

Net Weight:

No. 5238

AMICAL-50TM

ANTIMICROBIAL AGENT

CAUTION: Observe normal safety precautions when handling AMICALTM-50. Avoid breathing dust. Wash thoroughly after handling.

May cause eye irritation. In case of eye contact, flush with water and call physician.

Active Ingredient:	<u>Percent</u>
Diiodomethyl para- tolyl sulfone	75%
Inert Ingredients:	25%
Total	100%

AMICALTM-50 is recommended as an exterior latex paint preservative providing a broad spectrum of anti-bacterial and anti-fungal activity. See technical bulletin for details and directions for use.

See both side panels for cautions.



Chemical Division
Abbott Laboratories
North Chicago, Ill. 60064,
U.S.A.

ENVIRONMENTAL CAUTION:

Toxic to fish—Do not contaminate any body of water by cleaning of equipment or disposal of waste.

Do not reuse empty container. Destroy it by burying with waste or burning. Stay away from smoke or fumes.

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EPA Reg. No. 275-27

EPA Est. 275-IL-1

Lot No.

TM — Trademark

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BULLETIN NO 75-3

TECHNICAL INFORMATION



ACCEPTED
MAR 18 1976
Under the Federal Insecticide,
Fungicide, and Rodenticide Act,
registered under
EPA Reg. No. 275-27

AMICAL[®] 50

(EPA REG. NO. 275-27)

PRESERVATIVE FOR LATEX PAINTS

ABBOTT LABORATORIES
AMICAL® 50
PRESERVATIVE FOR LATEX PAINTS

NEW ORGANIC CHEMICAL ANTIMICROBIAL AGENT
DOES NOT TEND TO CAUSE YELLOWING

Amical 50 is one of a series of new highly effective organic chemical antimicrobial agents. It proves mildewcide activity superior to that of organomercurials, and also provides package preservative action when used at higher mildewcide levels.

Amical 50 contains the same active ingredients as Amical 48. However, Amical 50 also contains effective color suppressants.

Amical 48 has been reported to cause a transient yellow color in some paint systems. Evaluated in these same systems, Amical 50 has significantly alleviated the off color sometimes associated with the use of nonmercurial mildewcides. Results of drawdowns performed with both straight and modified acrylic coating systems are presented in Table 7.

Amical 50 contains not less than 75% diiodomethyl p-tolyl sulfone plus 20 percent color suppressants. The color suppressants have no harmful effects on paint stability in the can nor on the applied coating. They function only to inhibit the development of discoloration of the paint film.

Comparative laboratory and field exposure testing show the following advantages for Amical 50 preservative.

■ AMICAL 50 MILDEWCIDE ACTIVITY IS SUPERIOR TO MERCURIALS
IN LATEX PAINT SYSTEMS.

Outdoor exposure studies, including a two year exposure study in southern Florida, indicate that diiodomethyl p-tolyl sulfone (the active ingredient in Amical 50) is superior to standard mercurials for mildew inhibition.

- AMICAL 50 MILDEW PROTECTION IS COMPARABLE OR SUPERIOR TO THAT OF COMPETITIVE ORGANIC CHEMICAL MILDEWCIDES.

Recent outdoor exposure studies in severe mildew climates demonstrate equal or superior effectiveness for Amical 50 at use levels as low as two pounds per 100 gallons of paint, with the concurrent use of zinc oxide. Amical 50 was compared to competitive mildewcides at comparable cost and reduced cost/use levels. Refer to the results for Test Program B, page 9.

- AMICAL 50 ALSO ACTS AS A PACKAGE PRESERVATIVE.

Amical 50 provides latex paints with in-can preservative action when used at high mildewcide levels. Tests indicate that a separate preservative is not necessary when the concentration of active ingredient, diiodomethyl p-tolyl sulfone, reaches 0.5% of the formulation. Refer to the Recommendations on page 4, and the in-can stability study reported on page 11 for additional information.

- AMICAL 50 IS EFFECTIVE WITH OR WITHOUT ZINC OXIDE.

Amical 50 does not require zinc oxide to be effective. However, Amical 50 is compatible with zinc oxide. Data show that the concurrent use of zinc oxide allows the use of lower levels of mildewcide.

- AMICAL 50 DOES NOT TEND TO CAUSE YELLOWING.

The color suppressants in Amical 50 effectively control any tendency of the diiodomethyl p-tolyl sulfone to cause yellowing. This has been shown both by drawdowns in the laboratory and by observation of painted panels for outdoor exposure. Refer to Table 7 on page 10 for further information.

- AMICAL 50 IS EASY TO HANDLE.

