

# ANTIMICROBIAL AGENTS



SECTION  
**I-11** REVISED  
DOWICIDE G-ST  
Antimicrobial

## DOWICIDE® G-ST Antimicrobial

I-11  
1

### General

DOWICIDE G-ST Antimicrobial is Dow's designation for the sodium salt of pentachlorophenol. It is available in bead form.

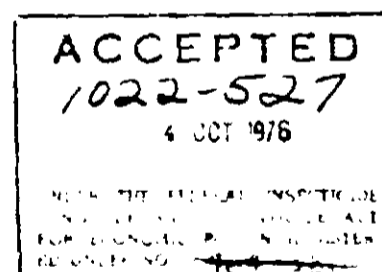
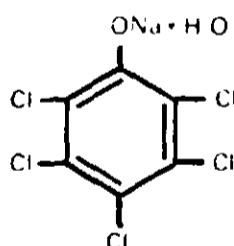
Adhesive manufacturers incorporate this antimicrobial into adhesives based on starch, vegetable protein, and animal protein to protect them against attack by bacteria and mold during manufacture and storage and throughout their service life. In the leather industry, DOWICIDE G-ST Antimicrobial plays an important role in the various pre-tanning and tanning stages of treatment, in protecting shaved and split stock during storage and in imparting mold resistance to finished luggage leather. Stored disposable raw materials for paint are protected by the addition of DOWICIDE G-ST or a 50-50 mixture of DOWICIDE A and DOWICIDE G-ST Antimicrobials, and shelf preservation of protein-based latex paints is accomplished by use of this same mixture. Finished paper and fiberboard products are protected against mildew, rot, and termites by the use of DOWICIDE G-ST, which also prevents deterioration of coatings, sizings, and printing colors. Textile sizing and finishing solutions, printing pastes, gray goods, cloth, and carpet yarn are treated with DOWICIDE G-ST to prevent microbiological attack.

In addition, DOWICIDE G-ST is used to control mold growth on construction materials and in petroleum drilling mud, to achieve optimum enhanced oil recovery in flooding operations by controlling microbial growth in underground strata, to inhibit fungal growth in photographic solutions, and to treat industrial cooling water.

### Physical Properties

(These are laboratory or literature data typical of the product and are not to be considered as, or confused with, specifications.)

### Structure



Special application reports covering the use of DOWICIDE G-ST and other Dow antimicrobials in the adhesive, leather, paint, pulp and paper, and textile industries are available upon request.

Trademark of The Dow Chemical Company

1969, 1976 The Dow Chemical Company

Not to be used as a disinfectant or for the control of bacteria in drinking water. For use in drinking water, use only as directed. For use in drinking water, use only as directed. For use in drinking water, use only as directed. For use in drinking water, use only as directed.



THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN 48640  
DESIGNED PRODUCTS DEPARTMENT

Form No. 192-475-76

## 2 Physical Properties — continued

Formula	$C_6Cl_5O Na \cdot H_2O$	Methanol	25
Molecular Weight	306.3	Ethanol (95% F 30)	65
Specific Gravity, 25-25 C	2.0	Isopropanol	30
Bulk density, lb/ft <sup>3</sup>		Ethylene glycol	40
Beads	50-55	Polyglycol E400	50
Ground	30-33	Propylene glycol	50
pH of saturated water solution, 25 C	9.0-11.5	Polyglycol P400	13
		Polyglycol P1200	30
Solubility, approx g/100 g solvent at 25 C		Water	
Acetone	35	5 C	19
Diacetone alcohol	45	15 C	30
DOWANOL <sup>*</sup> EM glycol ether	80	25 C	33
DOWANOL PM glycol ether	50	60 C	37
DOWANOL TPM glycol ether	60	70 C	39

\* Trademark of The Dow Chemical Company

## Sales Specifications

Description	light tan beads
Active ingredients <sup>1</sup>	90%
Sodium pentachlorophenate	79%
Sodium salts of other chlorophenols	11%
Inert ingredients	10%

<sup>1</sup> Calculated as sodium pentachlorophenate (molecular weight 288.3), determined from titration of hydroxyl group

Methods of analyses for these items may be obtained from The Dow Chemical Company, Designed Products Department, 2040 Dow Center, Midland, Michigan 48640.

