

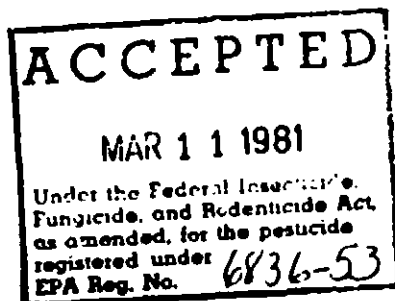
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LONZA

PRODUCT INFORMATION

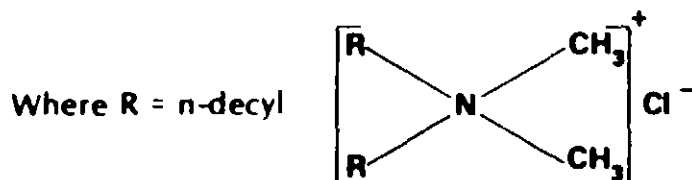


BARDAC® 2250 **BARDAC® 2280**

INTRODUCTION

Bardac 2250/2280, didecyl dimethyl ammonium chloride represents a class of germicidally active quaternary ammonium compounds that is radically different from the traditional alkyl benzyl type of quaternary. The Bardac "twin chain" type of structure has produced quaternary germicides with greatly improved performance characteristics over quaternary products with a benzene ring structure. Made by Lonza patented process technology, the Bardac products, with their superior performance, have had significant impact on the germicide industry.

The Bardac quaternary products are dialkyl dimethyl ammonium chlorides in which two alkyl groups in the C₈ to C₁₀ range are attached directly to the nitrogen atom. These alkyl chains were found to maximize germicidal performance. Bardac 2250/2280 has the following chemical structure.



For EPA registration purposes, Bardac 2250 and Bardac 2280 are described as:

Active Ingredients

	<u>Bardac 2250</u>	<u>Bardac 2280</u>
Didecyl dimethyl ammonium chloride	50%	80%
Ethanol	10%	10%

Inert Ingredients

Water	40%	10%
	<u>100%</u>	<u>100%</u>

Average Molecular Weight	361	361
Specific Gravity 25°C	0.927	0.891
Density (lbs./gallon)	7.73	7.43
EPA Registration Number	6836-51	6836-53
CAS Number		7137-51-5

GERMICIDAL ACTIVITY

The germicidal activity of Bardac 2250/2280 is substantiated by an extensive series of generally recognized microbiological tests including those required for EPA registration.

Standard laboratory evaluations indicate that Bardac 2250/2280 has superior over-all germicidal activity when compared to quaternaries with other structures. This activity is also exhibited under use conditions once considered detrimental to the performance of quaternaries. The following summarizes the advantages of Bardac 2250/2280.

- ... Broad spectrum biocidal activity against both gram positive and gram negative organisms.
- ... Better disinfectant performance at lower use concentrations.
- ... Greater hard water tolerance for sanitizing activity at lower use concentrations.
- ... Superior fungicidal performance.
- ... Substantial organic soil tolerance.
- ... Greater tolerance for anionic contaminants than previously possible.

Disinfectant Activity Determined by AOAC Use-Dilution Tests

The minimum concentration of Bardac 2250/2280 required for effective disinfection is determined by the AOAC, 12th Edition, paragraph 4.007-4.011 (1975), commonly known as the Use-Dilution Test.

<u>Test Organism</u>	<u>ATCC Strain No.</u>	<u>Quaternary concentration on 100% active basis</u>
Staphylococcus aureus	6538	300 ppm
Salmonella choleraesuis	10708	300 ppm
Pseudomonas aeruginosa (PRD-10)	15442	500 ppm

Organic Matter Tolerance and Residual Anionic Tolerance Determined by the AOAC Use-Dilution Test

Organic matter normally interferes with the biocidal activity of quaternary compounds. When compared to other quaternary compounds, Bardac 2250/2280 maintains an unusually high level of activity in the presence of proteinacious soil. This is substantiated by the fact that Bardac 2250/2280 at 400 ppm active concentration in the presence of 5% blood serum is effective against Staphylococcus aureus according to the AOAC Use-Dilution Test.