Amical 50 does not require any unusual handling precautions. Amical 50 is not considered to be a hazardous material to ship or store, nor is the product corrosive to the skin or eyes. Only the standard precautions for handling fine powders are required.

RECOMMENDATIONS

AMICAL 50 AS A MILDEWCIDE

Use levels are dependent upon the type and formulation of the latex paint system to be protected, and upon the expected severity of field conditions. Thus, thorough laboratory tests and field exposures are recommended to determine the optimum Amical 50 use level for a particular formulation. Suggested use levels for several common latex paint systems are presented in Table 1.

Field data show that when zinc oxide is used in the formulation, lower levels of Amical 50 will be needed. Please refer to Table 5 on page 9 for specific test results.

TABLE 1/AMICAL 50 USE LEVELS IN LATEX PAINTS

	Amical Use Levels (Pounds Per 100 Gallons Paint)					
	Straight Acrylic		20% Alkyd Modified Acrylic		Vinyl Acrylic	
	No ZnO	50 lb ZnO	No ZnO	50 lb ZnO	No ZnO	50 lb ZnO
Severe Humidity	4-6	2-4	4-6	2-4	4-6	2-4

For best results and economy in white paint formulations, Amical 50 is recommended at a use level of 2 pounds per 100 gallons of paint, plus 50 lbs. of zinc oxide.

AMICAL 50 AS AN IN-CAN PRESERVATIVE

When present in latex paints at a level of 0.5%, diiodomethyl p-tolyl sulfone provides in-can preservation in addition to mildewcide activity.

Additional data about the role of diiodomethyl p-tolyl sulfone as an in-can preservative has been published by the Kansas City Society for Paint Technology in "Nonmercurial Preservatives, Their Effectiveness and Relationship to Raw Materials in Latex Paints," JOURNAL OF PAINT TECHNOLOGY, Vol. 46; No. 589; pages 37-45. In the Kansas City study, diiodomethyl p-tolyl sulfone is reported to have demonstrated activity at a level of 1.20 pounds per 100 gallons of paint.

WHERE TO ADD AMICAL 50 TO YOUR PAINT SYSTEM

Amical 50 is a micronized powder and can be dispersed easily in the pigment grind, preferably as the last material added to the dispersion. The following is a suggested procedure:

- Add the water, glycols, wetting agents and pigments to the mixing tank.
- Disperse until the desired grind is achieved.
- Add the Amical 50 and disperse five more minutes.
- Avoid heat build up and prolonged mixing.

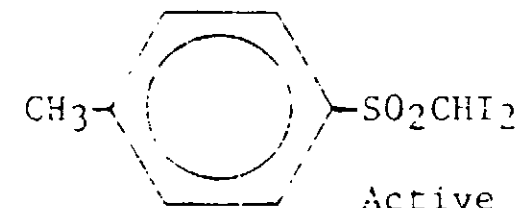
PHYSICAL AND MICROBIOLOGICAL PROPERTIES OF AMICAL 50

PHYSICAL PROPERTIES

Amical 50 is one of a series of newly developed organic chemicals offered exclusively by Abbott Laboratories. The active ingredient in Amical 50 is diiodomethyl p-tolyl sulfone. Color suppressants are also present.

TABLE 2/PHYSICAL PROPERTIES OF AMICAL 50

Appearance	Fine Tan Powder
Bulking Value	6.12 gal/100 lb
Specific Gravity	1.96 g/cc
Assay	
Active Ingredient	Min. 75%
Inert Ingredients	Max. 25%



Active Ingredient

Minimum Solubility at 25°C (mg/ml)

Water	0.1	Toluene	43
Ethyl Alcohol	20	Dimethyl formamide	1000
Isopropyl Alcohol	10	Diethyl phthalate	5
Ethylene Glycol	10	Diisooctyl phthalate	16
Acetone	350	Dibutyl phthalate	58
Hexane	2	Cellosolve acetate	75
Heptane	3	Carbitol acetate	114
Mineral Spirits	4	Methyl cellosolve	182
Benzene	50	Tributyl phosphate	220
Xylene	33	N-propyl acetate	263

MICROBIOLOGICAL PROPERTIES

Amical 50 provides a broad spectrum of antimicrobial activity, and is especially effective against major paint mildew-causing organisms.

Field tests show the activity of Amical 50 does not differ significantly from the activity of Amical 48, on a pound for pound basis. Table 3 lists the minimum inhibitory concentrations (MIC's) for Amical 48 against a series of organisms, including those of concern in in-can spoilage and mildew.