## Packages

DOWICIDE G-ST Antimicrobial, Bead Form is sold in paper bags having a net weight of 50 lb and fiber drums with a net weight of 100 lb.

## Status of DOWICIDE G-ST under federal laws

### E.P.A. Registration No. 464-380 (ST-Bead form)

DOWICIDE G-ST Antimicrobial is listed in the "E.P.A. Summary of Registered Pesticide Chemical Uses" for dormant application on almonds, apricots, and prunes.

DOWICIDE G-ST Antimicrobial meets the requirements of a number of the Food Additive Regulations administered by the Food and Drug Administration. These are as follows:

- CFR 121.2001 — Prior sanction as a slime control agent in the manufacture of paper products.
- CFR 121.2505 — Slimicides.
- CFR 121.2514 — Resinous and Polymeric Coatings: Par. (b) (3) (xxxii), can-end cements.
- CFR 121.2519 — Defoaming Agents Used in the Manufacture of Paper and Paperboard.
- CFR 121.2520 — Adhesives
- CFR 121.2526 — Components of Paper and Paperboard in Contact with Aqueous and Fatty Foods.
- CFR 121.2534 — Animal Glue.
- CFR 121.2535 — Textiles and Textile Fibers.
- CFR 121.2548 — Zinc-Silicon Dioxide Matrix Coatings.

DOW

- CFR 121 2550 Closures with Sealing Gaskets for Food Containers
- CFR 121 2556 Preservatives for Wood
- CFR 121 2557 Defoaming Agents Used in Coatings
- CFR 121 2562 -- Rubber Articles Intended for Repeated Use
- CFR 121 2571 -- Components of Paper and Paperboard in Contact with Dry Food
- CFR 121 2596 Sodium Pentachlorophenate Preservative for ammonium alginate employed in the manufacture of polyvinyl chloride emulsions.

### Antifungal and Antibacterial Efficacies

Test Organism	% Inhibition
<b>Fungi</b>	
<i>Trichoderma viride</i> , ATCC #8678	0.0025 — 0.005
<i>Chaetomium globosum</i> , ATCC #6205	0.0025 — 0.0005
<i>Ceratocystis ips</i> , ATCC #12860	0.0010 — 0.00025
<i>Lenzites trabea</i> , Madison 617	0.0001 — 0.00025
<i>Polyporus tulipiferae</i> , ATCC #11245	0.0001 — 0.00025
<i>Trichoderma</i> sp., Madison P-42	0.0005 — 0.001
<i>Rhizopus stolonifer</i> , ATCC #6227a	0.001 — 0.00025
<i>Aspergillus niger</i> , ATCC #6275	0.001 — 0.0025
<i>Rhizopus nigricans</i>	0.028 — 0.054
<i>Rhizoctonia solani</i>	0.0011 — 0.0022
<i>Hormiscus gelatinosum</i>	0.008 — 0.011
<i>Aspergillus</i> , No. 29	0.0011 — 0.0027
<i>Aspergillus flavus</i>	0.0022 — 0.0054
<i>Ceratostomella pilifera</i>	0.0022 — 0.0038
<i>Trichophyton interdigitale</i>	0.00054 — 0.0011
<i>Trichophyton rosaceum</i>	0.0027 — 0.0054
<b>Bacteria</b>	
<i>Bacillus cereus</i> var. <i>mycoides</i> , ATCC #11778	0.0005 — 0.001
<i>Staphylococcus aureus</i> , ATCC #6538	0.0001 — 0.00025
<i>Bacillus subtilis</i> , ATCC #8473	0.00025 — 0.0005
<i>Escherichia coli</i> , ATCC #11229	0.025 — 0.05
<i>Salmonella choleraesuis</i> , ATCC #10708	0.025 — 0.05
<i>Pseudomonas aeruginosa</i> , ATCC #15442	0.1 — 0.25
<i>Enterobacter aerogenes</i> , ATCC #13048	0.05 — 0.1

