

QuikSoil® 2800

Technical Discussion

QuikSoil® 2800 is a bio-augmentation and odor control product useful in all municipal and private waste processing operations. QuikSoil® 2800 is helpful wherever organic materials are decomposing intentionally or unintentionally. 2800 is especially designed for organics high in nitrogen content. Wastes such as some biosolids, manures, and processing wastes such as fish offal, blood, feathers, and paunch grass.

Many of the odorous compounds associated with waste processes are the products of incomplete oxidation¹. Others are the products of anaerobic decomposition volatilizing on exposure to oxygen during mechanical processing or moving of materials². Still other odors are the result of insufficient biological activity to utilize chemically available nutrients before they combine and volatilize³. Insufficient microbial activity is common even in the presence of abundant food (organics and nutrients) due to stresses in temperature, moisture, and physical conditions such as machine activity and materials movement.

QuikSoil® 2800 utilizes a series of amino groups containing significantly increased quantities of hydroxyls and forming a variety of highly reactive amino hydroxyl groups. These groups are housed in a nitrate solution in conjunction with a series of minerals. Nucleic acid and nucleotides are also included. In short, QuikSoil® 2800 is composed of amino hydroxyl groups, mineral coenzymes and reserves of molecular and cellular essentials.

The function of the amino hydroxyl groups is to facilitate and speed certain reactions in known compounds of decomposition that are odorous or are precursors to odorous compounds. Typically, this list includes a wide variety of VOC's. The amino hydroxyl groups are catalytic in function. This means that they enable a reaction without being consumed, decomposed, or bonded to the products of the reaction. Each group is capable of facilitating the same reaction ten or more times before structural stress disables it, thus providing the user with the most treatment for the least amount of concentrate.

In addition to the amino hydroxyl groups and nitrates, saponin glycosides with readily available carbohydrates are added. As these compounds separate, the glycosides become immediately available as energy food to any extant microbial population. This availability can help generate new bio-activity and increase stress resistance to less than perfect temperature or moisture conditions. Saponin glycosides have also proven valuable in providing the same type of stress relief against unfavourable pH changes or high salt environments.

The nitrates also serve an important function. They provide an immediate alternative to sulfates as food for reducing bacteria. The reduction of sulfate causes the formation of reduced sulfur compounds (RSC's). Nitrate provides an equally desirable reducing agent with non-odorous nitrogen gas rather than sulfides as the by-product. Some percentage of RSC formation is thus replaced by nitrogen formation. Additionally, hydroxyl radicals from the

proteins and added ribose in QuikSoil® 2800 facilitate oxidation of extant and newly formed VOC's and RSC's.

Initially, this increase in sulfate and nitrogen levels, and a corresponding decrease in sulfide levels, results in a change of pH caused largely by the decrease in hydronium ions. Each sulfate has fewer hydronium ions than a sulfide. The nitrogen produced in the reduction of the nitrate has no hydronium ions and the products of the corresponding oxidation and subsequent reactions – including ammonia - are rich in hydroxide ions. So a slight rise in pH toward the basic occurs. This also facilitates decreases in odor formation – especially organic acid formation.

In summary, QuikSoil® 2800 works against odor in 3 ways. Initially, enzymes in the product allow immediate reactions aiding in the decomposition of many odorous gases. Secondly, immediately available glycosides provide potential bio-energy and stress relief to increase bio-degradation of troublesome compounds. Thirdly, available nitrate provides an alternative reducing agent to sulfate, decreasing occurrence of RSC's. Additionally, factors in these reactions and the composition of QuikSoil® 2800 cause slight pH changes which increase stress factors and discourage formation of VOC's and RSC's.

QuikSoil® 2800 is applied as a liquid diluted with fresh water. Depending on odor intensity and type of application equipment utilized, dilution may be from 100 parts water to 1 part 2800, up to 500 parts water to 1 part 2800.

QuikSoil® 2800 is completely biodegradable within 36 hours. QuikSoil® 2800 is also non-toxic. At Concentrate, QuikSoil® 2800 has an LD 50 of greater than 2 grams per kilogram. Its dermal irritation rating is Category 4 ‡, or non-dermal irritant.

In the case of static materials and porous surfaces (such as compost, resting MSW, dirt, concrete, and asphalt) cell, application protocol and frequency of treatment will be determined by intensity of odor formation, humidity, temperature, and other external conditions.

1: Decomposition begins aerobically but insufficient oxygen is available to complete the total reaction pathway prior to volatilization. Examples are alcohols oxidized to aldehydes or ketones, further oxidized to carboxylic acids yielding esters including acetates. If the oxidation sequence ceases at any point – including oxidation of the acetates – the resulting compounds are odorous.

2: Examples are reduced sulphur compounds such as dimethyl disulfide and hydrogen sulphide, and reduced nitrogen compounds such as ethylamine and trimethylamine. Reduced nutrient compounds have distinctive, strong, and unpleasant odors.

3: The most common example is simple ammonia. However, ammonium radicals also are precursors to ptomaine diamines such as cadaverine and putrescine.