Lonza’s New Antimicrobial Technology

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Introduction
As an innovative global biocide and additive provider, Lonza is proud to introduce a newly registered biocide for the metalworking industry. Carboquat® MW50 is a multifunctional ingredient that meets today’s demand for simplified formulations that offer superior performance. It is non-formaldehyde-based and exhibits efficacy against Mycobacterium immugenum. We also introduce initial test results with Lonzbac® 12.100, a product currently registered in Europe (not registered in the U.S. with registration pending). Both products are non-formaldehyde-based and exhibit efficacy against Mycobacterium immugenum.

Efficacy and Performance

Results with Carboquat MW50
Carboquat MW50 is a broad spectrum preservative that is efficacious against bacteria, fungi, and mycobacteria (Mycobacterium immugenum). This product is especially unique in that unlike most quaternary ammonium compounds with halogenated anions, Carboquat MW50 has a bicarbonate/carbonate anion that, in addition to having outstanding biocide properties, also allows Carboquat MW50 to act as a corrosion inhibitor. Due to its cationic nature, Carboquat MW50 is designed for synthetic and semi-synthetic non-ionic formulations or with low volume anionic component interference.

The structure of Carboquat MW50 can be seen in Figure 1. Commercial materials are provided as a mixture of carbonate/bicarbonate anions.

Table 1 shows the efficacy data for Carboquat MW50 against Mycobacterium immugenum. The test methodology, developed by Biosan Laboratories, involves test biocides which were added to nitrate broth followed by the addition of mycobacteria.
strains. After 0, 24 and 72 hours, tubes were analyzed for surviving mycobacteria. Two strains of *Mycobacterium immugenum* were used, ATCC culture #700505 and a field strain from contaminated metalworking fluid.

Table 2 shows the efficacy data for Carboquat MW50 against aerobic bacteria counts using ASTM D 3946. Carboquat MW50 can provide efficacy performance similar to triazine.

**Corrosion Inhibition**

In addition to being a highly efficacious biocide, Carboquat MW50 also functions as a corrosion inhibitor. Carboquat MW50’s versatility provides a cost-effective solution to both preservation and corrosion inhibition in metalworking fluid formulations.

Carboquat MW50 functions as a highly effective corrosion inhibitor for a broad range of metals, including steel, copper, aluminum, zinc and tin. Additionally, Carboquat MW50 functions well in extremely corrosive environments such as high chloride environments (even as high as 3.5% saltwater). Carboquat MW50 can also be used in cleaning fluids containing oxidizing ingredients such as peroxides.

Figures 2, 3, and 4 show the corrosion inhibition properties of Carboquat MW50 on various metals.

Figure 5 shows bullet coupon test pieces after corrosion inhibition testing. Carboquat
MW50 has been added in optimized concentrations in a water soluble commercial formulated polyalkylene glycol (PAG) hydraulic fluid. The test is conducted in a rust preventing characteristics oil bath. The polished grade 1010 steel coupons are tested under stirring in hydraulic fluid plus synthetic sea water at 60°C for 4 hours. The end bullets are the control samples: Sample 1 is the control where a commercially formulated fluid is used. After the test, the bullet is covered by brown rust therefore failing the test. Sample 6 is the positive control, a known commercial hydraulic fluid that passes the test. Here, the sample does not develop rust but discoloration is observed. Bullet coupons 2-5 are control treated with Carboquat MW50 at the optimized concentration range, 0.5% and 0.75%. Note that these bullets do not discolor and no rust formation is observed. At this concentration range (0.5 to 0.75% Carboquat MW50 addition to the fluid) Carboquat MW50 substantially inhibits rust growth and provides color stability.

**Initial Efficacy and Performance Results with Lonzabac 12.100**

Lonzabac 12.100 is a tertiary amine (Bis (3-aminopropyl) dodecylamine) which is registered as a biocide in the EU. The product is currently not registered in the U.S. but has an EPA registration pending. It is a non – corrosive biocide which also has lubrication properties. Lonzabac 12.100 has better anionic surfactant tolerance when compared to Carboquat MW50 but can be deactivated by strongly ionized anionic surfactants.

Figure 6 shows the chemical structure of Lonzabac 12.100.

**Summary**

Lonza recognizes and provides solutions to meet the demand for innovative biocides and additives for the metalworking fluid industry. The multi-functionality and versatility of Lonza’s products deliver cost-effective solutions for a wide range of the metalworking fluid needs. Lonza continually provides innovative products that meet the needs of our customers and helps increase their profitability.