Nutrition & Biosciences

DUPONT

Microbial Control
Technical Data Sheet

AMICAL™ Preservatives

Fungicide for Industrial Products and Process Systems

Regional product availability

Please check with your DuPont representative for specific country information.

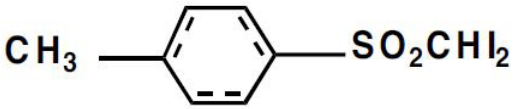
General

AMICAL™ Preservatives are antimicrobial agents, based on the active Diiodomethyl-ptolylsulfone, which are useful for the control of microbial degradation in a variety of end-use applications. The advantages of using AMICAL™ Preservatives are:

- Extremely effective active antifungal agent
- Effective over a broad pH range (2-11)
- Available in easy-to-use liquid or powder forms
- Non dermally-irritating

For regulatory information use in adhesives, paper coatings, plastics, tanned leather, caulks, metalworking fluids, textiles, coatings and wood preservation, contact your sales representative.

Structure



Physical properties

The following are typical properties of the AMICAL™ Preservatives products; **they are not to be considered product specifications.**

AMICAL™ 48 Preservative

Purity, Active Diiodomethyl-p-tolylsulfone	95%
Appearance	Tan, finely divided powder
Melting Point	150°C/302°F
Specific Gravity	2.20

AMICAL™ Flowable Preservative

Purity, Active Diiodomethyl-p-tolylsulfone Content	40%
Appearance	Light gray suspension
pH (as supplied)	4.0-6.0
Boiling Point	Approx. 100°C/212°F
Freezing Point	Approx. 0°C/32°F
Viscosity, cp @ 25°C/77°F	600-1000
Specific Gravity, 25/25°C/77°F	1.32-1.33
Weight per Gallon, lb @ 77°F	11.05

AMICAL™ Flowable Preservative is a water-based dispersion formulation based on the active Diiodomethyl-p-tolylsulfone. It is recommended for use in water-based formulations where high shear mixing is not used.

AMICAL™ WP Preservative

Purity, Active Diiodomethyl-p-tolylsulfone Content	48%
Appearance	Tan-gray, powder

AMICAL™ WP Preservative is a wettable powder based on the active Diiodomethyl-p-tolylsulfone. AMICAL™ WP Preservative is designed to be used in situations where dry blending of ingredients is desired.

Antimicrobial activity

The active ingredient, Diiodomethyl-p-tolylsulfone, in the AMICAL™ Preservatives provides a broad spectrum of antimicrobial activity. The Minimum Inhibitory Concentration (MIC) for a representative sample of various organisms is presented in the table below.

Fungi	MIC (ppm active)	Bacteria	MIC (ppm active)
Aspergillus fumigatis	0.5	*Bacillus subtilis*	10
Stachybotrys chartarum	0.5	*Staphylococcus aureus*	6
Alternaria sp.	0.4	*Streptococcus faecalis*	50
Aspergillus niger	0.4	*Enterobacter aerogenes*	>1000
Aspergillus oryzae	1.6	*Proteus vulgarus*	>1000
Aspergillus versicolor	0.8	*Pseudomonas aeruginosa*	>1000
Aureobasidium pullulans	0.4	*Salmonella typhimurium*	100
Chaetomium globosum	0.2		
Fusarium oxysporum	6.2		
Myrothecium verrucaria	0.8		
Penicillium citrinum	0.8		
Penicillium crisogenum	1.0		

Solubility of Diiodomethylp-tolylsulfone (g/L @ 25°C)

Water	0.0001	N,N-Dimethylformamide	33.0
Isopropyl Alcohol	10.0	Dioctyl Phthalate	<4.0
Acetone	350.0	Dipropylene Glycol	4.0
Mineral Spirits	4.0	Ethyl Phthalate	10.0
Toluene	43.0	Isophorone	25.0
Tributyl Phosphate	220.0	Methyl Ethyl Ketone	25.0
Ethanol	20.0	N-Methyl-2-Pyrrolidone	33.0
Ethylene Glycol	10.0	Mineral Oil	<4.0
Hexane	2.0	Monoethanolamine	20.0
Xylene	33.0	Polyethylene Glycol 350	20.0
n-Propyl Acetate	263.0	Tetrahydrofuran	25.0
Acetophenone	25.0	Triethanolamine	5.0
n-Butyl Phthalate	6.0		

Uses

Latex Paints

AMICAL™ Preservatives provide superior protection against mildew and algal formation on latex paint films. The use of AMICAL™ Preservatives does not adversely affect paint film or package stability. Chalking, color retention, checking and flaking ratings of coatings containing AMICAL™ Preservatives were similar to control paint films.

Biocides containing a halogen group such as bromine or iodine can cause yellowing of the dry film of some white paint formulations. Discoloration caused by AMICAL™ Preservatives have no effect on mildewcide activity or general paint stability. Typically, the discoloration does not affect the color of a tinted paint.