TABLE 3/MINIMUM INHIBITORY CONCENTRATION (MIC, PPM)

Organism	Amical 48
<u>Bacteria</u>	
<i>Staphylococcus aureus</i>	6.2
<i>Pseudomonas aeruginosa</i>	1000
<i>Proteus vulgaris</i>	1000
<i>Proteus mirabilis</i>	1000
<i>Escherichia coli</i>	1000
<i>Salmonella typhimurium</i>	100
<i>Streptococcus faecalis</i>	50
<i>Enterobacter aerogenes</i>	1000
<i>Bacillus subtilis</i>	10
<u>Fungi</u>	
<i>Chaetomium globosum</i>	0.2
<i>Myrothecium verrucaria</i>	0.8
<i>Aspergillus versicolor</i>	0.8
<i>Penicillium citrinum</i>	0.8
<i>Fusarium oxysporum</i>	6.2
<i>Alternaria species</i>	0.4
<i>Rhizopus nigricans</i>	100
<i>Aspergillus oryzae*</i>	1.56
<i>Aspergillus niger*</i>	0.4
<i>Aureobasidium pullulans*</i> (<i>Pullularia pullulans</i>)	0.78

*of major interest in paint mildew

SAFETY AND HANDLING

NORMAL BULK CHEMICAL HANDLING PRECAUTIONS ARE ADEQUATE

Amical 50 is not dangerous to handle, and requires no unusual handling precautions.

Amical 50 is a very fine powder. Though it is not irritating to the skin, Amical 50 can cause slight, temporary irritation of the eyes.

Although Amical 50 is not considered a toxic substance when inhaled, care should be taken to avoid breathing the dust. For more details, please refer to Table 4 and its footnotes. It is good practice for workers to take the standard precautions of wearing gloves, protective glasses and dust masks when handling Amical preservatives.

TABLE 4/AMICAL 50 TOXICOLOGICAL PROPERTIES

Amical 50 Report	Results
Oral LD ₅₀	
Mice	10,000 mg/kg
Rats	10,000 mg/kg
Dermal Irritation; rabbits, normal and abraded skin	None
Eye Irritation, Draize Test(1)	Slight
Inhalation Toxicity(2)	Not Toxic
Fish Toxicity(3)	

NOTES (1) The pure chemicals put directly into the eye cause no corneal damage but can cause slight, temporary irritation. See First Aid suggestion below. (2) Amical 50 is not considered a toxic substance when inhaled, as defined under 40 CFR 162.8. (3) Amical 50 is toxic to fish. Specific data for Amical 50 have not been determined, but are comparable to Amical 48 data. Amical 48 data are as follows: Amical 48 TL₅₀: 0.29 ppm for rainbow trout; 0.35 ppm for bluegills. Thus, care should be taken not to contaminate any body of water with Amical 50 by cleaning equipment or disposing of wastes.

FIRST AID

If Amical 50 gets on the skin, wash the area immediately with soap and water. If Amical 50 gets in the eye, flush immediately with copious amounts of water and call a physician. In case Amical 50 is ingested, induce vomiting at once and call a physician.

AMICAL TEST PROGRAMS

Discussion of two test programs to determine mildewcide activity follows. One is an outdoor exposure study and the second is a laboratory screening procedure. Also included is a discussion of the color characteristics of laboratory draw-downs and an evaluation of diiodomethyl p-tolyl sulfone as an in-can preservative.

Abbott has underway a continuing program of outdoor exposure studies at three test locations, and results will be published periodically in the format of supplementary research reports.

AMICAL 50 MILDEWCIDE ACTIVITY

Test A	Twelve month exposure/southern Florida/1973
Test B	Accelerated laboratory test/Federal Specification 141a, Method 6271.1.

RESULTS OF THE TEST PROGRAM

Amical 50 was found to be a very suitable replacement as a mildewcide for organomercurial products in protective coatings.

Amical 50 provided protection comparable to competitive organic chemical mildewcides at favorable cost/use ratios. Additionally, Amical 50 did not tend to cause yellowing.

TEST A TWELVE MONTH EXPOSURE/SOUTHERN FLORIDA/1973

Test A Conclusions

- Amical 50 is effective with or without zinc oxide.
- Lower levels of Amical 50 can be used if zinc oxide is included in the formulation. With 50 pounds of zinc oxide, Amical 50 was effective at a level of 2 pounds per 100 gallons. Control panels with 50 pounds of zinc oxide alone were failing.
- Performance of Amical 50 equals that of nonmercurial "M" and nonmercurial "N" on a competitive or lower cost/use basis.
- Formulations containing Amical 50 did not tend to yellow. Data confirming these observations were collected in the laboratory and are reported in Table 7, page 10.

