



**KATHON™ LX 1.5% Microbicide**  
**Preservative for use In Latex Paints, Industrial**  
**Coatings, Polymer Latexes, and Dispersed Pigments**  
 EPA Reg. No. 707-134

## General

KATHON™ LX 1.5% Microbicide is a highly effective microbicide recommended as a preservative for latex paints, aqueous industrial coatings, polymer latexes, and dispersed pigments. It's also effective in controlling bacteria and fungi in the manufacture and storage of dispersed pigments, such as kaolin clays, titanium dioxide, calcium carbonate, and others. Kathon LX 1.5% microbicide can be used as supplied.

KATHON LX 1.5% Microbicide is well established as a preservative for bulk storage of latexes. It has also received EPA registration as an in-can preservative for water-based paints and coatings. Its broad spectrum activity, excellent physical and chemical compatibility, and low toxicity at recommended use levels provide formulators with an economical, effective, and environmentally acceptable alternative to other commercial biocides.

Laboratory studies have shown KATHON LX 1.5% Microbicide to be an effective preservative for use in paints based on acrylic, polyvinyl acetate, styrene acrylic, and copolymer vehicles. The active ingredients are effective at low concentrations against bacteria and fungi and are highly resistant to the inhibitory effects of most organic and inorganic compounds.

## Physical Properties

The following are typical properties of KATHON LX 1.5% Microbicide; **they are not to be considered product specifications.**

|                             |                             |
|-----------------------------|-----------------------------|
| Appearance .....            | pale yellow to green liquid |
| Odor.....                   | mild, aromatic              |
| Specific Gravity.....       | 1.02                        |
| Density, lbs./gal. ....     | 8.4                         |
| pH .....                    | 2 to 4                      |
| Viscosity, cps at 25°C..... | 3                           |

The active ingredients are the compounds identified according to IUPAC nomenclature as 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one.

### Physical Properties of the Active Ingredients

|                                              |            |
|----------------------------------------------|------------|
| 5-Chloro-2-methyl-4-isothiazolin-3-one ..... | 1.15% min. |
| 2-Methyl-4-isothiazolin-3-one .....          | 0.35% min. |
| Minimum Value.....                           | 1.50%      |

### Physical Properties of the Inert Ingredients (Approximate Values)

|                              |           |
|------------------------------|-----------|
| Magnesium nitrate .....      | 3.0% max. |
| Copper.....                  | 0.15%     |
| Organic impurities.....      | —         |
| Water .....                  | 95.35%    |
| Total Inert Ingredients..... | 98.50%    |

### Miscibility/Solubility

Miscible with water, methanol, ethanol, isopropyl alcohol, and acetic acid. Immiscible with acetone.

### Compatibility

Biologically and physically compatible with anionic, nonionic, and cationic surfactants, halogens at use dilutions, and most organic and inorganic compounds normally used in coatings, latices, and pigment slurries.

### Stability

Stable as supplied at least one year at ambient temperatures.

## Features and Benefits

- Broad-spectrum activity: controls bacteria (gramnegative and gram-positive) and fungi, such as yeasts and molds
- Economical: use concentrations generally more cost effective than other commercial preservatives
- Formaldehyde free: does not contain or generate formaldehyde
- FDA-cleared: adhesives and paper coatings
- Low toxicity: extensive toxicological testing has shown that KATHON™ LX 1.5% Microbicide is non-toxic at recommended use levels in your final formulation
- Low use levels
- Compatible: with surfactants and emulsifiers regardless of their ionic nature
- Easy to formulate: KATHON LX 1.5% Microbicide is supplied as an aqueous solution
- No side effects: does not adversely affect product physical properties or performance
- EPA-registered: KATHON LX 1.5% (EPA Reg. No. 707-134)

## Antimicrobial Activity

The data in this bulletin were obtained with KATHON LX 1.5% Microbicide as supplied or with a technical grade of the active ingredients used as an intermediate in its manufacture.

