Green option for CIP

Decemeber, 15th 2023

CBUSA LAB RESULTS, HCR acid

Chemical	HCR	CIP Acid
pH	1.0	<1
Concentration (sample)	7%	15%
N (mg/L)	0	33,300
P (mg/L)	0	48,950
COD (mg/L)	0	0

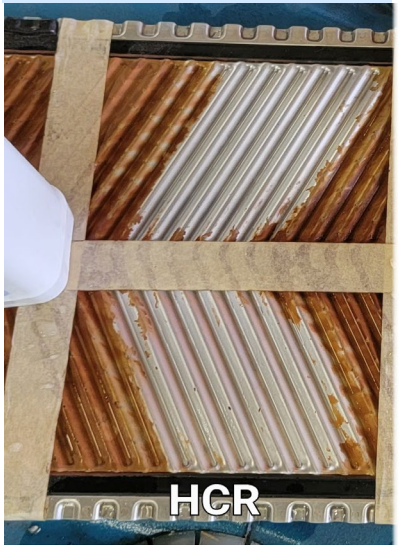
Chart notes:

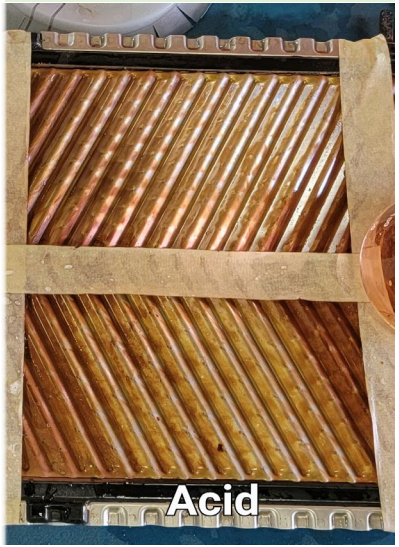
1. The difference in concentration is a fact in value but in this application the HCR sample was more effective.
2. Nitrogen Levels are less, but phosphorus are different, making the HCR sample the preference for this lab test.
3. Is recommended an industrial test.

Rust removal test

VertKleen HCR application

CIP acid current





Test description:

1. Was used a heat exchanger plate rusted.
2. Same surface was separated in four sections for a comparison between both acids.
3. The application was using both acid as is.
4. Both sides was implemented mechanic cleaning.
5. The HRC removed completely the rust from the surface without effort.
6. The CIP acid didn't remove the rust even applying more effort scrubbing the are.

CBUSA LAB RESULTS, CR caustic

Chemical	CR	CIP Caustic current
pH	13.1	>14
Concentration (sample)	25%	45%
N (mg/L)	0	210
P (mg/L)	0	85
COD (mg/L)	0	0
Amount of yeast removed (g)	~1.30	~1.25

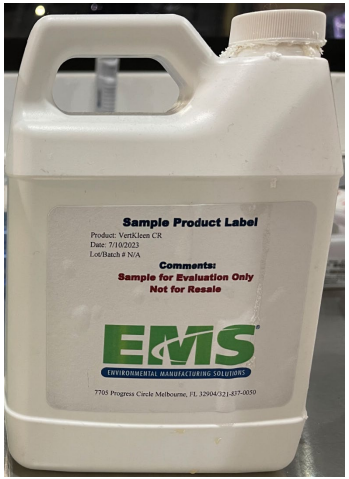


Chart notes:

1. The difference in concentration is a fact in value but in application they were similarly effective.
2. Levels of Nitrogen and Phosphorus are lower in CR sample than CIP caustic, but too low to consider them as a risk for the wastewater treatment plant.
3. Based on the application findings, no important benefit were detected.
4. From the safety standpoint go ahead with an industrial test will be beneficial to understand better the product.

Test description:

1. Yeast removal, CR removed more amount of yeast than traditional CIP caustic.

Thank you

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