Anticaro
Mühlestrasse 9
CH-8344 Bäretswil

Lenox Institute for Research Inc.
LENOX, Mass. 01240
101 Yokun Avenue
(413) 637 - 3025
Telex 92 - 6443

HARDWATER TREATMENT BY ANTICARO SYSTEM

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Betty C. Wu
Laboratory Supervisor
LENOX INSTITUTE FOR RESEARCH INC.
101 Yokun Avenue
Lenox, MA 01240 USA

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HARDWATER TREATMENT BY ANTICARO SYSTEM

Anticaro is a unit for treatment of water to reduce calcium carbonate coating of pipes and heating elements without changing the water quality. Testing of this unit was conducted at Lenox Institute for Research Inc. in the period December 7-11, 1987. The following are the test results.

Test 1. Hardness Determination

LIR well water was used as the raw water for all the testing.

Raw Water

Total Hardness = 244 mg/l
Temporary Hardness = 190 mg/l

After heating to 60°C

Total Hardness = 236 mg/l
Temporary Hardness = 187 mg/l

Treated cold raw water with a unit mounted on a copper pipe with a flow rate of approximately 15 l/m

Total Hardness = 220 mg/l
Temporary Hardness = 168 mg/l

After heating treated raw water to 60°C

Total Hardness = 190 mg/l
Temporary Hardness = 140 mg/l

Results show we have obtained a 16.7% reduction in hardness.

Treated cold raw water with a unit mounted on a galvanized steel pipe with a flow rate of approximately 15 l/m

Total Hardness = 224 mg/l
Temporary Hardness = 169 mg/l

After heating treated raw water to 60°C

Total Hardness = 195 mg/l
Temporary Hardness = 142 mg/l

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Results show we have obtained a 12.9% reduction in hardness.

We also tested the conductivity of this water. The results obtained were:

Raw Water = 400 mhos/cm
Copper and Steel Pipe Treated Water = 365-370 mhos/cm

Test 2. Coatation on Copper Pipe

A copper pipe with a diameter of 3/4" was fabricated into a U shape of approximately 50 cm in length.

Water entering the pipe at the rate of 2 l/min was heated by gas flame to an outlet temperature of 60-70°C. This process was done for seven hours. The pipe was then cut to check the coatation and the crystal formation of the calcium carbonate. The crystals on the microscope were viewed at 1:400.

Raw water without treatment showed a very clear coatation of approximately 1/2 mm.

Raw water treated through the copper pipe and steel pipe both had a very thin film-like coatation.

On the microscope, after magnification of 400 times, we have observed the crystal form of the untreated water was approximately 10 times larger than the crystal of the treated water.

The coatation on the inside of the untreated pipe was hard to the touch. The coatation on the inside of the treated pipe was like powder and flaked off when touched.

Test 3. Coatation on Heating Elements

A tank was built using a stainless steel pipe with a diameter of 30 cm and a height of 60 cm, with a heating element mounted 15 cm above the bottom. The heating element was run by 240 V and 4500 W.

For the duration of the test the tank was filled to a level of 60 cm at a flow of about 3 l/m to keep the level constant. The duration of the test was 24 hours without interuption.

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The heating capacity of the heating elements was so strong the water was constantly boiling.

After 24 hours the heating element was removed and dried for approximately 1 hour in a conventional laboratory oven at 90°C. After drying the element was weighed. The results are as follows:

Untreated water coatation = 25.7 grams

Treated water (steel pipe only) = 5.6 grams

The coatation on the treated water heating element was 78.2% less than the untreated element.

The tank used for raw water testing was heavily coated on the inside with calcium carbonate but had no coating on the bottom. The tank used for treated water testing was coated with a light film on both sides and bottom.

Test 4.

Treatment of raw well water, Anticaro with copper pipe treated effluent and Anticaro with steel pipe treated effluent with conventional chemicals. (Alum and Polymer)

All test results in terms of floc formation, floatability and measured total hardness are documented on Tables A-D. It is concluded that Anticaro treatment will not alter the floc formation detention time.

Conclusion

The Anticaro unit successfully reduced coatation of calcium carbonate on pipes and heating elements by approximately 78.2% without use of chemicals or energy and without changing the water quality.

This treatment will not alter floc formation detention time. Chemical coagulation (Alum and Polymer) did not reduce hardness further.

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TABLE A

TREATMENT OF RAW WELL WATER
WITH ALUM AND POLYMER

Jar #	Chemical dosages, ppm		Observation		
	Alum Al_2O_3	Polymer	Floc formation	Time min	Floatability
Control	0	0	No Floc	5	No
1	5	0.1	No Floc	5	No
2	10	0.1	Pin	2	
			Large Pin	3	
			S. Small	5	Yes
3	15	0.1	Pin	2	
			S. Small	3	
			M. Small	5	Yes
4	20	0.1	Pin	2	
			S. Small	3	
			M. Small	5	Yes
5	25		Pin	2	
			S. Small	3	
			M. Small	4	
			M. Small	5	Yes

Note: S = Small
M = Medium
Polymer = Magnifloc 1869A

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TABLE B

TREATMENT OF THE ANTICARO WITH COPPER PIPE EFFLUENT,
WITH ALUM AND POLYMER

	Chemical Dosages, ppm		Observation		
Jar #	Alum, Al_2O_3	Polymer	Floc Formation	Time min	Float-ability
Control	0	0	No floc	5	No
1	5	0.1	No floc	5	No
2	10	0.1	No floc	2	
			Pin	3	
			Large Pin	5	Yes
3	15	0.1	S. Pin	2	
			M. Pin	3	
			Small	5	Yes
4	20	0.1	Pin	2	
			L. Pin	3	
			M. Small	5	Yes
5	25	0.1	M. Pin	2	
			S. Small	3	
			M. Small	5	Yes

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TABLE C

TREATMENT OF THE ANTICARO WITH STEEL PIPE
EFFLUENT WITH ALUM AND POLYMER

Jar #	Chemical dosages, ppm		Observation		
	Alum Al_2O_3	Polymer	Floc formation	Time min	Floatability
Control	0	0	No Floc	5	No
1	5	0.1	No Floc	2	
			No Floc	3	
			Pin	5	No
2	10	0.1	S. Pin	2	
			Pin	3	
			Samll	5	Yes
3	15	0.1	Pin	2	
			S. Small	3	
			Small	5	Yes
4	20	0.1	Pin	2	
			S. Small	3	
			M. Small	5	Yes
5	25	0.1	M. L. Pin	2	
			Small	3	
			L. Small	5	Yes

Note: Polymer = Magnifloc 1869A
M L = Medium Large
M = Medium
L = Large
S = Small

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