Table 1 lists the MIC (Minimum Inhibitory Concentration) in ppm of isothiazolones or KATHON LX 1.5% Microbicide active ingredient, which inhibits the growth of various microorganisms in test tube cultures. The data are intended to indicate the activity of KATHON LX 1.5% Microbicide in aqueous solutions and do not represent a claim for recommended use concentrations nor list microorganisms necessarily involved in the contamination and deterioration of paint and industrial coating systems.

**Table 1**

| Test Organism                                        | MIC (ppm active ingredients) |
|------------------------------------------------------|------------------------------|
| <b>Gram positive bacteria</b>                        |                              |
| <i>Bacillus cereus</i> var. <i>mycoides</i> RandH L5 | 2                            |
| <i>Bacillus subtilis</i> RandH B2                    | 2                            |
| <i>Brevibacterium ammoniagenes</i> ATTC 6871         | 2                            |
| <i>Cellulomonas</i> sp. ATTC 21339                   | 6                            |
| <i>Sarcina lutea</i> ATTC 9341                       | 5                            |
| <i>Staphylococcus aureus</i> ATTC 6538               | 2                            |
| <i>Staphylococcus epidermidis</i> ATTC 155           | 2                            |
| <i>Streptococcus pyogenes</i> ATTC 624               | 9                            |
| <i>Streptomyces albus</i> ATTC 3004                  | 1                            |

**Gram negative bacteria**

|                                           |     |
|-------------------------------------------|-----|
| <i>Achromobacter parvulus</i> ATTC 4335   | 2   |
| <i>Alcaligenes faecalis</i> ATTC 8750     | 2   |
| <i>Azotobacter vinelandii</i> ATTC 12837  | 5   |
| <i>Enterobacter aerogenes</i> ATTC 3906   | 5   |
| <i>Escherichia coli</i> ATTC 11229        | 8   |
| <i>Flavobacterium suaveolens</i> ATTC 958 | 9   |
| <i>Nitrobacter agilis</i> ATTC 14123      | 0.1 |
| <i>Nitrosomonas europaea</i> ATTC 19718   | 0.1 |
| <i>Proteus vulgaris</i> ATTC 8427         | 5   |
| <i>Pseudomonas aeruginosa</i> ATTC 15442  | 5   |
| <i>Pseudomonas fluorescens</i> ATTC 13525 | 2   |
| <i>Pseudomonas oleoverans</i> ATTC 8062   | 5   |
| <i>Salmonella typhosa</i> ATTC 6539       | 5   |
| <i>Shigella sonnei</i> ATTC 9290          | 2   |

**Fungi**

|                                                                       |   |
|-----------------------------------------------------------------------|---|
| <i>Alternaria dianthicola</i> ATTC 11782                              | 3 |
| <i>Aspergillus foetidus</i> ATTC 16878                                | 8 |
| <i>Aspergillus niger</i> ATTC 9642                                    | 9 |
| <i>Aspergillus oryzae</i> ATTC 10196                                  | 5 |
| <i>Aureobasidium pullulans</i> ATTC 9294                              | 6 |
| <i>Candida albicans</i> (yeast) ATTC 11651                            | 5 |
| <i>Chaetomium globosum</i> ATTC 6205                                  | 9 |
| <i>Cladosporium resinae</i> ATTC 11274                                | 5 |
| <i>Coniophora puteana</i> ATTC 9351                                   | 8 |
| <i>Glocladium fimbriatum</i> (QM 7638)                                | 9 |
| <i>Lentinus lepideus</i> ATTC 12653                                   | 4 |
| <i>Lenzites trabea</i> ( <i>Gleophyllum trabeum</i> ) ATTC 11539      | 6 |
| <i>Mucor rouxii</i> RandH L5-83                                       | 5 |
| <i>Penicillium funiculosum</i> ATTC 9644                              | 5 |
| <i>Penicillium variable</i> ( <i>glaucum</i> ) USDA                   | 2 |
| <i>Phoma glomerata</i> ATTC 6735                                      | 3 |
| <i>Phoma herbarum</i> ( <i>pigmentivora</i> ) ATTC 12569              | 2 |
| <i>Pullularia</i> ( <i>Aureobasidium</i> ) <i>pullulans</i> ATTC 9348 | 5 |
| <i>Rhizopus stolonifer</i> ATTC 10404                                 | 5 |
| <i>Rhototorula rubra</i> (yeast) ATTC 9449                            | 2 |
| <i>Saccharomyces cerevisiae</i> (yeast) ATTC 2601                     | 2 |
| <i>Trichophyton mentagrophytes</i> ( <i>interdigitale</i> ) ATTC 9533 | 5 |

