# KATHON™ LX1400

## Microbicide for Latex Preservation

### INTRODUCTION

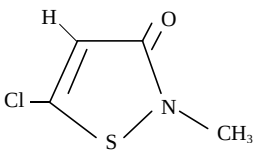
KATHON™ LX1400 microbicide is a formulation for latex emulsions developed following consultations with key customers in this market. It is formulated specifically to meet the changing needs and pressures facing latex emulsion manufacturers.

### PRODUCT COMPOSITION AND TYPICAL PROPERTIES

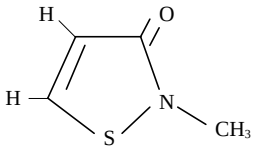
**Active Ingredients:**

The active ingredients of KATHON™ LX1400 are identified using the IUPAC nomenclature as 5-Chloro-2-methyl-4-isothiazolin-3-one and 2-Methyl-4-isothiazolin-3-one.

Structural formulae:




RH-651
5-Chloro-2-methyl-4-isothiazolin-3-one




RH-573
2-Methyl-4-isothiazolin-3-one

**PHYSICAL AND CHEMICAL PROPERTIES**
*(these do not constitute specifications)*

| | |
|---|---|
| Appearance | Yellow, clear, solids-free liquid |
| pH | 1-3 |
| Specific gravity | 1.3 |
| Viscosity | 16 CPS@25°C |
| Flash point | N.A. |
| Solubility in water | Fully miscible |
| Solubility in organic solvents | Soluble in a wide range |

**COMPOSITION**
*(these do not constitute specifications)*

| | Weight % |
|---|---|
| 5-Chloro-2-methyl-4-isothiazolin-3-one | 10.5 |
| 2-Methyl-4-isothiazolin-3-one | 3.5 |
| Stabiliser/salts (proprietary combination) | 26 |
| Water | 60 |

### PERFORMANCE BENEFITS

- **Reduced Gel Formation/Coagulum**

Some latex emulsions are very sensitive to the presence of metal salts and/or organic solvents, forming gels or coagulum when these are introduced. KATHON™ LX1400 is water based and stabilised with a proprietary combination of stabilisers which greatly reduce gel formation associated with biocide addition. The table below shows examples of gel/coagulum formation tests that compare KATHON™ LX1400 with other commercially available isothiazolinone formulations. All the data shown is generated using customers latex emulsions.

This reduction in gel formation presents several advantages to the latex manufacturer:

- the need for pre-dilution of the 14% biocide is greatly reduced which minimises upstream water addition.

- the range of products in which KATHON™ LX1400 can be used is broader than with standard isothiazolone formulations. This means that less economic non gel forming biocides can be eliminated.

- additional raw materials, used to counteract gels can be eliminated.

- reduced maintenance and replacement of filters.

- less off specification material is produced.

- production cycle time is improved.

These are significant advantages which help improve productivity and profitablity of production units.

**GEL/COAGULUM FORMATION: KATHON™ LX1400 VS STANDARD PRODUCT**

| Latex Type | Seive Size | Gels present upon receipt | KATHON™LX1400 dosed as is | KATHON™LX1400 diluted to 1.5% | Typical 1.5% a.i. isothiazolinone formulation |
|---|---|---|---|---|---|
| Pure acrylic | 150µ | 0.001 | 0.165 | 0.000 | 0.480 |
| Styrene acrylic | 150µ | 0.003 | 0.173 | 0.000 | 2.922 |
| Styrene acrylic | 45µ | 0.003 | 0.620 | 0.000 | No data |
| Styrene butadiene | 45µ | 0.003 | 0.011 | 0.001 | 12.6 |
| Styrene acrylonitrile | 45µ | 0.001 | 0.080 | 0.000 | No data |

Note: gel formation is expressed as g/Kg of wet latex. Gels upon receipt deducted from data obtained after biocide addition.

• **Water based**

KATHON™ LX1400 is water based and VOC free.

• **Stabiliser package**

The stabiliser package of KATHON™ LX1400 is based upon inert ingredients which are FDA compliant by virtue of being either prior sanctioned, generally recognised as safe (GRAS) or cleared under other existing indirect or direct food additive regulations.

• **Storage stability**

KATHON™ LX1400 exhibits excellent storage stability with 100% of the active ingredient remaining after 8 and 12 weeks storage at 55°C and 40°C respectively. Other isothiazolinone formulations are not so stable.

**In addition KATHON™ LX1400 offers all the performance benefits associated with other KATHON™ LX series products:**

• **Broad spectrum activity**

Controls both bacteria (Gram-negative and Gram-positive) and fungi (moulds and yeasts).

• **Rapid inhibition of microbial growth & enzyme synthesis**

KATHON™ LX1400 causes immediate inhibition of growth on coming into contact with a microorganism. The growth inhibition rapidly becomes irreversible and results in cell death. Even before cell death occurs, the organism treated with KATHON™ LX1400 is unable to synthesize enzymes.

• **Economical**

Use concentrations are more cost effective than other commercial latex preservatives.