9228

8143

## 4 Applications

Product or Material Protected	Reason for Treatment	Suggested Concentration <sup>1</sup>	How to Apply
<b>Adhesives</b>	To protect adhesive based on starch, vegetable protein, and animal protein from deterioration during manufacture, storage, and service life.	0.25-1.0% by wt of DOWICIDE G-ST or a 50-50 mixture of DOWICIDE A and DOWICIDE G-ST antimicrobials.	Add as concentrated aqueous solution.
<b>Construction Materials</b>	To control mold growth on inert surfaces such as asbestos shingles, tile roofs, brick walls, and concrete blocks, and in products such as insulation, pipe sealing compound, and wallboard.	1.0% by wt in water; 0.5-3.0% by wt of product in which incorporated.	Rinse previously cleaned inert surface with aqueous solution of antimicrobial. Can be added by methods such as acid precipitation to insulation board and wallboard.
<b>Leather</b>	To prevent deterioration of hides and treating solutions during pre-tanning and tanning steps, and protect finished leather from molding.	0.06-10.0% by wt in water; 0.5-3.0% by wt of product in which incorporated.	Add as concentrated aqueous solution.
<b>Paint</b>	For storage preservation of decomposable raw material solutions or dispersions and shelf-preservation of protein-base latex paints.	Minimum of 0.6% by wt of DOWICIDE G-ST or a 50-50 mixture of DOWICIDE A and DOWICIDE G-ST antimicrobials.	Add as concentrated aqueous solution.
<b>Petroleum (Enhanced Oil Recovery)</b>	To prevent bacterial growth in drilling muds, gypsum muds, packer fluids, and underground strata.	0.25-0.5 lb of antimicrobial per barrel of mud or packer fluid; 15-40 ppm in underground flooding water.	Add as concentrated aqueous solution.
<b>Photographic Solutions</b>	To control fungus and slime in solutions.	0.05-0.2% by wt of solution.	Add as concentrated aqueous solution.

<sup>1</sup> Refers to concentrations of DOWICIDE G-ST or to the sum of DOWICIDE G-ST and other Dow antimicrobials as noted

1022-527

Applications — continued

Product or Material Protected	Reason for Treatment	Suggested Concentration <sup>1</sup>	How to Apply
<b>Pulp and Paper</b>	To preserve processing materials and stored pulp, and to protect finished paper and fiberboard products against mildew, rot and termites.	0.1-1.0% by wt of paper product, pulp, or processing material.	Add as concentrated aqueous solution.
<b>Textiles</b>	To preserve processing materials and protect finished yarns and cloth against molding during storage.	0.1-0.75% by wt of material treated.	Add or apply as concentrated aqueous solution.
<b>Water Treatment</b>	To control algal, fungal, and bacterial-induced slimes in industrial recirculating water-cooling systems.	20-80 ppm (0.2-0.7 lb 1000 gal water).	Add as a concentrated aqueous solution to the water system after general clean-up. Add an additional 0.2-0.4 lb/1000 gal water weekly or as needed. Heavily contaminated systems must be cleaned mechanically, then treated with 0.4-0.7 lb 1000 gal water in the system. This dose may be repeated as needed to obtain control, then apply 0.2-0.4 lb 1000 gal water in the system weekly, or as needed.

<sup>1</sup>Refers to concentrations of DOWICIDE G ST, or to mixtures of DOWICIDE G ST and other Dow antimicrobials as indicated.

## 6 Hazards Due to Toxicity and Precautions For Safe Handling and Use

The following statements on health hazards summarize our laboratory and application data. The precautions for safe handling and use are necessarily general in nature, since the circumstances associated with each customer's use of the material are unknown and beyond our control. Suggestions with regard to the hazards likely to be encountered in specific operations will be made upon request whenever possible. Inquiries about such specific operations and uses may be addressed to The Dow Chemical Company. Assistance in evaluating particular plant conditions may be obtained from certain consulting laboratories and from state Departments of Health or of Labor, many of which have an Industrial Hygiene Service.

### Toxicological Properties

DOWICIDE G-ST Antimicrobial is capable of producing serious eye irritation and corneal damage which might result in permanent impairment of vision. Prolonged skin contact is capable of producing marked irritation or even a burn. Repeated skin contact can result in dermatitis and systemic intoxication. An allergic skin response may develop in a very limited number of persons who experience skin exposure. The material in solution is absorbed through the skin in amounts that can cause death. The dusts are irritating to the throat and nose. Ingestion of relatively small amounts can lead to illness.

