



## AMICAL™ Preservatives

EPA-Registered Fungicide for Industrial Products and Process Systems

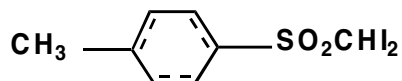
### General

AMICAL™ Preservatives are antimicrobial agents, based on the active Diiodomethyl-p-tolylsulfone, which are useful for the control of microbial degradation in a variety of end-use applications. They are EPA-registered for use in adhesives, paper coatings, plastics, tanned leather, caulks, metalworking fluids, textiles, coatings and wood preservation.

The advantages of using AMICAL Preservatives are:

- Extremely effective active antifungal agent
- FDA clearances in the U.S. for several indirect food contact applications
- Effective over a broad pH range (2-11)
- Available in easy-to-use liquid or powder forms
- Non dermally-irritating

### Structure



### Physical Properties

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

<b>AMICAL 48</b>	Purity, Active Diiodomethyl-p-tolylsulfone	95%
<i>EPA Reg. No. 464-670</i>	Appearance	Tan, finely divided powder
<i>CAS Reg. No. 20018-09-1</i>	Melting Point	150°C/302°F
<i>EINECS No. 2434683</i>	Specific Gravity	2.20
<b>AMICAL Flowable</b>	Purity, Active Diiodomethyl-p-tolylsulfone Content	40%
<i>EPA Reg. No. 464-673</i>	Appearance	Light gray suspension
<i>CAS Reg. No. 20018-09-1</i>	pH (as supplied)	4.0-6.0
<i>EINECS No. 2434683</i>	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 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.

<b>AMICAL WP</b>	Purity, Active Diiodomethyl-p-tolylsulfone Content	48%
<i>EPA Reg. No. 464-672</i>	Appearance	Tan-gray, powder
<i>CAS Reg. No. 20018-09-1</i>	AMICAL WP is a wettable powder based on the active Diiodomethyl-p-tolylsulfone.	
<i>EINECS No. 2434683</i>	AMICAL WP 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)
<i>Aspergillus fumigatis</i>	0.5	<i>Bacillus subtilis</i>	10
<i>Stachybotrys chartarum</i>	0.5	<i>Staphylococcus aureus</i>	6
<i>Alternaria sp.</i>	0.4	<i>Streptococcus faecalis</i>	50
<i>Aspergillus niger</i>	0.4	<i>Enterobacter aerogenes</i>	>1000
<i>Aspergillus oryzae</i>	1.6	<i>Proteus vulgaris</i>	>1000
<i>Aspergillus versicolor</i>	0.8	<i>Pseudomonas aeruginosa</i>	>1000
<i>Aureobasidium pullulans</i>	0.4	<i>Salmonella typhimurium</i>	100
<i>Chaetomium globosum</i>	0.2		
<i>Fusarium oxysporum</i>	6.2		
<i>Myrothecium verrucaria</i>	0.8		
<i>Penicillium citrinum</i>	0.8		
<i>Penicillium crisogenum</i>	1.0		

## Solubility of diiodomethyl-p-tolylsulfone (g/L @ 25°C)

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

## 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™ has 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 laminate binder
- carpet backing adhesive
- air filter binder

Suggested use levels for various applications are indicated in the table on page four.

Application	Suggested Use-Levels (% By Weight in Formulation)		
	AMICAL™ 48	AMICAL™ Flowable	AMICAL™ WP*
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.

The low toxicity via the oral and dermal route of AMICAL Preservatives provides for ease of handling for both the AMICAL itself and the treated leather.

Use levels range from three to nine ounces of AMICAL 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 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 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. AMICAL can be applied by dipping, spraying, brushing or pressure treatment.

AMICAL Flowable 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 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 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 levels should be between 100-3000 ppm. AMICAL 48 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.

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

For tankside addition, AMICAL Flowable 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 may be used at levels from 1000 to 8000 ppm by weight of solid. To aid in mixing, it is recommended that AMICAL 48 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 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 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 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 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 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.

### Indirect Food Contact Applications

The active ingredient of AMICAL Preservatives, diiodomethyl-*p*-tolylsulfone, has been cleared by the Food and Drug Administration (FDA) for use in indirect food contact applications as indicated below:

---

#### 21CFR

---

##### Part 175 — Indirect Food Additives: Adhesives and Components of Coatings

---

175.105 Substances for Use Only as Components of Adhesives — Adhesives

---

175.300 Substances for Use as Components of Coatings — Resinous and Polymeric Coatings (Can End and Side Seam Cements)

---

---

#### 21CFR

---

##### Part 177 — Indirect Food Additives: Polymers

---

177.2600 Substances for Use as Basic Components of Single and Repeated Use Food Contact Surfaces — Rubber Articles Intended for Repeated Use

---

The inert ingredients in AMICAL Flowable and AMICAL WP have been selected on the basis of similar FDA approvals so that these products may be used in these same indirect food-contact applications.

## First Aid

**If AMICAL 48 or AMICAL WP on eyes**, hold eyes open and flush with a steady gentle stream of water for 30 minutes. AMICAL Flowable 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.

**Precautionary  
Labeling,  
AMICAL WP**

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 and  
AMICAL Flowable**

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

DANGER!

CORROSIVE: CAUSES IRREVERSIBLE EYE DAMAGE.

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.

## Shipping and Packaging

AMICAL™ Preservatives are not classified as hazardous materials by the U.S. Department of Transportation (DOT) regulations or in the international regulations for ocean and air transport.

The bill of lading description used by DOW is:

DISINFECTANT NOI, OTHER THAN MEDICINAL OR TOILET PREPARATIONS. NAFC ITEM 57100 SUB 3 CLASS 60. NO HAZARD CLASS LABEL OR PLACARDS REQUIRED. TRADE NAME = AMICAL (48, WP or Flowable).

Shipping Container	Net Wt.	Gross Wt.
<b>AMICAL 48 and WP</b>		
15-gallon fiber drum	100 lb	109 lb
<b>AMICAL Flowable</b>		
30-gallon poly drum	300 lb	311 lb
2 1/2-gallon poly jug (2 per case)	50 lb	55 lb

## Product Stewardship

Dow Biocides encourages its customers to review their applications of Dow Biocides products from the standpoint of human health and environmental quality. To help ensure that Dow Biocides products are not used in ways for which they are not intended or tested, Dow Biocides 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:  
[www.dowbiocides.com](http://www.dowbiocides.com)  
or call:

United States 1-800-447-4369 (phone)  
and Canada: 1-989-832-1560 (phone)  
1-989-832-1465 (fax)  
Europe: 800-3-694-6367 (phone)  
32-3-450-2240 (phone)  
32-3-450-2815 (fax)  
Pacific: 800-7776-7776† (phone)  
800-7779-7779† (fax)  
603-7958-3392 (phone)  
603-7958-5598 (fax)  
Latin America: 55-11-5188-9555 (phone)  
55-11-5188-9937 (fax)  
Other Global 1-989-832-1560 (phone)  
Areas: 1-989-832-1465 (fax)

†except Indonesia and Vietnam

NOTICE: No freedom from any patent owned by Seller or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Seller assumes no obligation or liability for the information in this document. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

**USE BIOCIDES SAFELY. ALWAYS READ THE LABEL AND PRODUCT INFORMATION BEFORE USE.**