• **Low toxicity**

Extensive toxicological testing has shown that the active ingredients of KATHON™ LX1400 are safe at recommended use levels in your final formulation.

• **Low use levels**

The powerful active ingredients in KATHON™ LX1400 make it effective at low use levels.

• **Biodegradable/Non persistent in the environment**

Data generated by Rohm and Haas show that the active ingredients in KATHON™ LX1400 are readily dissipated in the environment by chemical, biological and physical means: the products of environmental degradation are easily utilised in biological systems. Active ingredient breakdown does not lead to the presence of chlorinated organics in the environment.

• **Compatibility**

Compatible with surfactants and emulsifiers, regardless of their ionic nature.

• **Formaldehyde-free**

KATHON™ LX1400 does not contain or generate formaldehyde.

## EFFICACY: MINIMUM INHIBITORY CONCENTRATION DATA

The table below indicates the minimum concentrations in parts per million (ppm) of KATHON™ LX1400 which inhibit the growth of various microorganisms in test tube cultures. These data demonstrate broad spectrum antimicrobial activity. The tests are carried out under standardised laboratory conditions in nutrient rich growth media - the MIC concentration will vary according to the growth media used and the test conditions.

| Test Organism | ATCC Number | Product (ppm) | Active Ingredient (ppm) |
|---|---|---|---|
| **Gram positive bacteria*** | | | |
| *Bacillus cereus var.mycoides* | R&H#L5 | 14 | 2.0 |
| *Bacillus subtilis* | R&H#B2 | 14 | 2.0 |
| *Brevibacterium ammoniagenes* | 6871 | 14 | 2.0 |
| *Staphylococcus aureus* | 6538 | 14 | 2.0 |
| **Gram negative bacteria*** | | | |
| *Alcaligenes faecalis* | 8750 | 14 | 2.0 |
| *Enterobacter aerogenes* | 3906 | 36 | 5.0 |
| *Escherichia coli* | 11229 | 57 | 7.9 |
| *Flavobacterium suaveolens* | 958 | 64 | 8.9 |
| *Proteus vulgaris* | 8427 | 36 | 5.0 |
| *Pseudomonas aeruginosa* | 15442 | 36 | 5.0 |
| *Pseudomonas fluorescens* | 13525 | 14 | 2.0 |
| **Yeasts*** | | | |
| *Candida albicans* | 11651 | 36 | 5.0 |
| *Rhodotorula rubra* | 9449 | 14 | 2.0 |
| *Saccharomyces cerevisiae* | 2601 | 14 | 2.0 |
| **Fungi** | | | |
| *Alternaria dianthicola* | 11782 | 21 | 2.9 |
| *Aspergillus foetidus* | 16878 | 57 | 7.9 |
| *Aspergillus oryzae* | 10196 | 36 | 5.0 |
| *Aureobasidium pullulans* | 9294 | 43 | 6.0 |
| *Cladosporium resinae* | 11274 | 36 | 5.0 |
| *Fusarium oxysporum* | R&H-EL-1 | 29 | 4.0 |
| *Penicillium funiculosum* | 9644 | 36 | 5.0 |
| *Penicillium variabile* | USDA | 14 | 2.0 |
| *Trichosporon sp.* | R&H-SH-2 | 14 | 2.0 |

* The organisms in these categories have been isolated from contaminated latex emulsions

## DIRECTIONS FOR USE

Freshly prepared latex emulsions can be reactive mixtures which makes it difficult to predict accurately the stability and therefore efficacy of a biocide. It is therefore recommended that for each latex emulsion stability and efficacy testing is carried out to optimise biocide dosing.

### Dosing Recommendations

Extensive laboratory testing and field experience with the product shows that optimal use levels are between 0.01% and 0.02% product as supplied (15 - 30 ppm active ingredient).

KATHON™ LX1400 has been specially formulated to minimise the need for predilution prior to use.

If you need engineering advice on biocide dosing systems, please contact your Rohm and Haas representative.

## REGULATORY STATUS OF KATHON™ LX1400

The list below is intended to assist you in complying with prevailing regulatory controls. It lists the status of KATHON™ LX1400 in those countries where specific approval is required.

