POWERFUL ENVIRONMENTALLY FRIENDLY DESCALER

Scale removal/Descaling

Eco-Lyme

- Unique and versatile performer for the HVAC/R market. Descaling applications include cooling towers, evaporative coolers, hot water boilers, processing equipment and more.
- New chemistry rapidly removes scale and rust – similar in performance to hydrochloric acid (also described as hydrogen chloride).
- Significantly safer on metals than competing hydrochloric acid based descalers.
- Safe on carbon steel, aluminum, stainless steel and copper.
- Readily biodegradable.
- Odorless - making it safer to handle.
- Low foaming chemistry for added safety.

Description

Eco-Lyme is a new odorless chemistry for the HVAC/R market that provides a unique blend of performance and safety to the environment and user. The product is specially formulated to achieve descaling behavior of competing hydrochloric acid based descalers. However, the active ingredient is substantially safer on equipment metals. Eco-Lyme is ideal for stainless steel construction - eliminates the issue of localized corrosion/pitting caused by repeated use of hydrochloric acid.

Eco-Lyme is readily biodegradable per OECD 301A, a recognized international method for determining biodegradability for applicable chemistry. Eco-Lyme uniquely provides top-tier performance with a validated eco-profile when a 'green' descaler is sought.

Application

Eco-Lyme is formulated to remove scale, rust and other water deposits from cooling towers, evaporative condensers, hot water boilers, processing equipment and more. Scale affects the performance, efficiency, and potentially design life of the equipment. For cooling tower applications, scale restricts water flow and quickly reduces heat transfer capability of the heat exchanger resulting in elevated high side pressure of the refrigerant system. Excessive high side pressure causes the compressor to draw extra current, which leads to increase power cost over time and may lead to a shorten life. In addition, the scale in the heat exchanger dramatically affects the capability of the equipment to operate at a designed condition. Nu-Calgon offers a family of products for water treatment to prevent scale build-up in cooling towers and evaporative condensers. For other situations when scale must be addressed, Eco-Lyme is the 'green' solution.

Eco-Lyme is ideal for heat exchanger descaling of hot water boilers due to its desired performance and is safer on ferrous and aluminum materials used in heat exchanger construction (see table on back page). Eco-Lyme is advantageous for descaling processing equipment (tanks and/or lines) of a stainless steel and/or aluminum construction. Eco-Lyme provides superior descaling capability, while having similar metal compatibility of phosphoric acid traditionally used in these applications.

Packaging

1 Gallon bottle	**4167-08**
5 Gallon pail	**4167-05**
55 Gallon drum	**4167-01**

Figure 1

Eco-Lyme Dosage Recommendations*

Tonnage-Cooling Towers, Shell & Tube Condensers	Eco-Lyme (Gallons)
10	4
25	10
50	20
75	30
100	40
150	50
200	60
250	100
500	200
1000	400

*Most systems can be descaled within four hours.
Heavily scaled systems may require additional Eco-Lyme.

Eco-Lyme… Today's Preferred Descaler

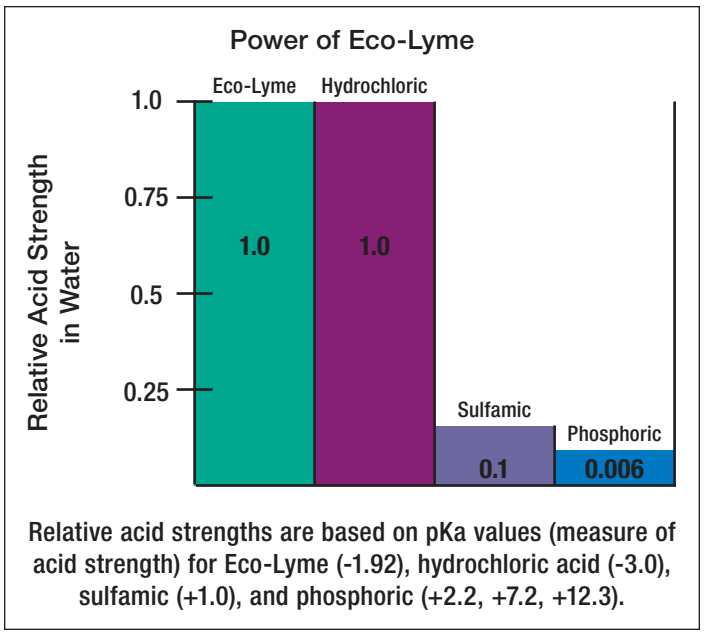
What makes Eco-Lyme different than other descalers?

