

CN-70

Liquid Calcium Nitrate for Odor Prevention

Description

A concentrated aqueous solution containing 3.5 pounds of nitrate-oxygen per gallon, for the prevention of sulfur-based odors in wastewater. This ready-to-use solution eliminates caking, insoluble residue, & impurities often found with the solid form.

This product is manufactured for wastewater treatment & associated applications. It contains very low levels of ammonia & other impurities, which may cause problems in certain waste water treatment applications.

Product Specifications

Density:	12.38 pounds per gallon	Nitrate-Oxygen:	3.5 pounds per gallon
pH range:	5.0 – 7.0	Appearance:	Clear to slightly yellow

Storage & Handling

CN-70 may be stored in stainless steel, polypropylene or fiberglass tanks. CN-70 contains no EPA listed hazardous ingredients & is non-corrosive. It's freezing point is -25 degrees F, so no special storage arrangements are necessary in most climates. Please see the Safety Data Sheet for specific health & safety information.

H₂S Odor Prevention Using CN-70

Introduction

Waste treatment operations have historically been faced with the problem of odors generated in the treatment process. In past decades, research has been done to determine the causes of odor creation, & evaluate the effectiveness of various odor control methods. The leading cause of nuisance odors is the evolution of sulfides, particularly hydrogen sulfide gas (H₂S). Below is a brief summary of how H₂S is formed, & how the addition of nitrates into wastewater can prevent it's formation. Finally, the benefits of using CN-70 brand calcium nitrate rather than other nitrate forms are highlighted.

How Hydrogen Sulfide (H₂S) Is Formed

Sulfur bearing compounds of numerous forms exist in domestic & industrial wastewaters. Of those, the sulfate ion (SO₄) is the most common. Odor problems associated with the collection, handling, & treatment of wastewater are primarily the result of the reduction of sulfates to sulfides under anaerobic conditions. Bacteria are biochemically oxidizing organic matter in the wastewater. In this process hydrogen is produced. As long as there is sufficient oxygen present, the hydrogen combines with free oxygen to form water. See formula # 1. When free oxygen is not available (an anaerobic condition), sulfates supply the oxygen needed, but form H₂S as a by-product. See formulas # 2 & # 3.

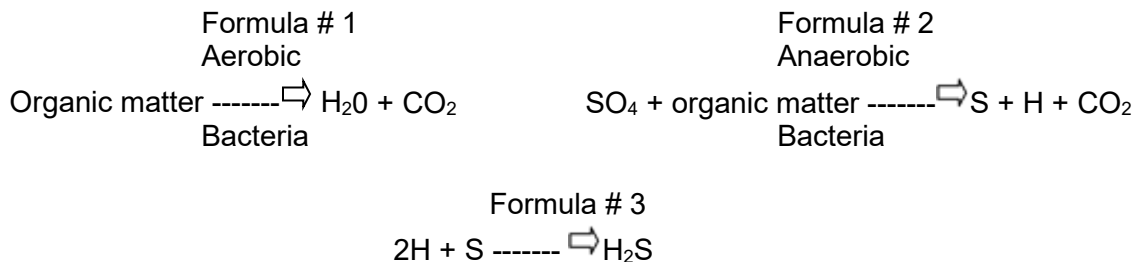
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How Nitrate Prevents H₂S Evolution

As long as there is an abundance of oxygen in wastewater, odor problems associated with the presence of sulfides are generally minimal. When bacteria biochemically reacts with organic matter, there must be a "receptor" for the hydrogen evolved. This receptor is normally oxygen as previously stated. In the event that free oxygen is no longer available, bacteria begin to breakdown other oxygen bearing compounds to sustain the reaction. The order in which this occurs is as follows:

1. Nitrate (NO₃)
2. Sulfate (SO₄)
3. Oxidized organics
4. Carbon dioxide

As can be seen, nitrate is preferentially used before sulfates, organics, or carbon dioxide. If there is a sufficient source of nitrate in wastewater, the nitrate will be reduced, preventing sulfates from being reduced to hydrogen sulfide. When the nitrate is reduced, it produces odorless nitrogen & water, as shown below:



Why Use CN-70 Calcium Nitrate?