**Efficacy of  
KATHON™ LX 1.5%  
Microbicide**

**Evaluation of Preservatives**

Water-based industrial formulations are susceptible to spoilage caused by microbial growth. Uncontrolled growth may affect the color, odor, viscosity, pH, and other properties of the formulation. Extremely heavy growth may even result in gassing, coagulation or clumping and may necessitate filtration or disposal of the spoiled formulation.

Microbicides are used to prevent or overcome microbial growth. Their efficacy can be evaluated by incubating samples of infected material containing a microbicide for a period of 6 weeks with periodic reinoculations with microbial cultures. Counts of colony-forming units per milliliter (CFU/ml) obtained by an agar plating method or a standard streak test indicate the degree of control afforded by the biocide. This severe test procedure is intended to represent a repeated insult situation where many sources of contamination may exist. Other test procedures are available to assist you in your individual formulation testing.

A cell suspension is made by mixing 19 cultures of bacteria, yeasts, and filamentous fungi isolated from contaminated polymer latices or paints and two additional pseudomonad cultures. A sample of naturally contaminated polymer latex or paint is used as a second inoculum. Fifty-gram aliquots of latex or formulation in screw-capped bottles are treated with a designated level of KATHON™ LX 1.5% Microbicide and inoculated at two-week intervals with the cell suspension and/or inoculum to provide at least one million CFU/ml of sample and held for 6 weeks. Microbial populations are determined biweekly prior to each reinoculation by means of a standard Agar Streak Test. The rating scale used to describe microbial growth is presented below.

| Rating | Colony-Forming Units/mL (Bacteria) |
|--------|------------------------------------|
| 0      | <10                                |
| T      | 10 to 100                          |
| 1+     | 100 to 1,000                       |
| 2+     | 1,000 to 10,000                    |
| 3+     | 10,000 to 100,000                  |
| 4+     | >100,000                           |
| F      | Fungal Growth                      |

### Interpreting Test Results

When several preservatives protect a particular formulation equally well for the duration of a test, only a cost/performance comparison gives the potential user direction in selecting the preservative of choice. It is important to note that all of the preservative treatment levels in this bulletin are shown as ppm active ingredient (AI) not as product supplied, unless otherwise noted. KATHON LX 1.5% Microbicide is generally more cost effective when compared to other commercial preservatives.

The following tables show the results of 6-week preservative testing in various latex formulations.

## Preservation of Polymer Latex-Based Paints

**Table 2**

Table 2 shows the results of preservation tests (6 weeks) on acrylic and polyvinyl acetate latex-based paints with KATHON LX 1.5% Microbicide. Microbicide levels of 10-20 ppm AI gave control. Excellent control is achieved for both the acrylic and polyvinyl acetate paints.

### Preservation of Latex-Based Paints

| Preservative                  | Level,<br>ppm AI | Microbial Growth Rating* |         |         |
|-------------------------------|------------------|--------------------------|---------|---------|
|                               |                  | 2 weeks                  | 4 weeks | 6 weeks |
| Acrylic Exterior Paint (pH 9) |                  |                          |         |         |
| None                          | 0                | 4+                       | 4+      | 4+      |
| KATHON™ LX 1.5%               | 10               | 0                        | 0       | 0       |
|                               | 20               | 0                        | 0       | 0       |

**Acrylic Interior Paint (pH 8)**

|                 |    |    |    |    |
|-----------------|----|----|----|----|
| None            | 0  | 4+ | 4+ | 4+ |
| KATHON™ LX 1.5% | 10 | 0  | 0  | 0  |
|                 | 20 | 0  | 0  | 0  |

**Polyvinyl Acetate Paint (pH 7.7)**

|                |    |     |    |    |
|----------------|----|-----|----|----|
| None           | 0  | (F) | 4+ | 4+ |
| KATHON LX 1.5% | 10 | 0   | 0  | 0  |
|                | 20 | 0   | 0  | 0  |

\*See Rating Description

**Preservation of Latex Emulsions**

Table 3 gives the results of preservative tests on two acrylic polymer latices at different pH containing KATHON™ LX 1.5% Microbicide. Trypticase soy broth was added to the acid latex (0.3% based on latex) after four weeks to increase the growth rate. All levels of KATHON LX 1.5% Microbicide were effective in controlling growth.

