body wash/shower gels
- Liquid hand soaps
- Cosmetic ingredients such as surfactants, rheology modifiers, silicone emulsions, opacifiers, etc.

We Supply More Than a Preservative

In the current regulatory climate, where more and more data are required by regulatory authorities, it is important not only to choose a high purity and consistent quality preservative, but also the right supplier who is able to give you the technical, regulatory and commercial support that you need. Dow has more than 30 years of experience with isothiazolinone chemistry and over 100 patents. To support the use of our products, we maintain the following information on NEOLONE™ 950 Preservative:

- Complete regulatory dossiers
- Extensive toxicological databases
- Environmental fate database that is continually updated
- Safe handling expertise that can help you in your manufacturing facilities
- Technical expertise with isothiazolinone chemistry
- Public relations/media expertise and support

Features and Benefits

- Global Approvals for use as a preservative in rinse-off personal care products*
- Broad spectrum bactericide
- Effective and compatible with a variety of bactericides, fungicides and boosters
- Easy to dose and highly water soluble
- Effective at low use levels
- Excellent stability in use over a wide range of pH (2 to 12) and temperatures
- Compatible with a wide range of personal care products and ingredients
- Safe to use at recommended use levels
- Excellent environmental profile: rapidly degrades, does not bioaccumulate and is non-persistent in the environment
- Does not release formaldehyde

*Customers should verify the appropriate legislation by jurisdiction.

Current Regulatory Status

NEOLONE™ 950 Preservative for Global Formulations

Extensive databases and global expertise provided Dow with a solid foundation for obtaining registration and global approval for NEOLONE 950.

Recommended Use Rates

The recommended use level for NEOLONE™ 950 Preservative is 0.05% - 0.1% (48 - 95 ppm of active ingredient) of NEOLONE 950 as supplied.

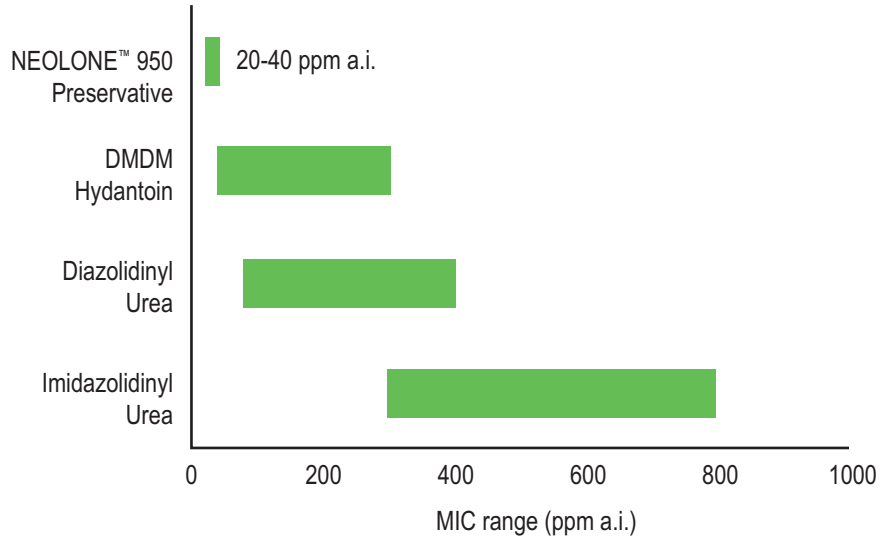
NEOLONE 950 should be added as the last ingredient and at the lowest temperature ($\leq 45^{\circ}\text{C}$) possible. NEOLONE 950 may tolerate exposure to higher temperatures (70°C), however the stability of the active ingredients should be confirmed. Since the process conditions and components of personal care formulations vary considerably and may have impact on the efficacy of preservatives, we urge each manufacturer to verify the efficacy and stability of NEOLONE 950 in use.

Microbiological Properties/Activity

NEOLONE™ 950 Preservative exhibits outstanding antimicrobial activity, inhibiting a wide variety of Gram-positive and Gram-negative bacteria. The following table gives the minimum inhibitory concentration (MIC) in ppm active ingredient methylisothiazolinone, which inhibited the growth of various microorganisms in broth tests. The figure below shows comparative MIC ranges against bacteria for methylisothiazolinone and other personal care preservatives.

Organism	ATCC No.	MIC (ppm active ingredient)
Bacteria		
<i>Enterobacter aerogenes</i>	15038	30
<i>Pseudomonas aeruginosa</i>	15442	40
<i>Burkholderia cepacia</i>	17765	20
<i>Pseudomonas oleovorans</i>	8062	30
<i>Pseudomonas putida</i>	795	20
<i>Staphylococcus aureus</i>	6538	40
<i>Serratia marcescens</i>	Lab Isolate	30

Minimal Inhibitory Concentrations Test Parameters: Nutrient Broth, 30°C/pH 7, 24 Hour Contact Time



The data demonstrate that NEOLONE™ 950 Preservative inhibits a wide variety of bacteria at low active ingredient levels. Overall, the MIC values for NEOLONE 950 are lower compared to other bacterial preservatives. MIC values are an indicator of intrinsic antimicrobial activity and should not be taken as recommended use concentrations in personal care products.