There are several metallic nitrate liquids in the marketplace that may be suitable as a source of nitrate oxygen. Sodium nitrate & ferric nitrate are two examples. CN-70 calcium nitrate is the preferred nitrate in most applications for the following reasons:

High Concentration

CN-70 provides the highest concentration of nitrate oxygen per gallon of solution. Therefore, less product is required to achieve the necessary degree of odor protection. This saves money in shipping & handling costs.

pH Neutral

CN-70 is pH neutral, & therefore does not affect the pH of the water being treated. Hydrogen sulfide is much more soluble in acidic conditions. Slightly lowering the pH of a wastewater stream can significantly increase H₂S evolution.

Low Cost

CN-70 is the lowest cost source of nitrate oxygen available in most cases. Less pure sources of various nitrates are available, but the potential effect of impurities such as ammonia & heavy metals on the water treatment process must be fully considered.

Non-Hazardous

CN-70 is non-hazardous & non corrosive. There are significant cost advantages associated with transporting, storing, & handling calcium nitrate over other nitrates, which are classified as oxidizers or corrosives.

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Low Freeze Point

CN-70 freezes at -25 degrees F. Special storage arrangements such as insulated or heated tanks are not necessary, reducing the cost of capital equipment.

Ready-To-Use

CN-70 requires no dilution, mixing, or dissolving prior to use. It is simply metered into the wastewater stream.

How CN-70 Is Used To Prevent H₂S Evolution

Where Do I Add CN-70?

CN-70 is normally dosed at or upstream of force mains, sewers, or lift stations (before the wastewater enters an anaerobic system). The exact location for dosing depends on the physical layout of the wastewater collection system. All force mains or sewers do not necessarily contribute equally to the odor problem. While H₂S concentrations entering force mains or sewers may be relatively equal, H₂S concentrations at the headworks depend on several factors. The length of the force main & flow rate of the water will affect H₂S generation. Varying sulfate levels at force main extremities will affect H₂S generation. Water temperature is also a factor. One may find that only a few points of addition are necessary to effectively control odor at the headworks.

How Can I Isolate The Problem?

To determine the primary contributors to odor generation at the headworks, sulfide levels entering & exiting force mains or sewers must be measured. Several measurements are required to determine the natural variability in each system. Measuring H₂S concentrations at base flow rates, peak flow rates, low ambient & high ambient water temperatures will allow the operator to better understand which systems are contributing the highest concentrations of H₂S under those conditions. A dosing system can then be installed for the systems that are found to contribute the bulk of the H₂S at the headworks.

How Much H₂S Is A Problem?

Most operators try to maintain H₂S levels at the headworks to 0.5 ppm – 1.0 ppm. Several case studies have shown wastewater H₂S levels entering force mains at less than 0.5 ppm & ending up at the headworks in excess of 25 ppm in summer months if the wastewater is not treated. What level of H₂S causes an odor problem is facility specific. In some cases, H₂S levels above 1.0 ppm do not present a problem because the treatment plant is far enough away from populated areas.

How Much CN-70 Do I Add?

This depends upon the relative increase of H₂S concentration in the anaerobic system (force main or sewer). Other factors such as sulfate levels in the wastewater; pH & temperature affect the amount of CN-70 to add. Operators have success dosing at rates of 33 ppm to 100 ppm CN-70 during peak summer months.

How Do I Start?

A practical approach in determining the optimum dose rate is to start dosing at a low level, say 25 ppm. Allow one week for the system to acclimate & then test incoming & outgoing wastewater for H₂S levels. If the outgoing levels are still too high, increase the dose rate. Keep in mind that the various biochemical reactions are taking place primarily in the slime layer. Therefore, it may take several days to condition the sewer before the full preventative action of CN-70 is realized.

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What Equipment Do I Need?

CN-70 addition can be achieved by installing a simple, low-cost system consisting of a storage vessel, metering pump, piping, & valves. CN-70 is compatible to an array of materials such as polypropylene, polyethylene, fiberglass, & stainless steel. In very small dosing operations, a storage tank is not necessary. CN-70 is available in drum quantities, & a simple metering system can be installed to dose directly from the drum.

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