<u>Test Organism</u>	<u>Strain No.</u>	<u>Contaminant</u>	<u>Quaternary concentration on 100% active basis</u>
Staphylococcus aureus	6538	Blood Serum 5%	400 ppm

Quaternaries, which are cationic surface active agents, are deactivated by anionic surface active agents with the formation of an insoluble cationic-anionic complex. The ability of Bardac 2250/2280 to maintain bactericidal activity in the presence of anionics is important because residual amounts of anionics are often present in hard surface disinfection applications. When Bardac 2250/2280 is evaluated at a concentration of 400 ppm active against *Staphylococcus aureus* in the presence of 300 ppm sodium lauryl sulfate, it passes the AOAC Use-Dilution test whereas other quaternaries fail.

<u>Test Organism</u>	<u>Strain No.</u>	<u>Contaminant</u>	<u>Quaternary concentration on 100% active basis</u>
<i>Staphylococcus aureus</i>	6538	300 ppm sodium lauryl sulfate	400 ppm

Sanitizing Activity Determined by the AOAC Germicidal and Detergent Sanitizer Method

The germicidal activity of quaternary products decreases in the presence of hard water. The hard water tolerance of Bardac 2250/2280 is measured by the AOAC Germicidal and Detergent Sanitizer Method, 12th Edition, paragraph 4.023-4.032 (1975), commonly called, the hard water tolerance test. Exposure of 100 million organisms of *Escherichia Coli* (#11229) to 150 ppm of Bardac 2250/2280 for 30 seconds at 25°C in 1,000 ppm of water hardness results in the required reduction of 99.999% of the bacteria.

Calcium and magnesium salts are typical hard water components; however, other electrolytes may be present during actual field applications. The unusually high hard water tolerance of Bardac 2250/2280 affords users a margin of safety over a range of quaternary concentrations.

<u>Test Organism</u>	<u>Concentration of Bardac 2250/2280 Required for 99.999% Reduction</u>	<u>Hard Water Ceiling</u>
<i>Escherichia Coli</i> #11229	50 ppm	250 ppm hard water
	100 ppm	600 ppm hard water
	150 ppm	1,000 ppm hard water
	200 ppm	1,500 ppm hard water

Fungicidal Performance as Determined by the AOAC Fungicidal Test

Possessing superior fungicidal activity, Bardac 2250/2280 effectively passes the AOAC Fungicidal test at one-fifth to one-seventh the concentration required for alkyl benzyl quaternaries.

<u>Bardac 2250/2280</u>	<u>Ten Minute Killing Dilution (100% Active)</u>		
	<u>P. ovale #12098</u>	<u>T. interdigitale CDC #-X-32</u>	<u>C. albicans #14053</u>
Ten Minute Killing Dilution	1:4845	1:7350	1:7350
In Use Dilution =	200 ppm	150 ppm	150 ppm

Phenol Coefficient as Determined by the AOAC Phenol Coefficient Test

The phenol coefficient of a germicide is measured by its relative effectiveness in comparison to phenol. The bactericidal activity of Bardac 2250/2280 produces phenol coefficient results that surpass the alkyl benzyl quaternaries. The test protocol is AOAC 12th Edition, paragraph 4.001-4.006 (1975).

<u>Test Organism</u>	<u>ATCC Strain No.</u>	<u>Phenol Coefficient</u> 100% active quaternary	
		<u>Bardac 2250</u>	<u>Bardac 2280</u>
Staphylococcus aureus	6538	1050	1680
Salmonella typhosa	6539	1050	1680

Bactericidal Efficiency as Determined by the Minimum Inhibitory Concentration Test

This tube-dilution test determines the minimum concentration of Bardac 2250/2280 which will reduce the bacterial count of a suspension by at least 99.999% from a level of 100 million organisms per ml. in 30 seconds at 25°C. The test method is a broth dilution test with 18 hour immersion at 37°C. Minimum inhibitory concentration test results indicate that Bardac 2250/2280 offers superior performance.