**Table 3****Preservation of Acrylic Latices**

| Preservative          | Level,<br>ppm AI | Microbial Growth Rating* |         |         |
|-----------------------|------------------|--------------------------|---------|---------|
|                       |                  | 2 weeks                  | 4 weeks | 6 weeks |
| Alkaline Latex (pH 9) |                  |                          |         |         |
| None                  | 0                | 4+                       | 4+      | 4+      |
| KATHON™ LX 1.5%       | 25               | 0                        | 0       | 0       |
|                       | 40               | 0                        | 0       | 0       |
| Acid Latex (pH 6)     |                  |                          |         |         |
| None                  | 0                | 0                        | 2+      | 4+      |
| KATHON LX 1.5%        | 20               | 0                        | 0       | 0       |
|                       | 40               | 0                        | 0       | 0       |

\*See Rating Description

Table 4 presents the results of preservative tests on two polyvinyl acetate latices at pH 5 and 5 containing KATHON LX 1.5% Microbicide. KATHON LX 1.5% Microbicide provided complete protection at 15-40 ppm AI in both latices.

**Table 4****Preservation of Polyvinyl Acetate Latices**

| Preservative         | Level,<br>ppm AI | Microbial Growth Rating* |         |         |         |
|----------------------|------------------|--------------------------|---------|---------|---------|
|                      |                  | 2 weeks                  | 4 weeks | 6 weeks | 8 weeks |
| Acidic Latex (pH 5)  |                  |                          |         |         |         |
| None                 | 0                | 4+                       | 4+      | 4+      | 4+      |
| KATHON™ LX 1.5%      | 15               | 0                        | 0       | 0       | 0       |
|                      | 25               | 0                        | 0       | 0       | 0       |
|                      | 40               | 0                        | 0       | 0       | 0       |
| Neutral Latex (pH 7) |                  |                          |         |         |         |
| None                 | 0                | 0                        | 2+      | 4+      | 4+      |
| KATHON LX 1.5%       | 15               | 0                        | 0       | 0       | 0       |
|                      | 25               | 0                        | 0       | 0       | 0       |
|                      | 40               | 0                        | 0       | 0       | 0       |

•See Rating Description

## Eradication of Microbial Growth in Field-Contaminated Latices

KATHON™ LX 1.5% Microbicide is very effective in cleaning up contamination and eradicating microbial growth in field-contaminated polymer latices or paints. One such latex was treated with 30 ppm AI of KATHON LX 1.5% Microbicide and the microbial populations were measured after 4 and 7 days. Table 7 shows the results of this study, which clearly demonstrate increased levels of contamination for the control latex and complete control for the KATHON LX 1.5% Microbicide-treated latex.

**Table 5**

**Eradication of Microbial Growth in Contaminated Acrylic Latex (pH 9-9.5)**

| Preservative    | Level, ppm AI | Microbial Population Colony-Forming Units/mL* |         |         |
|-----------------|---------------|-----------------------------------------------|---------|---------|
|                 |               | 2 weeks                                       | 4 weeks | 6 weeks |
| None            | 0             | 3+                                            | 4+      | 4+      |
| KATHON™ LX 1.5% | 30            | 0                                             | 0       | 0       |

\*See Rating Description

The enzymes generated by microbes cause the deterioration of organic components in latex formulations. It is therefore essential to stop the secretion or production of these enzymes by the existing organisms as quickly as possible. Studies show that KATHON LX 1.5% Microbicide prevents secretion of additional enzymes by the organisms immediately. Complete death of the organism may take longer to occur, however, the production of enzymes ceases within 10 minutes after the addition of KATHON LX 1.5% Microbicide.