Eco-Lyme provides performance similar to hydrochloric acid, but safer on metals, odorless, and is readily biodegradable per OECD 301A. Eco-Lyme is a unique performer for descaling needs in the HVAC/R market.

Nu-Calgon literature states the active ingredient is found in nature. How?

Scientific evidence has shown the active ingredient used in Eco-Lyme takes part in the natural sulfur cycle1. Analysis of the Antarctic ice cores give evidence of its global deposition over many thousands of years.

1 S.C. Baker, D. P. Kelly, J.C. Murrell, Nature 350, 627 (1991)



Relative acid strengths are based on pKa values (measure of acid strength) for Eco-Lyme (-1.92), hydrochloric acid (-3.0), sulfamic (+1.0), and phosphoric (+2.2, +7.2, +12.3).

How does the characteristics of Eco-Lyme compare to traditional descaling chemistries?

The chart to the right shows the relative acid strengths of Eco-Lyme compared to hydrochloric acid, sulfamic and phosphoric acids. The relative acid strength of Eco-Lyme and hydrochloric acid are similar. Eco-Lyme is a substantially stronger acid than sulfamic and phosphoric acids.

How much friendlier is Eco-Lyme to system metals?

The chart at the bottom of the page shows comparative corrosion rates of various descaling chemistries currently in the market. Results show Eco-Lyme is similar in behavior to phosphoric, a weak acid; but significantly less aggressive than sulfamic and hydrochloric acids. Eco-Lyme is the chemistry of choice with system materials. Eco-Lyme may remove zinc from galvanized metal.

Why is Eco-Lyme a better choice than competing brands touted as 'metal safe' for stainless steel construction?

Studies have shown hydrochloric acid at any concentration and temperature can remove the protective layer off common grades of stainless steel causing localized pitting – resulting in potential leakage. Eco-Lyme prolongs the life of the equipment by being less aggressive to stainless steel.

I have noticed 'hydrogen chloride, aqueous' stated in literature in the industry. What is it?

Hydrochloric acid.

Eco-Lyme has a high salt solubility. What does this mean?

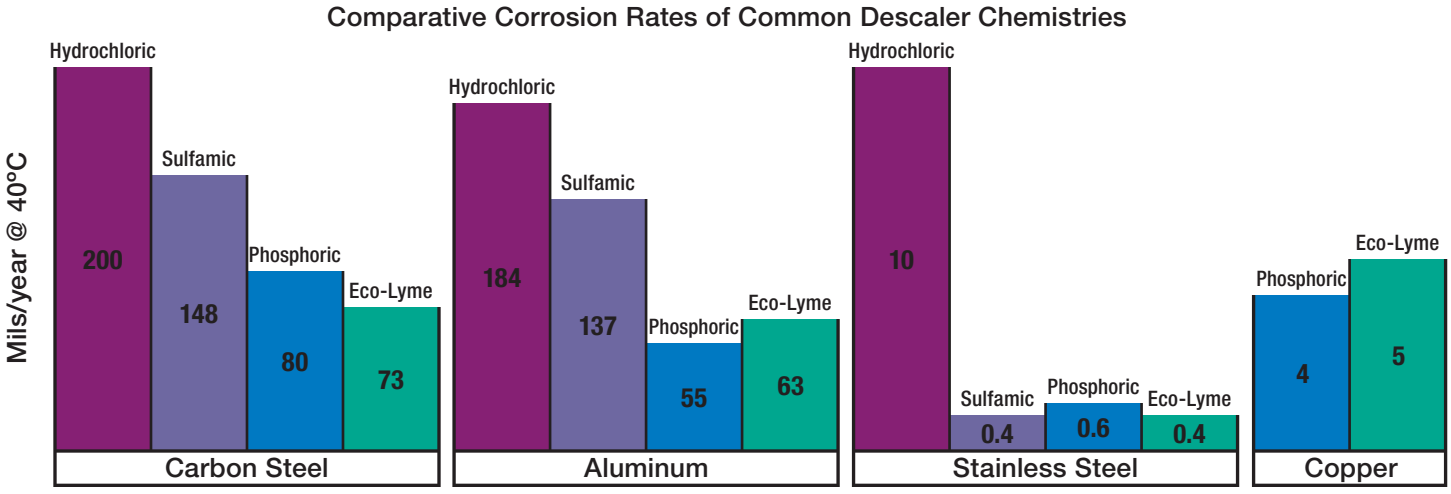
Eco-Lyme has a high threshold to hold dissolved scale in solution – this prevents re-depositing of the formed salt elsewhere within the circuit. This is advantageous in heavy scale situations to ensure rapid scale removal.