<u>Test Organism</u>	<u>Strain No.</u>	<u>Gram Stain</u>	<u>Minimum Inhibitory Concentration (100% active)</u>
Staphylococcus aureus	6538	+	0.5 ppm
Escherichia Coli	11229	-	5.0 ppm
Pseudomonas aeruginosa	15442	-	50.0 ppm
Proteus vulgaris	9920	-	20.0 ppm

Fungi

A. niger	16404		5.0 ppm
T. mentagrophtes	(SWRI) Enmons		5.0 ppm
C. albicans	10231		1.5 ppm

Summary of Germicidal Activity

The test data presented substantiates the over-all superior germicidal performance of Bardac 2250/2280.

APPLICATIONS

The unique performance characteristics of Bardac 2250/2280 have been used to develop a series of disinfectants, sanitizers, and cleaners that are in commercial use in homes, hospitals, and institutions. These symptoms range from simple dilutions to more complex blends of quaternaries, surfactants and detergent builders.

Summary of Applications and Recommended Use Levels

<u>Application Areas</u>	<u>Recommended Use-Levels on 100% Active Basis</u>
General-Hospital Disinfection	300-500 ppm
Sanitizing	150 ppm
Water Treatment/Cooling Towers	5-20 ppm
Water Treatment/Secondary Oil Recovery	5-20 ppm
Laundry Mildew Preventative/Sanitizer	630 ppm
Bacteriostat/Preservative/Fungicide	5-1000 ppm

General and Hospital Disinfection

A general purpose Disinfectant-Sanitizer-Fungicide-Deodorizer product may be produced by diluting Bardac 2250/2280 to 7.5% active level. This product will afford effective disinfection and/or sanitizing in hospitals, schools, homes, dairy, farm and industrial areas when used at appropriate use dilutions. A sample label for a Disinfectant-Sanitizer-Fungicide-Deodorizer based on Bardac 2250/2280 is attached. It may be used as a guide in registering your product with the Environmental Protection Agency.

The following EPA registered formulations based on Bardac 2250/2280 are available as a technical service to the compounder for registration and manufacture:

<u>Formula</u>	<u>Application</u>	<u>Dilutions</u>
Formulation 19a	2 for 1 Hospital/Institutional /Household Disinfectant Cleaner	1:64 2 oz./gal. 1:128 1 oz./gal.
Formulation 30-3	Hospital Strength Disinfectant Cleaner	1:64 2 oz./gal.
Formulation 47-5	Economical Institutional/Household Disinfectant Cleaner	1:64 2 oz./gal.
Disinfectant - Sanitizer Solution	No-rinse sanitizing clearance from FDA	
Mildew Preventative	For commercial laundries	
Water Treatment Microbiocide	For building and industrial cooling towers	
Water Treatment Microbiocide	For oil field flood waters	

Sanitizing

Bardac 2250/2280 has been cleared by the FDA, Federal Register, Section 178.1010, Food Additives, for sanitizing at a concentration of 150 ppm without the requirement of a potable water rinse. In addition, the use of this sanitizing solution is consistent with the current practices of the Grade "A" Pasteurized Milk Ordinance, 1978 Recommendations of the United States Public Health Service. The high hard water tolerance of Bardac 2250/2280 allows the use of a lower concentration (150 ppm use-level) at a hard water ceiling of 1,000 ppm. In contrast, the alkyl benzyl quaternaries when used as sanitizers must be used at 200 ppm. This lower use concentration for Bardac 2250/2280 results in a material saving of 25%.

Water Treatment Microbiocide/Cooling Tower

Bardac 2250/2280 provides the formulator with a superior microbiocide for building and industrial cooling towers at use levels of 5 - 20 ppm.