AMICAL™ Preservative use-levels are dependent upon the individual formulation of the latex paint system to be protected and upon the expected severity of exposure conditions. Thorough testing is recommended to optimize the use level of AMICAL™ Preservatives in particular formulations. The use rates will vary from 1000 ppm to 5000 ppm on an active basis. Given the toxicity profile of AMICAL™ Preservatives, they are especially suitable for use in interior applications

Pigment Dispersions

Water-based pigment dispersions are susceptible to fungal attack, just as in the case with latex paints. Various organic surfactants and suspending agents provide an excellent source of nutrients for fungal contaminants in such stored dispersions. AMICAL™ Preservatives provide excellent protection of such slurries at 0.02 to 0.15% by weight of active ingredient based on the weight of the slurry.

Latex Caulks, Adhesives and Binders

Adhesives and sealants require the incorporation of biocides to maintain their appearance, to prevent deterioration in-package and in-service, and to prevent the loss of adhesive properties which accompanies such deterioration. Because AMICAL™ Preservatives are essentially insoluble in water, they do not leach out of dried caulks and adhesives, thereby assuring long-lasting broad-spectrum protection.

AMICAL™ Preservatives provide superior antifungal protection at levels as low as 0.01% of active ingredient by weight based on the weight of the formulation. Typical applications for AMICAL™ Preservatives include products for the construction, home improvement, and automotive industries. They are especially effective in the following construction and building products:

- gypsum wallboard joint compounds
- ceramic tile adhesives
- adhesives for wall coverings
- adhesive emulsions
- acrylic, polyvinyl acrylic, and silicone-based interior and exterior sealants
- Foil Scrim Kraft (FSK) laminate binder
- carpet backing adhesive
- air filter binder

Suggested use levels for various applications are indicated in the table below.

	Suggested Use-Levels (% By Weight in Formulation)		
Application	AMICAL™ 48 Preservative	AMICAL™ Flowable Preservative	AMICAL™ WP* Preservative
Ceramic Tile Adhesive	0.02–0.15	0.05–0.37	–
Wallboard Joint Compound	0.08–0.30	0.20–0.72	0.17-0.61
Vinyl Wallpaper Paste	0.02–0.12	0.05–0.30	0.04-0.26
Mastics	0.05–0.15	0.12–0.37	–
Latex Caulks	0.05–0.30	0.12–0.72	–
Air Filter Binders	0.08–0.12	0.20–0.30	–
Foil Scrim Kraft (FSK) Laminate Binder	0.09–0.15	0.23–0.37	–
Carpet Backing Adhesive	0.08–0.20	0.20–0.50	–

Leather Tanning

AMICAL™ Preservatives possess recognized utility in protecting chrome or vegetable-tanned leather from mold and mildew during in-tannery wet processing and for protecting wet-blue during long storage and long transportation times as encountered in the export of wet-blue.

Use levels range from three to nine ounces of AMICAL™ Preservative active ingredient per 1,000 pounds of white weight, equating to 0.02% to 0.06% preservative. Exact levels are a function of the type of hide and the tanning process.

Wood Preservation

AMICAL™ Preservatives are effective against many of the organisms which attack wood.

AMICAL™ Flowable Preservative is compatible with, and can be used in conjunction with, other wood preservatives such as chromated copper arsenate (CCA), quaternary ammonium compounds, borates, tributyltin compounds and zinc and copper salts.

AMICAL™ Flowable Preservative is intended to be combined with suitable vehicles for treating wood to protect it from stain and decay. Either aqueous or solvent-based systems can be used at treatment levels of 0.3-1.0% by weight of active ingredient based on the weight of wood treated. Solvent-based systems utilizing mineral spirits will require a suitable co-solvent to effect solution of the AMICAL™ Preservative. AMICAL™ Preservative can be applied by dipping, spraying, brushing or pressure treatment.

AMICAL™ Flowable Preservative is designed to be used at wood treatment facilities. It is also designed to be incorporated into or used in conjunction with other registered wood preservatives.

To prevent sapstain and mold growth on borate-treated wood, a use-level of 0.0025 to 0.5% by weight of AMICAL™ Flowable Preservative based on tank solution is recommended.

To prevent sapstain and mold growth on CCA-treated wood, a use-level of 0.00625 to 0.125% by weight of AMICAL™ Flowable Preservative is recommended. Under severe conditions, protection has been demonstrated for up to 12 weeks.

Metalworking Fluids

AMICAL™ Preservatives can be used in metalworking fluids and lubricants to prevent fungal growth.

For addition to metalworking fluids, AMICAL™ 48 Preservative levels should be between 100-3000 ppm. AMICAL™ 48 Preservative should be added to the metalworking fluid concentrate in an amount such that when diluted the fluid will contain the desired level of AMICAL™ 48 Preservative.

To assist in the formulation of AMICAL™ 48 Preservative into fluid concentrates, AMICAL™ 48 Preservative should be dissolved in an appropriate solvent (e.g., glycol or oil).