How is Eco-Lyme biodegradable?

The chemistry in Eco-Lyme is biodegradable per OCED 301A. This method is an established international standard for establishing the biodegradability of applicable chemistries.

How else is Eco-Lyme safer?

Eco-Lyme is odorless!



Test Conditions: Coupons immersed for seven days, static conditions, 100 mL closed vessel per ASTM methods.

Descaling Instructions – Cooling Towers

Eco-Lyme will safely descale copper, stainless steel, steel, aluminum, iron, brass, wood, rubber and plastic equipment.

1. Wear goggles and protective gear.
2. Shut-off bleed and makeup water to cooling tower.
3. Drain water from sump. Scrap or hose down loose scale from slats or coil. Flush out sump to remove loose scale and sludge. This step will reduce the amount of Eco-Lyme needed to descale the cooling tower.
4. Fill system with water.
5. Add an initial Eco-Lyme dosage to the water circuit following the system tonnage schedule shown in Figure 1.*
6. As the descaling solution circulates, monitor solution activity in the cooling tower sump. Eco-Lyme is a strong chemistry that will descale quickly. It's normal to see some bubbling from carbon dioxide gas release as Eco-Lyme descales the equipment. This bubbling or sputtering will fade as the Eco-Lyme is consumed.
7. It is recommended to test the working strength of the Eco-Lyme in 15-20 minute intervals to establish if the descaler is at an active (working) strength. This can easy be done with the supplied pH strips that accompany each package size of Eco-Lyme. Simply place a pH strip in the descaler solution. If the pH strip turns red, then the solution is still at an active strength. If the pH strip remains yellow/orange, the initial dosage of Eco-Lyme has been consumed and more is required. Add more Eco-Lyme and repeat monitoring the pH of the solution with pH strips every 15-20 minutes.
8. The system is free of scale when the solution retains its active strength (red color on pH paper) for a minimum of 30 minutes. Typically, systems can be descaled within four hours. Some applications may be heavily scaled and may require some additional time. Never leave Eco-Lyme in the system any longer than necessary and never longer than six hours.
9. Drain and flush out the sump again, removing all the Eco-Lyme solution along with sediment that may have been loosened. Discard biodegradable Eco-Lyme solution following local regulations.
10. Fill the system with fresh water and open bleed.
11. Consider setting the cooling tower up with a Nu-Calgon Water Treatment Program in the prevention of unwanted scale. Contact Nu-Calgon for further details.

*Initial dosage guidelines shown in table are nominal starting points in the descaling process developed from historical experience. A good rule of thumb of a starting dosage is one gallon of Eco-Lyme per 2.5 tons of cooling capacity. For adverse scale applications, more Eco-Lyme will be required. The advantage of nominal lower dosage amount shown in table is that Eco-Lyme is only added after further monitoring that has established more is needed. This minimizes the amount of Eco-Lyme that is needed per job or the amount that will need to be neutralized before disposal.

Remember, a more dilute solution of Eco-Lyme will dissolve the same amount of scale as a more concentrated Eco-Lyme solution. However, the rate will be slower. The dilution recommendations above are intended to provide guidelines on desired descaling rates. Adjust according if desired.

Warning: Eco-Lyme may remove zinc from galvanized metal -consider Season Treat in this circumstance.

Descaling Instructions- Shell and Tube Condensers

Eco-Lyme will safely descale alloys of typical construction with shell and tube condensers.

1. Wear goggles and protective gear.
2. Turn off system.
3. Shut-off makeup water to system.
4. Locate and dissemble inlet and outlet water pipe unions as close to condenser as possible. Some applications may require added plumbing (isolation valves) to descale condenser.
5. Allow water to drain from unit and attach discharge hose to Nu-Calgon 31-TX1 Acid Pump to inlet side of condenser.
6. Locate an amply sized acid resistant (i.e., polypropylene) container and place 31-TX1 Acid Pump in container.
7. Attach hose to condenser outlet and place other end of hose into container.
8. Prepare a 1 part Eco-Lyme : 1 part water solution in the container.
9. Turn on pump and monitor Eco-Lyme solution activity. Eco-Lyme is a strong chemistry that will descale quickly. Its normal to see some bubbling from carbon dioxide gas release as Eco-Lyme descales the equipment. This bubbling or sputtering will fade as the Eco-Lyme is consumed.
10. It is recommended to test the working strength of the Eco-Lyme in 15-20 minute intervals to establish if the descaler is at an active (working) strength. This can easy be done with the supplied pH strips that accompany each package size of Eco-Lyme. Simply place a pH strip in the descaler solution. If the pH strip turns red, then the solution is still at an active strength. If the pH strip remains yellow/orange, the initial dosage of Eco-Lyme has been consumed and more is required. Add more Eco-Lyme and repeat monitoring the pH of the solution with pH strips every 15-20 minutes.
11. The condenser is free of scale when the solution retains its active strength (red color on pH paper) for a minimum of 30

minutes. Typically, systems can be descaled within four hours. Some applications may be heavily scaled and may require some additional time. Never leave Eco-Lyme in the system any longer than necessary and never longer than six hours.

