BI-3610

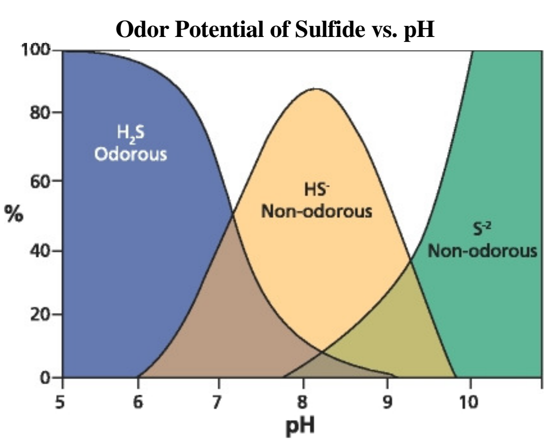
Targets sulfide and related odors in wastewater treatment and collection systems

Objectionable odors continue to rise on the list of major process considerations in industrial and municipal wastewater treatment and collection. The intolerance for odors combined with increased development in proximity to treatment facilities and collection systems has driven the sensitivity Although a multitude of odor control products and strategies exist, many fall short because they are unable to comprehensively moderate the conditions that facilitate odor formation.

Odor Formation

Odors are often caused by anaerobic conditions in the resident biological systems found in wastewater treatment and collection systems. An anaerobic environment can be signaled by a sufficiently negative oxidation reduction potential (OM) and little or no dissolved oxygen (DO). Anaerobic environments may allow microorganisms with a sulfate respiratory pathway to predominate. These organisms are collectively referred to as sulfate reducing bacteria *(SRB).* When sulfate ($S04^2$) is reduced, sulfide is formed.

Sulfide exists in wastewater in three forms; dissolved hydrogen sulfide (H_2 S), non-volatile sulfhydride anion (HS), and sulfide (S^2). The ratio of the three species of sulfide; H_2S, HS, and S^2 is dependent on the pH as depicted in the graph below. For example, at a pH of 6, 90% of the sulfide will be present as H_2S. The higher the H_2S concentration, the greater the tendency for it to volatize. At a pH of 7 hydrogen sulfide is easily purged from the liquid and ultimately responsible for odors, corrosion, and potentially hazardous atmospheres.



Mercaptans, a group of foul smelling molecules, are primarily formed during the anaerobic metabolism of sulfur containing amino acids and other sulfur containing organic compounds. Many of these compounds have odor thresholds in the parts per billion range. Experience demonstrates that mercaptans actually account for many odor complaints. Programs targeting sulfides alone may not be capable of controlling odors from mercaptans.

The anaerobic fermentation of sugars and certain amino acids gives rise to the formation of volatile organic acids including VFA. These molecules are often responsible for objectionable odors as well.

Odor Control Options

Sulfide odor control approaches that use only chemicals or masking agents often do not produce satisfactory results. Some chemical additions target the pH of the system, others attempt to react with sulfide, while others target the destruction of the SRB that create sulfide. Another set of options involves the addition of oxygen through either aeration or a chemical like hydrogen peroxide (H_20_2).

Alternatives to oxygen have been used to offer an alternative respiratory pathway to the indigenous bacterial population. This approach makes the tenuous assumption that the indigenous population contains microorganisms capable of sulfide oxidation. Finally, masking agents are sometimes deployed to temporarily hide the odor. Chemicals targeted at most other odors are equally unreliable.

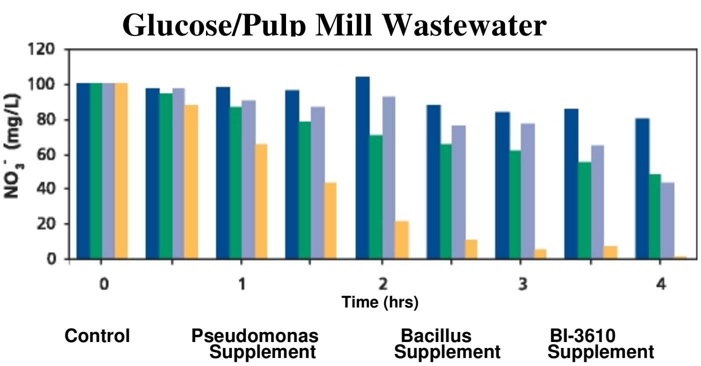
The main problem with a pure chemical approach centers on accurate dosing. Inherently dynamic biological processes drive odors formed by biological activity. Most purely chemical strategies compensate by over dosing product. This translates into programs that are not cost effective.

BI-3610 - Chemistry and Biology

BI-3610 a revolutionary product from Brighton Industries, offers a superior way to treat sulfide odors and odors associated with mercaptans and volatile organic acids including VFA. A strategy featuring BI-3610 approaches the problem from two angles.

First, DISSOLVER, is dosed at a sufficient rate to shutdown the sulfate respiratory pathway by offering a respiratory pathway with a higher energy yielding transaction for biological respiration. This is accomplished using at least 3 moles of nitrate oxygen, or equivalent, per mole of hydrogen sulfide. Since only a small fraction of the biological community can use these alternate electron acceptors, specialized microorganisms must be introduced.

BI-3610, formulated with specialized bacterial strains, is capable of oxidizing sulfides, mercaptans, and volatile organic acids including VFA using oxygen, nitrate, or other alternate electron acceptor. The key strain in BI-3610 produces enzymes that allow nitrate to be reduced more efficiently thereby reducing the amount of nitrate required. Once the correct biological population is established an approximate 1 to 1 molar ratio of nitrate oxygen to hydrogen sulfide is adequate to maintain control. When nitrate is reduced, harmless nitrogen gas (N_2) is generated. Without augmenting the indigenous biological community optimal results will be hard to achieve.



The graph above shows nitrates being reduced more rapidly in the presence of BI-3610.

An odor control strategy based on BI-3610 offers superior odor control because it provides an equally responsive capability to the dynamic manner in which odors are generated in wastewater treatment and collection systems. BI-3610 can make a chemical addition program more effective while lowering overall program costs.

A Complete Understanding of Odor Formation

We offer a service that can give an unparalleled perspective on odor formation and control strategies. Concentrations of potential odor causing compounds in the wastewater are measured and projections on when and where they will volatize are developed. Published odor thresholds of potential offenders are reviewed and models are verified with on site air sampling. This approach provides the necessary information to understand how odors are formed and ensures that proper options are recommended.

Product Characteristics

Bacterial count	3.1 billion cfu/gram (3.1 x 10^9cfu/gram)
Stability	Loss of 1.0 log/year when stored under recommended conditions
Appearance	Tan, free-flowing powder
Odor	Yeast like

Dosage Recommendations

Product dosage will vary according to the specific situation and objectives.

Available Packaging

- 25-LB pails of 1 pound Solu Paks.

Optimum Conditions for Use

The bacteria contained in BI-3610 perform within a pH range of 6.0 to 9.0, with optimum activity near pH 7.0. Temperature affects the growth rate of the bacterial population, and activity improves with increasing temperature up to 40^0 (104° F). No appreciable activity can be expected below 5° C (40° F).

Storage and Handling

Store in a cool dry place. Recommended storage temperature of 1^0- 23^0C (34^0- 73° F). Avoid excessive inhalation. Avoid contact with eyes. Wash hands thoroughly with warm, soapy water after handling.

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