

FILE COPY

Date Out EFB: JUL 26 1979

To: Product Manager 31
TS-767

Through: Dr. Gunter Zweig, Chief
Environmental Fate Branch

From: Review Section No. 1
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 6836-32

Chemical: Didecyl dimethyl ammonium chloride (Bardac- 22)

Type Product: Microbiocide

Product Name: LONZA WATER TREATMENT Microbiocide

Company Name: Lonza

Submission Purpose: Waiver

ZBB Code: Sec. 3 Waiver

Date in: 4/3/79

Date Completed: 7/23/79

Deferrals To:

☐ Ecological Effects Branch

☐ Residue Chemistry Branch

☐ Toxicology Branch

1.0 Introduction

1.1 Chemical Name and Type Pesticide

Didecyl Dimethyl Ammonium Chloride 50% a.i.

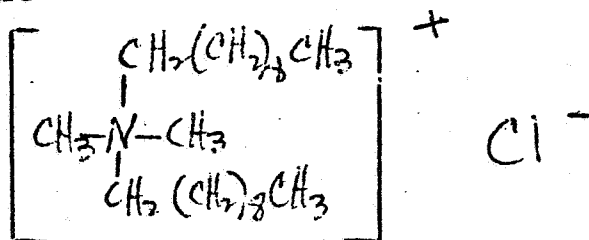
Isopropanol 20%

Microbiocide

1.2 Trade Name

Bardac - 22

1.3 Structure



1.4 Physical and Chemical Properties

Density 7.52 lbs/gal.

pH 6.5-9.0

Solubility Very Soluble

1.5 Applicant requests a waiver of environmental chemistry data requirements (hydrolysis and activated sewerage sludge metabolism studies) for didecyl dimethyl ammonium chloride quaternary as a microbiocide for water treatment usage in a recirculating cooling tower.

2.0 Directions for Use

To control algae and bacterial slimes, use LONZA WATER TREATMENT MICROBIOCIDES as directed. For best results, slug feed. The frequency of addition of microbiocide needed depends on many factors. To optimize your use of LONZA WATER TREATMENT MICROBIOCIDES, follow this procedure.

Recirculating Cooling Towers:

1. Initially use 6 fluid ounces per 1000 gallons of water to be treated (20 ppm active quaternary).

Should the above dosage not give satisfactory results, use 9 fluid ounces per 1000 gallons of water.

Repeat the initial dose every seven days or increase the frequency if needed.

2. When the above treatment level is successful, use 2 to 3 fluid ounces per 1000 gallons of water to maximize efficiency. Repeat weekly as needed.

Should slime develop again, go back to initial dosage.

Cooling tower waters that are inherently low in algae growth and bacteria count may be adequately controlled by the lower range of these dosages; slug fed every seven days.

Dilute the appropriate amount of LONZA WATER TREATMENT MICROBIOCIDES in 1 or 2 gallons of water then add to the sump of the tower. Note this product weighs 7.49 lbs per gallon (at 20 C).

Should tower be heavily fouled, a precleaning is required.

Oil Field Water Flood or Salt Water Disposal Systems:

1. For the control of slime forming and sulfate reducing bacteria in oilfield water flood or salt water disposal systems, add 5-10 ppm (active) LONZA WATER TREATMENT MICROBIOCIDES (1-1/2 - 3 gallons per 3000 barrels of water) continuously. Levels for effective control will vary depending on conditions at the site.
2. For intermittent use, dose at a rate of 5-20 ppm (active) LONZA WATER TREATMENT MICROBIOCIDES (1-1/2 - 6 gallons per 3000 barrels of water) for 4-8 hours per day, one to four times a week as needed to maintain control.

Add LONZA WATER TREATMENT MICROBIOCIDES directly from the drum with the proper type of metering equipment. This product weighs 7.49 lbs/gallon (at 20 C).

2.1 Use Precautions

This product is toxic to fish. Treatment effluent should not be discharged where it will drain into lakes, streams, ponds, or public water.

