

# Septic Tank Additives

**Editor's Note:** The following questions are based on calls received over the National Small Flows Clearing-house's technical assistance hotline. The information was compiled by the technical assistance staff. If you have a question, call (800) 624-8301 or (304) 293-4191.

## How does my septic system work?

Household wastewater flows into the septic tank, where it is collected to separate the solids—both floatable and settleable—from the liquid portion, called the "effluent." During a retention time of 24–48 hours, settleable (heavier) solids collect in the bottom of the tank to form a sludge layer. Floatable solids, such as greases, oils, and fats, collect at the surface to form a scum layer. The partially clarified effluent empties into the soil absorption system.

The purpose of the soil absorption system is to further treat and provide final disposal of the septic tank effluent. As the wastewater flows through a soil absorption system, it is treated by natural processes (physical, chemical, and biological) in the soil. This is how a septic system works in treating wastewater through natural processes with minimal human intervention.

As with most processes found in nature, man has attempted to mitigate the natural treatment process found in a septic system to enhance the efficiency and capability of the system or correct a malfunction. This has resulted in the manufacture and marketing of septic tank additives to solve every possible problem a septic system may encounter.

## What are the different types of septic tank additives?

Recent interest in wastewater treatment and disposal has led to the use of additives, stimulators, or enhancers for a septic system. It has been suggested that additives can be used in a septic system to accelerate digestion of biosolids, break up scum, improve settling through coagulation, or rejuvenate a clogged soil absorption system. However, it should be understood that, in most cases, the purpose of using an additive is to digest or "liquefy/gasify" the solids in a septic tank, rejuvenate stressed bacterial populations in the septic tank, or increase settleability of solids

in the septic tank.

There are two distinct categories of additives used in a septic system: 1) chemical, includes inorganic and organic compounds and 2) biological, includes yeast, bacteria, and enzymes. There are approximately 1,200 additive products on the market today, many of which contain enzymes that can be purchased through septic tank pumpers, discount stores, and chemical companies.

## Is there research on septic system additives?

Over the past 40 years, there have been several studies conducted on septic tank additives; however, there is still some debate on their effectiveness. Part of the problem stems from the number of additives that are marketed and the lack of an established standard testing method for all additives.

Complicating this situation is the debate between additives manufacturers and independent researchers regarding which effects are deemed beneficial and which are deemed detrimental. Currently, there is contention as to whether or not increasing the friability, or breakup, of the scum layer or enhancing the anaerobic decomposition process is beneficial in septic systems.

Notable studies conducted include university research by William Sack, Ph.D., John T. Winneberger, Ph.D., and Rein Laak, Ph.D., as well as manufacturer research by L&F and INTERBIO. Several other research studies on additives were also conducted and are discussed in the following sections. Recently, the National Association of Waste Transporters (NAWT) conducted an independent field study on 12 septic tanks using additives. The data collected from this study are currently being analyzed, and the results should be available soon.

## What are the beneficial or detrimental effects of additives from various research studies conducted?

The beneficial effects of biological additives on the septic system are still being debated, but two

benefits may ultimately be identified. Based on available literature, enzymatic products might have the ability to reduce the amount of oil and grease in the septic tank. Second, under septic tank bacterial "die-off" conditions, slight reductions in the amount of effluent solids have been achieved by using additives.

A research study by Mark Gross, Ph.D. has shown that septic tank "die off" conditions occur when the bacteria in a septic tank are destroyed due to the presence of toxic substances. Die-off conditions were observed when adding a concentration of 1.85 gallons of liquid bleach, 5.0 gallons of liquid Lysol cleaner, or 11.3 grams of Drano drain cleaner to a standard 1,000-gallon septic tank. Other factors that can cause die-off include the use of anti-bacterial agents, and, in certain cases, medications taken by the homeowner.

However, research conducted by Winneberger, et al., suggests that some biological additives may increase the biological activity to the point where excess solids can be carried into the soil absorption system. This occurs when anaerobic decomposition of solids causes the formation of methane gas. As they rise, bubbles push solids up from the settled portion of the septic tank. Ultimately, this may lead to solids "carryover" to the soil absorption system where clogging can ensue.

Contrary to the ability of enzymatic products to reduce scum, the effects of degradation in the scum layer are believed to be detrimental to a soil absorption system. The scum layer "holds" fats, grease, and floatables, preventing their escape to the soil absorption system. Enzymatic products can "break up" this scum layer and increase its mobility, allowing it to enter the soil absorption system.

Some chemical additives that have been used in septic systems include hydrogen peroxide, sulfuric acid, formaldehyde, baking soda, and alum. J. Harkin proposed that hydrogen peroxide could be used to restore the infiltrative capacity of a failed or clogged soil absorption system. However, it was also reported from another study that hydrogen peroxide could agitate soils containing fines (clayey and loamy soil), destroying the soil structure, thereby decreasing the soil's permeability.

A number of products sold over-the-counter for soil absorption systems and clogged drain pipes contain sulfuric acid, which is highly corrosive in concentrated form. This could affect the microbial population in the septic tank and soil absorption system, and contribute to structural weakness when applied directly to a concrete tank. The use of sulfuric acid might result in severe burns if it comes into contact with human skin.

It should be noted that the federal government does not control the use and disposal of hazardous substances in small quantities purchased from supermarkets. Additives used to control odor by controlling excessive anaerobic growth may contain formaldehyde, paraformaldehyde, quarternary ammonium, and zinc sulfate as active ingredients. Although these chemicals are biodegradable with dilution, they are biocidal at full strength.

Organic chemicals used in additives include organic solvents or surfactants that have been reformulated to make the product safe for the environment. Even at these approved safe levels, naphthalenes, alkanes, and benzenes sometimes used as ingredients in portable toilet cleaners and deodorizers are significant pollutants, and should not be added to a septic system.

## Do I need to use an additive in my septic system to keep it working?

A homeowner does not need to add a stimulator or an enhancer to a septic tank that is designed, operated, and maintained properly—naturally occurring bacteria are already present within human fecal matter. Contrary to popular belief, yeast, dead chickens, possums, or raw hamburger do not need to be added to the septic tank.

Chemical additives, such as caustic hydroxides and sulfuric acid, should never be added to a septic system. Adding these products will destroy the bacterial population in the septic tank, change the permeability characteristics of the soil absorption system, and may cause groundwater contamination. Often, manufacturers of biological additives market their use to restore the bacterial balance in a septic tank on a monthly basis as part of a routine maintenance program. This is not necessary because these bacteria already reside in human feces.

There are special instances when the use of a biological additive may be warranted, such as when homeowners take antibiotics or other prescription medications. However, it should be noted that research is still needed in this area.

Claims made on the effectiveness of additives to either eliminate pumping of a septic tank or restore permeability of the soil absorption system are unsubstantiated. No product will allow a homeowner to escape a regular septic tank pumping and maintenance schedule.

The debate on the issue of using an additive can be resolved only through a cooperative research effort from independent/unbiased researchers (such as universities and research centers) and additive manufacturers to determine their true effectiveness and reveal their limitations.

If you have additional questions about septic tank additives, call NSFC at (800) 624-8301 or (304) 293-4191. ■