### Handling Precautions for Cleaning Up Spills or When Gross Contact is Likely

- Eyes* - Use chemical workers' goggles or their equivalent.
- Skin* - Avoid all skin contact. Wear impervious clothing such as rubber boots, rubber aprons, and rubber gloves, as required by circumstances.
- Inhalation* - Avoid breathing dusts. If dusty atmospheres are encountered, wear a suitable dust respirator as recommended by the U.S. Bureau of Mines for toxic dusts.
- Ingestion* - Do not take internally. Label all containers properly so that accidental use or handling should not occur.

### First Aid Measures

*Eye Contact* - Contaminated eye(s) should be flushed immediately with copious amounts of flowing water for at least 15 minutes. Medical attention should be obtained.

*Skin Contact* - Contaminated clothing, including shoes, should be removed and the affected skin area should be washed thoroughly with soap and plenty of water. Contaminated clothing and shoes should not be re-used until thoroughly cleaned. Any injuries or irritations which may develop should receive medical attention.

*Ingestion* - If material is swallowed, induce vomiting as quickly as possible by tickling the back of the throat with a finger or by giving an emetic such as 2 tablespoons of table salt in a glass of warm water. Call a physician.

*Inhalation* - If a person should experience any noticeable effects from breathing the dust of this material, medical attention should be obtained promptly.

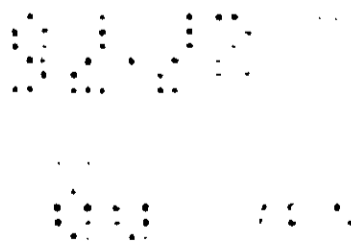
DOW

DOWICIDE G-ST Antimicrobial -- Toxicological Data

I-11  
7

Test	Animal	Results
<b>Acute Oral Lethality</b>	Rat	LD <sub>50</sub> — 210 mg / kg body wt
	Rabbit	LD <sub>50</sub> — 275 mg / kg body wt
	Guinea Pig	LD <sub>50</sub> — 80 to 160 mg / kg body wt
<b>Chronic Oral</b>	Rabbit	Fed by intubation 100 mg / kg as a 5% solution for 20 daily doses with no adverse effects.
	Rat	Fed by intubation 100 mg / kg as a solution for 20 days with only slight liver and kidney injury.
<b>Eye Irritation</b>	Rabbit	Undiluted material caused marked pain, moderate to severe conjunctival irritation, severe corneal damage and moderate iritis. Only minor healing in seven days.
<b>Skin Irritation</b>	Rabbit	Extracts of a 10% suspension in both chloroform and acetone when applied to the ear 5 days a week for 4 weeks caused chloracne responses signifying a potential acneform dermatitis in man.
	Rabbit	Capable of causing marked irritation, even a burn, on prolonged contact.
	Humans	Tests on humans indicate that the material may produce hypersensitivity in an occasional person if exposures are prolonged and frequently repeated.
<b>Skin Absorption</b>	Rabbits	LD <sub>50</sub> in range of 100 to 300 mg / kg applied as a 20% solution.
<b>Inhalation</b>	Humans	Dust very irritating to nose and throat, not likely to be tolerated voluntarily.

If more specific information, or information on toxicity of Dow antimicrobials in a specific application is needed, contact The Dow Chemical Company, Designed Products Department, 2040 Dow Center, Midland, Michigan 48640



102d-527

I-11  
8

**Customer Notice**

Dow encourages its customers to review their applications of Dow products from the standpoint of human health and environmental quality. To help ensure that Dow products are not used in ways for which they are not intended or tested, Dow personnel are willing to assist customers in dealing with ecological and product safety considerations. Your Dow salesman can arrange the proper contacts.

**FILMED - 1979**

Rehab Group Inc. Arlington, Va.  
(703) 521-7800 Zip 22204

NOTICE: This information is presented in good faith, but no warranty, express or implied, is given nor is freedom from any patent owned by The Dow Chemical Company or by others to be inferred. Inasmuch as any assistance furnished by Dow with reference to the safe use and disposal of its products is provided without charge, Dow assumes no obligation or liability therefor.

3050  
DOW