For tankside addition, AMICAL™ Flowable Preservative is recommended due to its dispersion properties in water-based systems.

Rubber and Plastic Products

AMICAL™ Preservatives provide protection to products made of PVC, polyurethane, rubber and polymer-based products such as shower curtains, bath mats, thermoplastic rubber, etc., from microbial degradation.

AMICAL™ 48 Preservative may be used at levels from 1000 to 8000 ppm by weight of solid. To aid in mixing, it is recommended that AMICAL™ 48 Preservative be dissolved in plasticizer before it is incorporated into the resin.

Temperature stability of AMICAL™ Preservatives will be influenced by the choice of heat stabilizers and plasticizers used in the formulation. Testing should be done to confirm AMICAL™ Preservative stability in the specific formulation. The active ingredient in AMICAL™ Preservatives melts at 150°C/302°F and thermal decomposition of neat material can be seen as temperatures approach 210°C/410°F.

Nitrocellulose

AMICAL™ Preservatives can be used to protect nitrocellulose wet with water during storage and shipment. Add 500 to 3000 ppm AMICAL™ 48 Preservative based on wet weight of nitrocellulose.

Paper and Paperboard

Use of AMICAL™ Preservatives aids in the control of objectionable fungi in pulp, paper mills and the additive system, and in the preservation of pulp, pigment slurries, alum, emulsions, adhesives, defoamers, polymers and paper products. AMICAL™ Preservatives are used to inhibit fungal growth which causes discoloration, odor and degradation in paper and paperboard. These products ***are not*** cleared for use in the manufacture of paper and paperboard products that come in contact with food.

As a slimicide, AMICAL™ 48 Preservative can be added using continuous or slug methods at a rate of 0.0008 to 0.8 lb active ingredient per ton of pulp or paper produced.

To inhibit mold growth on paperboard products, AMICAL™ 48 Preservative can be added to white water at 1000 ppm to 1700 ppm active ingredient per ton of dry fiber. Application can also be made at the size press or water box at a rate of 80 to 8,000 ppm active ingredient in the solution applied to the paper sheet.

AMICAL™ Preservatives can also be added to stored materials (e.g., pulp, alum, polymers, slurries, etc.) to control fungal contamination. It is recommended that AMICAL™ 48 Preservative be used at an active ingredient level of up to 250 ppm for microbially-resistant material, and for more susceptible material up to 400 ppm can be used. These use rates are based on a two-week storage time.

Textiles and Non-Wovens

AMICAL™ Preservatives can be used to prevent mildew growth on products such as canvas, carpet, cordage, filters, shower curtains and drapes. Use rates will vary depending upon the expected severity of exposure. In general, 0.5 to 5.0 lb of AMICAL™ 48 Preservative per 1000 lb of dry fabric (500-5,000 ppm) is needed.

AMICAL™ Preservatives can also be added together with water-repellent emulsion or dye to enhance durability.

AMICAL™ Preservatives are not registered for use on clothing articles.

First aid

If AMICAL™ 48 Preservative or AMICAL™ WP Preservative on eyes, hold eyes open and flush with a steady gentle stream of water for 30 minutes. AMICAL™ Flowable Preservative on eyes, hold eyes open and flush with a steady, gentle stream of water for 15-20 minutes. Get medical attention.

If on skin, take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If swallowed, call a poison control center or doctor for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Never give anything by mouth to an unconscious person.

NOTE TO PHYSICIAN

Probable mucosal damage may contraindicate the use of gastric lavage unconscious person.

Precautionary labeling AMICAL™ WP Preservative

Labels for AMICAL™ WP bear these caution statements:

DANGER!

CORROSIVE: CAUSES IRREVERSIBLE EYE DAMAGE.

Harmful if absorbed through skin.

Do not get in eyes.

Wear goggles.

Avoid contact with skin or clothing.

Wash thoroughly with soap and water after handling.

Precautionary labeling AMICAL™ 48 Preservative and AMICAL™ Flowable Preservative

Labels for AMICAL™ 48 Preservative and AMICAL™ Flowable Preservative bear these caution statements:

Do not get in eyes, on skin or clothing.

May be harmful if absorbed through the skin.

Avoid contact with skin.

Do not take internally.

Wash thoroughly with soap and water after handling.

Remove contaminated clothing and wash before reuse.

Wear goggles.

Handling

Based on the toxicological studies, the principal hazard of AMICAL™ Preservatives is the possible irritation which would result from accidentally getting them in the eyes. Wear appropriate eye protection (goggles) whenever handling AMICAL™ Preservatives.

The use of gloves is recommended whenever the powders or dispersions are handled. This practice helps to prevent inadvertent transfer of AMICAL from the hands to the eye. If on the skin, take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. Wash the exposed area immediately with soap and water.

Product stewardship

When considering the use of any DuPont 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. DuPont 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 DuPont products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer notice

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

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