12. When the condenser is clean, discard neutralized biodegradable Eco-Lyme solution following local regulations. Fill container with fresh water to purge condenser of residual chemistry/sediment. Locate the discharge hose to a secondary container so as not to recirculate same fluid. Discard water. (This step also rinses the 31-TX1 pump for added life.)
13. Disconnect the hoses to the water cooled condenser; reconnect water supply/return lines to condenser. Re-establish water supply to the water circuit and turn on power to system.
14. Periodic Eco-Lyme cleaning will maintain optimum performance of the condenser. Ideally, consider Nu-Calgon's water treatment program in the prevention of scale on the heat exchanger.

Descaling Instructions - Evaporative Coolers

Eco-Lyme will safely descale copper, stainless steel, steel, aluminum, iron, brass, rubber and plastic materials.

1. Wear goggles and protective gear.
2. Turn power off to the unit.
3. Shut-off water supply.
4. Remove the water overflow pipe. Drain and flush reservoir with water, scrap off any loose scale – this step will reduce the amount of Eco-Lyme needed to descale the equipment.
5. Reinstall the water overflow pipe.
6. Add to Eco-Lyme to sump by diluting 1 part Eco-Lyme to 1 part water.
7. Turn on the system's circulating pump. Do not turn on the fan(s). Allow diluted Eco-Lyme solution to circulate through headers and spray nozzles.
8. It is recommended to test the working strength of the Eco-Lyme in 15-20 minute intervals to establish if the descaler is at an active (working) strength. This can easy be done with the supplied pH strips that accompany each package size of Eco-Lyme. Simply place a pH strip in the descaler solution. If the pH strip turns red, then the solution is still at an active strength. If the pH strip remains yellow/orange, the initial dosage of Eco-Lyme has been consumed and more is required. Add more Eco-Lyme and repeat monitoring the pH of the solution with pH strips every 15-20 minutes.
9. When system is clean and the solution circulates (rains) properly in the reservoir, shut off the circulating pump. Remove the water overflow pipe, drain neutralized Eco-Lyme solution and flush reservoir with fresh water.
10. Reinstall water overflow pipe. Turn on water supply and then circulation pump to flush unit.
11. Turn off water supply, shut off circulation pump, remove water overflow pipe and drain water reservoir.
12. Reinstall water overflow pipe. Reposition boat float – ensure mechanism moves freely. Open water supply to unit, turn circulation pump and return unit to service by turning on power and making any other adjustments deemed necessary.
13. Consider incorporating Nu-Calgon Evap-Treat into the water reservoir. Following a Evap-Treat program assists in prevention of scale formation on the evaporative condenser.

Warning: Eco-Lyme may remove zinc from galvanized metal -consider Season Treat in this circumstance.

Descaling Instructions - Stainless Steel Constructed Steam Ovens Or Steam Tables.

1. Wear goggles and other protective gear.
2. Prepare descaler solution by mixing 1 part Eco-Lyme with 2 to 4 parts water (depending on severity of scale present). Pour diluted Eco-Lyme solution into stainless steel apparatus that requires descaling.
3. Monitor until scale is visibly gone. Otherwise monitor the working strength of the Eco-Lyme in 15-20 minute intervals to establish if the descaler remains at an active (working) strength. This can easy be done with the supplied pH strips that accompany each package size of Eco-Lyme. Simply place a pH strip in the descaler solution. If the pH strip turns red, then the solution is still at an active strength. If the pH strip remains yellow/orange, the initial dosage of Eco-Lyme has been consumed and more is required. Add more Eco-Lyme and repeat monitoring the pH of the solution with pH strips every 15-20 minutes.
4. Repeat process until the scale is visually gone or if the Eco-Lyme solution retains it working strength (pH paper is red) for 30 minutes.
5. Rinse surfaces thoroughly with fresh water.

Descaling Geothermal Heat Exchangers and Boilers: Consult service bulletin 3-130 for details.