FORMULATIONS EVALUATED

Antimicrobial Agents: Amical 50 was evaluated at levels ranging from two to six pounds per 100 gallons of paint, both with and without the concurrent use of zinc oxide. PMA and competitive nonmercurial mildewcides were also evaluated.

Paint Vehicles: The formulations used were standard formulas recommended by latex suppliers and are available on request. The formulations included straight acrylic, alkyd modified acrylic, and vinyl acrylic exterior house paints.

EXPOSURE TESTING

Application Methods: Two coats of each paint were brush applied on white pine at a spreading rate of 325 square feet per gallon with 24 hours drying between coats. After drying for at least one week, the panels were then exposed in southern Florida in June, 1973.

A pine substrate was chosen as an effort to exaggerate mildew conditions. White pine contains a high degree of nutrients that support fungus growth, and is a common construction material. During the exposure test, the panels were examined periodically for mildew formation and appearance. The results at the end of twelve months of exposure are summarized in Table 5.

TABLE 5/EXPOSURE DATA/MILDEW RATINGS (12 MONTHS NORTH VERTICAL FLORIDA EXPOSURE)

Mildewcide	Use Level (lbs/100 gal)	Acrylic	Modified Acrylic	Modified Acrylic +50 lbs ZnO	Modified Vinyl +50 lbs ZnO
Control	0.5	0	0	8	8
Amical 50	2.0	-	-	10	10
Amical 50	4.0	8-9	8	10	10
Mildewcide "M"	2.0	-	-	10	10
Mildewcide "N"	10.0	8-9	8	10	10

TEST B ACCELERATED LABORATORY TEST/FEDERAL SPECIFICATION 141A

The purpose of this study was to evaluate Amical 50 for mildew resistance by the Federal Specification noted below. Competitive Mildewcide "K" and sodium pentachlorophenate were also evaluated for comparison.

CONCLUSIONS

Amical 50 definitely afforded superior mildew resistance to latex paint film under the conditions tested than did competitive Mildewcide "K" or sodium pentachlorophenate.

Amical 50 provided efficacy at a one pound level. The competitive mildewcides we found ineffective at the levels used.

PROCEDURE

The study was performed in accordance with Federal Specification Test Method 141a: Method 6271.1, September, 1965, using a mixture of 1.0×10^5 spores/ml each of *Aspergillus niger* and *Aureobasidium pullulans*. After seven days of incubation, the specimens were evaluated. Table 6 presents the results of the visual evaluation.

RESULTS

Visual evaluation at seven days illustrated the superiority of Amical 50 over competitive Mildewcide "K" and sodium pentachlorophenate. Amical 50 was found to be effective at a level of one pound per 100 gallons of paint.*

Mildewcide "M" failed to protect the paint film from mildew growth at and above its recommended use levels.

Sodium pentachlorophenate passed at the 24 pound level, but must have been subject to leaching, since it failed at the same level after leaching.

*NOTE: This test procedure is not intended to determine specific mildewcide use levels for a particular formulation. A panel study can most accurately perform this function. Federal Specification 141a is a laboratory screening procedure and can be used to indicate comparative efficacy under the specific test conditions.

TABLE 6/RESULTS OF FEDERAL TEST METHOD 141A METHOD 6271.1

Compound	USE LEVEL (lbs/100 gal)									
	Unleached Specimens					Leached Specimens				
Amical 50	0.5	1.0	2.0	3.0	4.0	0.5	1.0	2.0	3.0	4.0
	0	+	+	+	+	0	+	+	+	+
	0	+	+	+	+	0	+	+	+	+
	0	+	+	+	+	0	+	+	+	+
Mildewcide K	0.5	1.0	1.5	2.0		0.5	1.0	1.5	2.0	
	0	0	0	0		0	0	0	0	
	0	0	0	0		0	0	0	0	
	0	0	0	0		0	0	0	0	
Sodium Pentachlorophenate	2.0	6.0	12.0	24.0		2.0	6.0	12.0	24.0	
	0	0	0	+		0	0	0	0	
	0	0	0	+		0	0	0	0	
	0	0	0	+		0	0	0	0	
Blank	0					0				
	0					0				
	0					0				

NOTES: In this visual evaluation, (+) indicates passing and (0) indicates failure. A failure is denoted by mildew growth observed across predrawn lines. The paint used was an acrylic; the formulation is available on request.

LABORATORY DRAWDOWN EVALUATION: AMICAL 50 DOES NOT TEND TO CAUSE YELLOWING.