Do not reuse empty drum. Return to drum reconditioner or rinse well with soap solution and discard. Do not contaminate water by disposal of waste.

3.0 Discussion of Data

3.1 Effect of Microbe on Pesticide

3.2 The Biodegradability of Low Concentrations of Certain Quaternary Ammonium Antimicrobials by Bacteria by L.J. Gawel and R.L. Huddleston Continental Oil Company, Ponca City, Oklahoma Acc #237475.

Experimental Procedure

Four different quaternary ammonium antimicrobials: didecyl dimethyl ammonium chloride, dioctyl dimethyl ammonium chloride, alkyl (C₁₄) dimethyl benzyl ammonium chloride, and alkyl (C₁₄) dimethyl ethylbenzyl ammonium chloride were used in the studies. The first three are sold as Bardac 22, Bardac LF, and Barquat MB-50, respectively. Quats are commonly applied as 50% solutions in water and isopropanol. In this study they are at the 100% active level. The culture used for biodegradation testing was a mixed culture from soil and raw city sewage that grew out in a mineral salts plus yeast extract medium. For some experiments the culture was acclimated to the specific antimicrobials. Testing was carried out in 250 ml or 2000 ml erlenmeyer flasks at 22 C on a gyratory shaker operating at 250 rpm. Controls consisted of inoculated blank medium, uninoculated medium containing quat, and inoculated media containing quat and antimetabolite. Biodegradation of pentachlorophenol (Dowicide G, Dow Chemical Co) was used for comparison.

Analytical Procedure

Biodegradation was followed using a colorimetric test and UV spectrophotometry, when possible. Samples were prepared for colorimetric analysis by adding 7.5% concentrated HCl, refilling for 30 minutes, adjusting volume to 100 ml, adding 1 ml of 0.02% bromphenyl blue dye in alkaline water, extracting with 10 ml of chloroform, and reading at 450 and 460 nm with a B and L Spectronic 20 colorimeter. Quat concentration was computed from a standard concentration curve. Aromatic quats were analyzed with UV spectrometry using refluxed samples at 263 and 268 nm. A nitric acid oxidation colorimetric analysis of pentachlorophenol degradation was done by reading color absorbance at 450 nm.

Results/Conclusions

The didecyl dimethyl quat (10 ppm) was degraded 97.5% after 36 hours using an unacclimated culture. Degradation comparisons of the 4 quats with unacclimated cultures ranged from 92 to 95% after 48 hours. The aliphatic quats were more rapidly attacked than the aromatic quats. Acclimation of the culture to the quats resulted in more rapid degradation. Biodegradation of 10 ppm pentachlorophenol did not exceed 40% over a 7-day incubation period using both acclimated and unacclimated cultures. Two water cooling tower studies tested BARDAC-22 degradation under actual field conditions.

Water Tower Studies I and II

	<u>Time</u>	<u>BARDAC-22 Degradation (ppm)</u>
I	First dose to 5 hr.	29.0 to 1.0
	Second dose to 8 hr.	16.0 to 0.6
	Third dose to 14 hr.	36.0 to 0.7
II	Initial dose to 72 hr.	41.5 to 1.0

4.0 Conclusions

4.1 Effect of Pesticide on Microbes

BARDAC-22, a microbiocide quat, has been shown to rapidly degrade both in the laboratory using unacclimated or acclimated cultures and in water tower cooling systems. In contrast, comparative laboratory testing of pentachlorophenol showed that it did not degrade beyond 20% after a 7-day incubation period.

5.0 Recommendations

5.1 The request for a waiver of environmental chemistry data requirements (hydrolysis and activated sewage sludge) is not needed because the quat is almost totally degraded (36.0 ppm to 0.7 ppm after 14 hours; 46.5 ppm to 0.0 after 24 hours) prior^{to} discharge into waste water treatment facilities. Therefore there are no environmental chemistry requirements.

5.2 Defer to EEB for the need of additional EC data.

Herbert L. Manning

Herbert L. Manning, Ph.D.
Review Section #1
EFB/HED