| COUNTRY | PRODUCT | REGULATORY CLEARANCE | APPLICATION |
|---|---|---|---|
| Germany | The active ingredients in KATHON™ LX1400 | BgVV Rec. XIV | • As a preservative of polymer emulsions for the coating of food contact articles and general articles, with a maximum of 0.004 mg/dm². |
| | | BgVV Rec. XXXVI | • As a slimicide in the manufacture of paper, carton and cardboard designated for food-contact with a maximum of 0.0004% relative to the dry fibre. In the extract of the final product the maximum detectable concentration must not exceed of 0.0005 mg/dm². |
| | | BgVV Rec. XXXVI/1 | • As a slimicide in the manufacture of cooking and hot filter papers and filter layers designated for: hot extraction e.g. cooking bags, teabags, hot filterpapers, and filter layers designated for extraction (filtration) at a maximum of 4 mg/kg relative to the dry fibre. In the hotwater extract of the final product the maximum detectable concentration must not exceed 0.0005 mg/dm². |
| | | BgVV Rec. XXXVI/2 | • As a slimicide in the manufacture of paper, carton and cardboard for baking purposes designated for food-contact at a maximum of 0.0004% relative to the dry fibre. In the hotwater extract of the final product the maximum detectable concentration must not exceed 0.0005 mg/dm². |
| Italy | The active ingredients in KATHON™ LX1400 | Decree No. 395 August 1987 | Food Contact Paper |
| Belgium | The active ingredients in KATHON™ LX1400 | | The formulation containing these active ingredients can be used in food-contact applications provided the specific migration limit (SML) of 0.01 mg/kg for each active ingredient is respected. |
| Holland | The active ingredients in KATHON™ LX1400 | | The formulation containing these active ingredients with taking into account the specific migration limits of these active ingredients can be used in the process water during the manufacturing of paper and board as defined in the WARENWET. |

These clearances apply only to KATHON™ LX1400 as submitted by Rohm and Haas Company. Formulations containing other ingredients may need to be resubmitted for approval.

| COUNTRY | PRODUCT | REGULATORY CLEARANCE | APPLICATION |
|---|---|---|---|
| USA | The active ingredients in KATHON™ LX1400 | FDA21CFR-175.105 | • Adhesives: Limitations - for use only as an antimicrobial agent in polymer latex emulsions. |
| | | FDA21CFR-176.170 | • Component of Paper and paperboard in Contact with Aqueous and Fatty Foods Limitations - for use only:<br>**1.** As an antimicrobial agent for polymer latex emulsions in paper coatings at a level not to exceed 50 ppm (active ingredient) in the coating formulation.<br>**2.** As an antimicrobial agent for finished coating formulations and for additives used in the manufacture of paper and paperboard including fillers, binders, pigment slurries and sizing solutions at a level not to exceed 25 ppm (based on active ingredient) in the coating formulation and additives. |
| | | FDA21CFR-176.180 | Components of Paper and paperboard in Contact with Dry Food. Limitations - same as specified under 21CFR-176.170. |

These clearances apply only to KATHON™ LX1400 as submitted by Rohm and Haas Company. Formulations containing other ingredients may need to be resubmitted for approval.

## PLANT HYGIENE

The preservation of latex emulsions should be achieved through a combination of an effective biocide and good quality control. Biocide addition should not be used to replace good hygiene; it is complementary to good manufacturing practice, not a substitute for it. Some of the key aspects of preventing microbial contamination are given below.

- **Raw Materials**
  - are they susceptible to microbial contamination?
  - regularly monitor their microbiological quality
  - set a microbiological specification for them
- **Process Water**
  - monitor the microbial contamination level
  - regularly clean and sanitise water treatment units
  - treat stored water prior to use
- **Storage and Handling**
  - flush and drain lines when not in use
  - clean and sanitise lines and equipment regularly
  - try to minimise dead or non draining areas
  - clean and sanitise reused drums and containers
  - avoid entry of ambient air into storage tanks
  - minimise tank headspace and/or provide microbe free headspace
- **Cleaning and Sanitisation**
  - establish protocols for cleaning and sanitising of tanks and equipment.

Detailed suggestions and guidance regarding plant hygiene are given in our bulletin "Preventing Microbial Contamination in Manufacturing" which is available from your local Rohm and Haas sales office.

## TOXICOLOGY AND ENVIRONMENTAL FATE

Rohm and Haas Company takes every measure to ensure that its products are safe for both man and the environment.

### Toxicology

In line with this policy, Rohm and Haas can provide comprehensive toxicological data for KATHON™ LX1400, which shows it is of low toxicity at recommended use levels. More detailed information on the toxicological profile of KATHON™ LX1400 can be obtained from your local Rohm and Haas sales office.

### Environmental Fate

There is no short cut to environmental safety: Rohm and Haas has conducted extensive research into the environmental fate of the active ingredients of KATHON™ LX1400.

These studies demonstrate that at normal use/dilution levels KATHON™ LX1400 has minimal environmental impact because of the following properties:

• High performance product used at very low use levels

• Rapid degradation to non toxic, non persistent substances

• Degradation does not produce chlorine or chlorinated organics

• Does not affect the performance of waste water treatment plants

This combination of properties makes KATHON™ LX1400 the environmentally sound choice for the preservation of latex emulsions.

## MATERIAL SAFETY DATA SHEETS

Rohm and Haas company maintains Material Safety Data Sheet (MSDS) on all of its products. These contain important information that you may need to protect your employees and customers against any known health and safety hazards associated with our products. We recommend you obtain copies of MSDS for our products from your local Rohm and Haas technical representative or the Rohm and Haas company. In addition, we recommend you obtain copies of MSDS from your suppliers of other raw materials used with our products.

**More information on the web about our products and services and all our worldwide addresses:**
**www.rhcis.com**

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