## Preservation of Dispersed Pigments

Table 6 gives the results of preservative tests on three levels of KATHON LX 1.5% Microbicide in a TiO<sub>2</sub> slurry. Excellent preservation is obtained at all levels tested. KATHON LX 1.5% Microbicide also performs well in other dispersed pigments such as kaolin clays and calcium carbonate.

**Table 6**

**Preservation of TiO<sub>2</sub> Slurry (pH 7.8)**

| Preservative    | Level, ppm AI | Microbial Population* |         |         |
|-----------------|---------------|-----------------------|---------|---------|
|                 |               | 2 weeks               | 4 weeks | 6 weeks |
| None            | 0             | 4+                    | 4+      | 4+      |
| KATHON™ LX 1.5% | 10            | 0                     | 0       | 0       |
|                 | 20            | 0                     | 0       | 0       |
|                 | 30            | 0                     | 0       | 0       |

\*See Rating Description

## Applications/ Directions for Use

KATHON LX 1.5% Microbicide is supplied as a liquid which can be readily incorporated during paint formulation. Studies have shown that point of addition of KATHON LX 1.5% Microbicide does not adversely affect paint performance. KATHON LX 1.5% Microbicide may be added directly into the grind or letdown and is usually added as the last ingredient in either stage. The actual required concentration of preservative depends on the particular latex, the expected frequency of repeated microbial contamination, and the necessary level of protection. To insure uniform distribution of preservative, treat the latex or paint while using adequate agitation.

### Paints and Coatings

Treat 1000 lbs. of material with 0.43 to 1.65 lbs. of KATHON LX 1.5% Microbicide to provide a level of 6.25 to 25 ppm active isothiazolones.

## Polymer Latices

Treat 1000 lbs latex with 0.43 to 3.3 lbs. of KATHON™ LX 1.5% Microbicide to provide a level of 6.25 to 50 ppm active isothiazolones.

**Table 7**

**KATHON LX 1.5% Microbicide Conversion Chart**

| Parts Per Million (ppm)<br>Active Isothiazolones | Pounds of KATHON™ LX 1.5%<br>per 1000 Pounds of Paint |
|--------------------------------------------------|-------------------------------------------------------|
| 6.25                                             | .43                                                   |
| 10.00                                            | .67                                                   |
| 15.00                                            | 1.00                                                  |
| 20.00                                            | 1.33                                                  |
| 25.00                                            | 1.65                                                  |
| 30.00                                            | 2.00                                                  |
| 40.00                                            | 2.66                                                  |
| 50.00                                            | 3.30                                                  |

## Storage, Handling and Disposal

Do not get in eyes, on skin or clothing. Wear goggles and rubber gloves when handling. Avoid breathing vapor or mist. Do not take internally. Wash thoroughly after handling.

After contact with eyes: FLUSH IMMEDIATELY with plenty of water with the eyes held open for at least 15 minutes. Get prompt medical attention.

After contact with skin: FLUSH IMMEDIATELY with plenty of water for at least 15 minutes. Shower with soap and water. Launder contaminated clothing before reuse.

If swallowed and victim is conscious: Dilute by giving two glasses of water to drink and call a physician. Never give anything by mouth to an unconscious person.

The active ingredient of KATHON LX 1.5% Microbicide is readily deactivated or neutralized to nontoxic components by the addition of a freshly prepared solution of 5% sodium bicarbonate and 5% sodium hypochlorite in water. Apply solution at a ratio of 10 times deactivation solution per estimated volume or residual spill.

NOTE: The sodium bicarbonate and bleach must be pre-mixed prior to application to ensure effective deactivation.

Personnel cleaning up spills should wear protective clothing consisting of splash goggles, face shields, plastic rain jackets and pants, butyl rubber boots, and impervious gloves. All protective equipment for spill cleanup should be thoroughly deactivated and cleaned before reuse.