NEOLONE™ 950 Performance in Rinse-Off Applications

NEOLONE™ 950 Preservative microbiological performance was assessed with Dow's 3-cycle challenge test which uses separate pools of bacteria and fungi. Dow's method is a modification of the Personal Care Product Council (PCPC) preservative efficacy test.

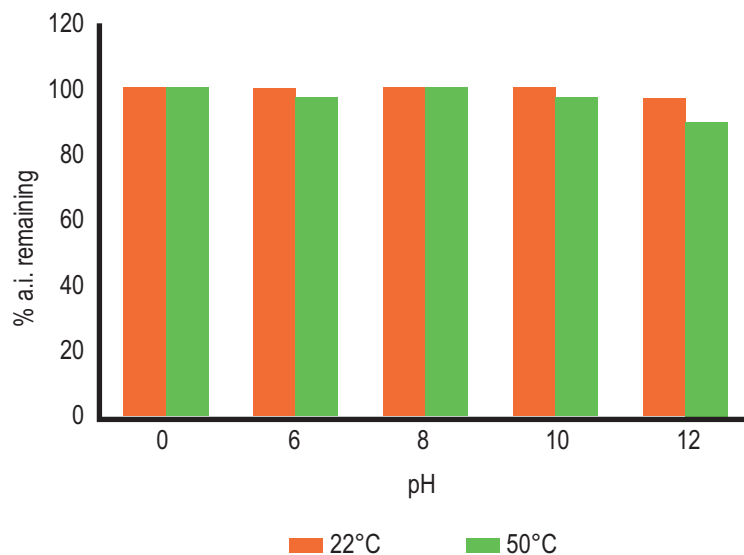
Product	NEOLONE™ 950 Preservative (% Product)	Bacteria – Estimated CFU/g after day:		
		7	14	21
Shampoo, pH 6.1	0 (Unpreserved)	>10 ⁶	>10 ⁷	>10 ⁶
	0.05	<10	<10	<10
	0.10	<10	<10	<10
Body Wash, pH 6.8	0 (Unpreserved)	10	>10 ³	>10 ³
	0.05	<10	30	20
	0.10	<10	<10	10
Hair Conditioner	0 (Unpreserved)	>10 ³	>10 ³	>10 ³
	0.05	<10	<10	<10
	0.08	<10	<10	<10
Sodium Lauryl Sulfate, pH 8.9	0 (Unpreserved)	>10 ⁷	>10 ⁷	>10 ⁷
	0.05	<10	<10	<10
	0.10	<10	<10	<10

Chemical Stability

NEOLONE™ 950 Preservative shows excellent stability in personal care formulations and with cosmetic raw materials. NEOLONE 950 is stable over a wide range of pH and temperature conditions and is compatible with a variety of surfactants and proteins. The data below demonstrate these formulation advantages.

Effect of pH and Temperature in Buffered Water

Methylisothiazolinone Stability After 3 Weeks



NEOLONE™ 950 Preservative Stability in Surfactants

Matrix	% Active Ingredient Remaining at 4 Weeks		
	25°C	42°C	50°C
Sodium Lauryl Ether Sulfate	100	100	100
Sodium Lauryl Sulfate	100	100	100
Cocamidopropyl Betaine	100	85	66
Sodium C14-16 Olefin Sulfonate	100	93	79
Ammonium Lauryl Sulfate	100	98	100
Sodium Dodecylbenzene Sulfonate	100	100	N/A
Sodium Lauroyl Sarcosinate	84	(52 weeks at 25°C)	

NEOLONE™ 950 Preservative Stability in Proteins

Matrix	% Active Ingredient Remaining at 12 Weeks:
	35°C
2% Keratin	86
1% Collagen	91
8% Elastin	94
2% Hydrolyzed Animal Protein	93

Analytical Procedures

High Performance Liquid Chromatography (HPLC)

HPLC analysis is the preferred method for determining use levels of methylisothiazolinone, the active ingredient in NEOLONE™ 950 Preservative. This method can be used to determine NEOLONE 950 active ingredient levels in many personal care products. If you require detailed information on HPLC methods, please contact your local Dow representative.

Handling Precautions

Storage

Store products in tightly closed original containers at temperatures recommended on the product label.

Disposal Considerations

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow representative for more information.

Product Stewardship

When considering the use of any Dow product in a particular application, review the latest Safety Data Sheet (SDS) and country-specific product label to ensure the intended use is within the scope of approved uses. Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including Safety Data Sheets (SDS), should be consulted prior to use of Dow products. Current Safety Data Sheets are available from Dow.

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