GC Liquid Oxidizer Treatment UMass Research

Report by Hannah Rouillard

RESEARCH OBJECTIVE

Research done at UMass was devised to evaluate efficacy of BioSafe Systems peroxyacetic acid-based products in reducing sulfur-based odor compounds found in wastewater. Seeking the most effective combination, various concentrations of peroxyacetic acid (PAA) and hydrogen peroxide were tested in wastewater dosed with 20ppm of H_2S (a very high amount). Research would tell which PAA mixture is most successful at removing odor causing hydrogen sulfide (H_2S) from wastewater without leaving harmful residues.

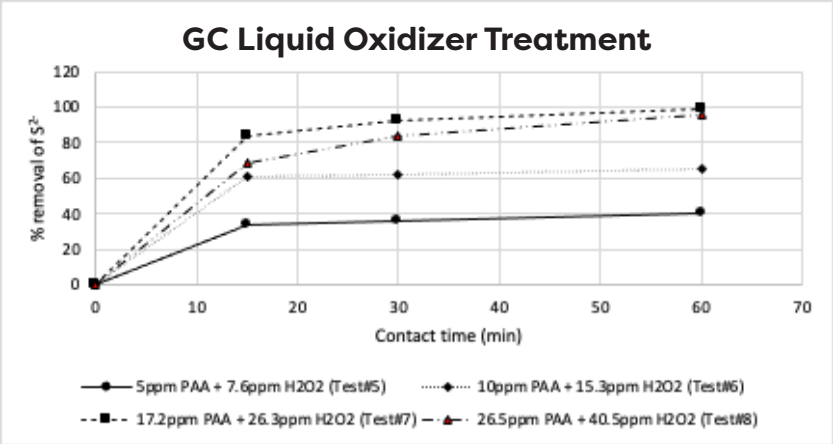
PROCEDURE

Testing included four different dosage rates of PAA: 5ppm, 10ppm, 17.2ppm and 26.5ppm, combined with a starting H_2S concentration of 20ppm in the water. Each dosage of product was mixed with the wastewater over various lengths of time to test efficacy peaks and plateaus. For example, the solution with 5ppm will reach peak efficacy after an hour, removing 40% of hydrogen sulfide. In contrast, GC Liquid Oxidizer Treatment solution with a measured 17.2ppm of PAA surges in activity within the first twenty minutes removing over 80% of H_2S, then continues removing odor compounds until it reaches 100% after an hour.

RESEARCH FINDINGS

The reason for the initial surge in activity when GC Liquid Oxidizer Treatment was mixed with raw wastewater is because the combination of PAA and hydrogen peroxide begins oxidizing on contact with organic matter. The efficacy of aqueous chlorine, as hypochlorite, is highly dependent on pH when it is used as an oxidizing agent or biocide. If the pH level of the water is higher than 7.2, most of the hypochlorite is hindered in its ability to oxidize odorous compounds, or inactivate the organisms that form them. In contrast, the efficacy of PAA is not mitigated by the pH levels typical of municipal wastewater, so it acts quickly and efficiently.

The PAA oxidizing reaction happens quickly, saving time in treating odor causing compounds. An additional benefit of GC Liquid Oxidizer Treatment is that the hydrogen peroxide component continues to oxidize the H_2S in the water after the PAA is consumed. Thus, the sulfides are minimized and the odor eliminated. Wastewater samples were spiked with 20ppm 'as H_2S'. It was demonstrated that 17.2ppm of PAA, (GC Liquid Oxidizer Treatment) oxidized 100% of the hydrogen sulfide with one hour of contact. Data revealed 0.86ppm of PAA is required to oxidize every 1ppm of H_2S.



1) GC Liquid Oxidizer Treatment (18% PAA + 27.5% H_2O_2)

- These tests are compared to show increase in S2- removal corresponding to increase in oxidant doses as GC Liquid Oxidizer Treatment.
- Tests compared: Test5 vs. 6 vs. 7 vs. 8

Figure 2. Percent (%) removal of S2- in wastewater over contact time (t=15, 30, 60 mins) at different doses for GC Liquid Oxidizer Treatment: N=2 (Test5 and 6), N=4 (Test7 and 8)

This graph shows that at a 17.2 ppm PAA dose after 30 min, 93% of sulfides were removed. At a starting H2S concentration of 20 ppm in primary effluent. 0.86 ppm PAA per 1 ppm H_2S.

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