1. Absorb as much of the spilled liquid KATHON LX 1.5% Microbicide as possible using an inert absorbent material such as sand, diatomaceous earth, or kitty litter.
2. Place the absorbed material and the absorbent into a container such as a drum that has been lined with a polyethylene liner. The contaminated absorbent material may be deactivated when the immediate emergency of handling the spill has been resolved.
3. Use a freshly prepared solution of 5% sodium bicarbonate and 5% sodium hypochlorite in water to deactivate the remaining KATHON LX 1.5% Microbicide that could not

be absorbed. Use a volume ratio of 10 parts decontaminant to one part of active microbicide. Prepare the decontamination solution by mixing 4 parts of solid sodium bicarbonate with 100 parts of bleach (5% sodium hypochlorite).

4. Allow the decontamination solution to remain in contact with the KATHON™ LX 1.5% Microbicide for up to 30 minutes. The actual decontamination reaction takes place in much less time, but the added time ensures that the reaction goes to completion.
5. Once the decontamination reaction has taken place, the resultant decontaminated material may be safely flushed from the area using a fire hose and large amounts of water.
6. Once the spill areas have been cleaned up, the absorbed material may be decontaminated. Place the decontamination solution in the drum to thoroughly wet the solid material. Let the container stand open for 48 hours to avoid the buildup of pressure from the decontamination reaction, then seal and dispose of it, according to appropriate local, state, and federal regulations.

## Regulatory Information

### FDA Clearances for KATHON LX 1.5% Microbicide

| Country | Product                                              | Regulatory Clearance                                                                          | Application                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------|------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USA     | The active ingredients in KATHON LX 1.5% Microbicide | FDA 21 CFR 175.105 (Adhesives)                                                                | For use only as an antimicrobial agent in polymer latex emulsions                                                                                                                                                                                                                                                                                                                                                        |
|         |                                                      | FDA 21 CFR 175.300 (Resinous and Polymeric Coatings)                                          | For use only as an antimicrobial agent in emulsion-based silicon coatings at a level not to exceed 50 mg active ingredient/Kg in the coating formulation                                                                                                                                                                                                                                                                 |
|         |                                                      | FDA 21 CFR 175.320 (Resinous and Polymeric Coatings for Polyolefin films)                     | For use only as an antimicrobial agent in emulsion-based silicon coatings at a level not to exceed 50 mg active ingredient/Kg in the coating formulation                                                                                                                                                                                                                                                                 |
|         |                                                      | FDA 21CFR 176.170 (Components of paper and paperboard in contact with aqueous and fattyfoods) | 1. As an antimicrobial agent for finished coatings and for additives used in the manufacture of paper and paperboard including fillers, binders, pigment slurries, and sizing solutions not exceeding 25 ppm active ingredient in coating formulations and additives<br><br>2. As an antimicrobial agent for polymer latex emulsions in paper coatings not exceeding 50 ppm active ingredient in the coating formulation |
|         |                                                      | FDA 21 CFR 176.180 (Components of paper and paperboard incontact with dry foods)              | 1. As an antimicrobial agent for finished coatings and for additives used in the manufacture of paper and paperboard including fillers, binders, pigment slurries, and sizing solutions not exceeding 25 ppm active ingredient in coating formulations and additives<br><br>2. As an antimicrobial agent for polymer latex emulsions in paper coatings not exceeding 50 ppm active ingredient in the coating formulation |

These clearances apply only to KATHON LX 1.5% Microbicide as submitted by The Dow Chemical Company. Formulations containing other ingredients may need to be resubmitted for approval.

## Product Stewardship

Dow Microbial Control encourages its customers to review their applications of Dow Microbial Control products from the standpoint of human health and environmental quality. To help ensure that Dow Microbial Control products are not used in ways for which they are not intended or tested, Dow Microbial Control personnel are willing to assist customers in dealing with ecological and product safety considerations. Contact your representative if you need any assistance or information. When considering the use of any Dow product in a particular application, review the latest Safety Data Sheet and country-specific product label to ensure the intended use is within the scope of approved uses and can be accomplished safely. Before handling any of the products mentioned in the text, obtain available product safety information and take necessary steps to ensure safety of use.

For further information visit our website:  
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