Corrosion Rates Comparison PCT 3026 Stabilized Bromine To Four Other Cooling Tower Biocides

Review of our corrosion coupon data base shows that we have five (5) plants where the biocide has been changed to PCT 3026, from various other products, with all other operating conditions held constant. Plants #2 and #3 are basically identical excepting that plant #3 has a sidestream filter installed. The following results were obtained from these corrosion studies.

Plant #1 Biocides

Corrosion Coupon	glutaraldehyde	PCT 3026
steel mil/yr	0.29	0.33
copper mil/yr	0.02	0.02

Note: Results are average of six and four sets of coupons

Plant #2 - no sidestream filter Biocides

Corrosion Coupon	DBNPA	PCT 3026
steel mil/yr	4.99	4.21
copper mil/yr	0.01	0.01
brass mil/yr	0.02	0.03

Note: Results are average of seven and six sets of coupons

Plant #3 - sidestream filter Biocides

Corrosion Coupon	DBNPA	PCT 3026
steel mil/yr	1.51	0.75
copper mil/yr	0.01	0.03
brass mil/yr	0.02	0.05
zinc mil/yr	10.31	6.00

Note: Results are average of three sets each of coupons

Plant #4 Biocides

Corrosion Coupon	chlorine dioxide	PCT 3026
steel mil/yr	1.29	0.59
copper mil/yr	0.01	0.05
brass mil/yr	0.08	0.02

Note: Results are average of six and ten sets of coupons

Plant #5 Biocides

Corrosion Coupon	tris nitro propanediol	PCT 3026
steel mil/yr	6.92	4.35
copper mil/yr	0.03	0.03
brass mil/yr	0.05	0.05

Note: Results are average of ten and four sets of coupons, **zero blowdown system**

The above data shows no major changes in the corrosion rates were observed by switching from various non-oxidizers, and chlorine dioxide, to PCT 3026. In most cases, a small to moderate drop in corrosion rate was found in steel corrosion rates.

PCT 3026, stabilized bromine or n,n,dibromosulfamate, is an organic bromine donor which functions as a strong oxidizer. In contrast to non-oxidizing biocides, where micro-organism communities can develop resistance and thus alternating biocides must be used, micro-organisms cannot develop resistance to an oxidizer. Biological control programs for cooling towers using PCT 3026 thus do not need an alternative biocide. ProChemTech has successfully treated over 100 cooling towers systems for periods of up to nineteen years using only PCT 3026 for biological control.

In addition to not needing a second biocide to maintain effective biological control, PCT 3026 has a significant use cost advantage over traditional non-oxidizing biocides as shown by the following table.

Biocide Chemistry	mg/l dose average	lb/1000 gal system vol.	$/lb list	$/1000 gal use cost
10% poly quat	100	0.83	1.70	1.42
16% quat	62.5	0.52	2.10	1.09
30% carbamate	50	0.42	3.00	1.26
20% quat, 2.9% tin	80	0.67	2.85	1.91
10% MBT	47.5	0.40	3.25	1.30
50% polyquat	68	0.57	4.50	2.57
98% bromochloro hydrantoin	26	0.22	5.20	1.14
20% DBNPA	37.5	0.31	4.50	1.40
1.5% isothiazolin	127	1.06	3.40	3.60
15% glutaraldehyde	227.5	1.90	2.65	5.04
PCT 3026 stabilized bromine	37.5	0.31	1.80	0.56

Multimedia Sidestream Filter

We also note a significant difference in the overall corrosion rates obtained between plant #2, without sidestream filtration, and plant #3, with sidestream filtration. These two plants have the same makeup water, similar process equipment, similar ProChemTech designed and supplied cooling systems, identical chemical feed and control systems, the exact same treatment chemistry, and the same degree of system control. The only difference between the two plants is the sidestream filtration.

The 70 to 80% difference in steel corrosion rates between Plants 2 and 3 can thus be attributed solely to the presence of sidestream filtration on the cooling tower system at plant #3.

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