Water Treatment Microbiocide/Secondary Oil Recovery

Many water floods in the secondary recovery of oil contain bacteria including the sulfate reducing bacteria *Desulfovibrio desulfuricans*. This micro-organism produces corrosive degradation products. Bardac 2250/2280 will inhibit the growth of *D. desulfuricans*, and thus reduce the corrosive nature of the water flood. Where oil field flood waters and salt water disposal systems require the use of a microbiocide, Bardac 2250/2280 may be added to the system at a level of 5.0 to 20.0 ppm.

Bardac 2250/2280 is registered with the Environmental Protection Agency (file #6836-32) for both cooling tower and secondary oil recovery applications of water treatment use; a sample label is available for these applications.

Laundry Mildew Preventative/Sanitizer

Soiled commercial linens are prone to mold and mildew attack causing permanent staining. Bardac 2250/2280 at use level 630 ppm based on the dry weight of the fabric is recommended in the final rinse of the laundry cycle to reduce the loss of linens due to staining. At this level, Bardac 2250/2280 provides residual bacteriostatic and self sanitizing protection. For these sanitizing process purposes, Bardac 2250/2280 is EPA registered as Lonza laundry mildew preventative (file #6836-30); a sample label is available as a technical service.

Bacteriostat/Preservative/Fungicide

Bardac 2250/2280 is a highly effective broad spectrum bacteriostat for a variety of industrial applications. For situations where compatibility with a cationic material has been established, the actual use levels for the quaternary should be determined for each application.

Recent work with the lumber industry indicates that Bardac 2250/2280 is an effective biocide in wood preservation.

GENERAL INFORMATION**Product Registration**

Biocides and products with biocidal claims require registration by the Environmental Protection Agency under the Federal Insecticide, Fungicide and Rodenticide Act. In addition, some state authorities require separate registration. The EPA NUMBERS FOR BARDAC 2250 AND BARDAC 2280 are 6836-51 and 6836-53 respectively, and may be referred to by consumers of this product. As a technical service, LONZA INC. provides advice on the registration of Bardac 2250/2280 based products with you.

Safety and Handling

The toxicity of Bardac 2250/2280 is of the same order of magnitude as other commercial quaternaries. Bardac 2250/2280 at an "as-is" concentration may be considered a primary skin and eye irritant. The data below summarizes the acute oral and dermal toxicity of Bardac 2250/2280 on a 100% activity basis as determined in mice and rabbits respectively.

Oral LD₅₀ ± standard error, mg/kg 664 ± 56

Acute Dermal LD₅₀ ± standard error, mg/kg 1300 ± 252

Handling

For detailed handling information consult the Bardac 2250/2280 Product Safety Data Sheet which is available on request.

SAMPLE LABEL

Sanitizing of Food Processing Equipment and other Hard Surfaces in Food Contact Locations.

For sanitizing food processing equipment, dairy equipment, food utensils, dishes, silverware, glasses, sink tops, counter-tops, refrigerated storage and display equipment and other hard surfaces. No Potable water rinse is required.

Wash and rinse all articles thoroughly, then apply a solution of 1 oz. _____ in 4 gallons of water.

Apply to sink tops, countertops, refrigerated storage and display equipment and other stationary hard surfaces by cloth or brush. No Potable water rinse is required.

Dishes, silverware, glasses, cooking utensils and other similar size food processing equipment can be sanitized by immersion in a 1 oz./4 gallon dilution of _____

No Potable water rinse is required.

At 1 oz./4 gallons, _____ fulfills the criteria of Appendix F of the Grade "A" Pasteurized Milk Ordinances 1978 Recommendations of the U.S. Public Health Services in waters up to 1000 ppm of hardness calculated as Ca CO₃ when evaluated by the AOAC Germicidal and Detergent Sanitizer Method against Escherichia coli and Staphylococcus aureus.

The udders, flanks, and teats of dairy cows can be sanitized by washing with a solution of 1 oz. _____ in 4 gallons of warm water. No Potable water rinse is required.

Use a fresh towel for each cow. Avoid contamination of sanitizing solution by dirt and soil. Do not dip used towel back into sanitizing solution. When solution becomes visibly dirty, discard and provide fresh solution.