Drawdowns made with coatings containing Amical 50 and aged four weeks at 120°F show that Amical 50 does not tend to cause yellowing. Results of a laboratory evaluation are reported in Table 7.

- Yellowness indexes of an Amical 50 protected straight acrylic and a modified acrylic were essentially the same as controls without mildewcides.
- Yellowness indexes of the Amical 50 protected latex paints were equal to or lower than competitive mildewcides.

TABLE 7/YELLOWNESS INDEX OF COATINGS WITH NONMERCURIAL MILDEWCIDES

Mildewcide	Use Level (lbs/100 gallons)	Yellowness Index*	
		Straight Acrylic	Modified Acrylic
Control	No Mildewcides	2.1	4.7
Amical 50	2	2.2	4.9
Mildewcide "M"	2	2.6	4.9
Mildewcide "N"	10	3.6	5.6

*Yellowness index determined with a Hunter Laboratories Color Difference Meter D25D2.

IN-CAN STABILITY

Amical 50 will provide in-can preservative action when the concentration of diiodomethyl p-tolyl sulfone reaches 0.5% in the formulation. At this level, it is not necessary to add a package preservative when Amical 50 is incorporated into the paint for mildewcide activity.

Paints containing diiodomethyl p-tolyl sulfone that had been used in a panel exposure study for Amical 48 were retained and examined at 12 and 18 months for pH, viscosity, appearance and odor. The paint systems included straight acrylic alkyl modified acrylic and ethylene vinyl acetate house paints. Diiodomethyl p-tolyl sulfone at levels of 0.25, 0.5, 0.75 and 1.0% caused:

- No significant change in pH.
- No significant change in viscosity.
- No pigment flocculation.
- No foreign odors.

In another laboratory test, diiodomethyl p-tolyl sulfone was tested at a 0.5% level in alkyl modified acrylic and alkyl modified polyvinyl acetate exterior paints.

The paints were inoculated with a mixed bacterial culture consisting of *Bacillus subtilis*, *Serratia marcescens*, *Aerobacter aerogenes* and *Proteus mirabilis*, with 150,000,000 cells present per milliliter of inoculum. The bacterial inoculum was added to the sterile paint system at a concentration of 1 ml. per 100 ml. of paint.

Samples of the paint were streaked on nutrient agar petri plates at 0, 24 and 48 hour intervals after introduction of the bacterial inoculum. The plates were incubated for one week at a controlled temperature and humidity optimal for bacterial growth. The plates were observed daily during the incubation period. Results are reported in Table 5.

In this test, diiodomethyl p-tolyl sulfone at a use level of 0.5% prevented bacterial growth.

These same paint samples were re-inoculated and re-tested one week later using the same procedure. Again, 0.5% diiodomethyl p-tolyl sulfone prevented bacterial growth.

TABLE 8/DIIODOMETHYL P-TOLYL SULFONE IN-CAN PRESERVATIVE ACTION

Agent	Paint System	Time After Inoculation		
		4 Hours	24 Hours	48 Hours
Control	Acrylic	Growth	Growth	Growth
0.5% Amical 48	Acrylic	No Growth	No Growth	No Growth
Control	PVA	Growth	Growth	Growth
0.5% Amical 48	PVA	No Growth	No Growth	No Growth

CAUTION: Amical paint preservatives have been reported to cause transient yellow color in certain paint systems. The problem is more common at higher Amical levels, in oil modified paints and in systems without zinc oxide. The problem is less likely to occur with Amical 50 than it is with Amical 48. Usually the yellow color disappears in one to three days on exposure to daylight. The color has no effect on mildewcide activity or general paint stability.

Since the amount and persistence of the yellow color depends on the total paint system, it is important that Amical mildewcides be tested in each paint formulation in which it is to be used.

SAMPLES

For more information or samples for evaluation, write or phone: Amical, Abbott Laboratories, Chemical Division, D-902, North Chicago, Illinois 60064; (312) 891-5167.

NOTE: Our recommendations for use of this product are based upon tests believed to be reliable. The data and statements contained herein are based on information received from many sources, and Abbott Laboratories does not undertake to guarantee the accuracy of any information herein set forth. The use of this product being beyond the control of Abbott, no guarantee, expressed or implied is made as to the effects of such or the results to be obtained if not used in accordance with directions or established safe practice. The buyer must assume all responsibility, including injury or damage, resulting from its misuse as such, or in combination with other materials. Abbott does not assure customers or recipients of the information herein set forth of freedom from infringement of patents owned by Abbott or by others in connection with the use of any product, formula, process or use described herein.

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