Precautionary Statements

Hazards to Humans and domestic animals

DANGER

Keep out of reach of children. Corrosive. Causes eye damage and skin irritation. Do not get in eyes, on skin, or on clothing. Protect eyes and skin when handling. Harmful if swallowed. Avoid contamination of food.

STORAGE AND DISPOSAL

-DO NOT CONTAMINATE WATER, FOOD, OR FEED BY STORAGE OR DISPOSAL

-OPEN DUMPING IS PROHIBITED

-DO NOT REUSE EMPTY CONTAINER

PESTICIDE DISPOSAL

PESTICIDE OR RINSATE THAT CANNOT BE USED OR CHEMICALLY REPROCESSED SHOULD BE DISPOSED OF IN A LANDFILL APPROVED FOR PESTICIDES OR BURIED IN A SAFE PLACE AWAY FROM WATER SUPPLIES.

CONTAINER DISPOSAL

TRIPLE RINSE (OR EQUIVALENT) AND DISPOSE IN AN INCINERATOR OR LANDFILL APPROVED FOR PESTICIDE CONTAINERS, OR BURY IN A SAFE PLACE.

GENERAL

CONSULT FEDERAL, STATE OR LOCAL DISPOSAL AUTHORITIES FOR APPROVED ALTERNATIVE PROCEDURES SUCH AS LIMITED OPEN BURNING.

DISINFECTANT-SANITIZER FUNGICIDE DEODORIZER

Disinfectant-Sanitizer-Fungicide Deodorizer for Hospital, Institutional, Industrial, School, Dairy and Other Farm and Home Use

Active Ingredients

Didecyl dimethyl ammonium chloride 7.5%

Inert Ingredients

92.5% 100.0%

KEEP OUT OF REACH OF CHILDREN.

DANGER

Statement of Practical Treatment

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. For eyes, call a physician. Remove and wash contaminated clothing before reuse.

If swallowed, drink promptly a large quantity of milk, egg whites, gelatin solution; or if these are not available, drink large quantities of water. Avoid alcohol. Call a physician immediately.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression, and convulsion may be needed.

SEE LEFT PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS

EPA Registration No.

EPA Establishment No.

Net Contents

Manufactured By:

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It is a vic product i labeling.

Disinfection Health Care

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The formula you are manufacturing is EPA registered, thus specifying by law the correct amounts of active ingredients to be present in your finished product. Therefore, the amounts and directions for the proper production of the formula given below must be followed explicitly.

The greatest accuracy in preparing this formulation is achieved when all ingredients are added by weight. If this is not possible, measure the liquids and weigh the solids.

The amounts given are for a production batch of 1,000 lbs. In order to produce larger or smaller batches, merely add multiples or fractions of the amounts listed.

The specific gravity/density of the ingredients required to correctly produce a 7.5% active Bardac 2250/2280 dilution have been taken into account in the amounts given below:

**Bardac 2250/2280 /7.5% Dilution
1,000 lb. batch**

<u>Ingredients</u>	<u>Density lb./gal.</u>	<u>% wt/wt</u>		<u>If Addition is by Weight, add in lbs.</u>		<u>If Addition is by Volume, add in gallons</u>	
		<u>2250</u>	<u>2280</u>	<u>2250</u>	<u>2280</u>	<u>2250</u>	<u>2280</u>
Bardac 2250	7.73	15.0	—	150.0	—	19.4	—
Bardac 2280	7.43	—	9.38	—	93.8	—	12.62
Water	8.34	85.0	90.62	850.0	906.2	101.92	108.66
Total	—	100.0	100.00	1,000.0	1,000.0	123.32	121.28

- Specific Gravity at room temperature of Bardac 2250/2280 - 7.5% active dilution = 0.974
- Density at room temperature of Bardac 2250/2280 - 7.5% active dilution = 8.12 lbs./gal.

Production Procedure for Bardac 2250/2280 - 7.5% Active Dilution

In a suitable blending vessel add together the water and Bardac 2250/2280. Mix for 15 minutes, making sure a clear, uniform solution has been achieved. Package.