

RV HOLDING TANKS CHEMICALS AND BEYOND © 2004, 2005

by

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EDITOR'S NOTE: Joseph Aiello sent me an e-mail as a result of an exchange in RV Lifestyles about why the dump station in Blythe, CA was temporarily closed in January/February 2005. He offered to send this article. Here's Joseph's background and reason for compiling his research.

I am a retired pharmacist and for the past three summers have sold Odorlos at Camping World stores. To understand how Odorlos works and how the other chemicals were used in the black holding tanks, I had to learn how sewage is treated at waste treatment plants and then I had to read the labels of my "competitors" to know how Odorlos stood. My knowledge of chemistry and some Internet research helped to put a scientific basis to the article. All statements are backed by references.

PREFACE

The following article deals with the chemistry of the currently available holding tank treatments and observations about advertising practices, conceptions and misconceptions by makers of those chemicals.

Three areas will be covered.

- The first section covers the sewage waste treatment process: what goes on in a septic tank and waste treatment plant.
- The second section deals with the pros and cons of the currently available chemical products used in RV holding tanks.
- The third will be frequently asked questions about holding tanks usage and other related topics.

A. BACKGROUND OF SEWAGE WASTE TREATMENT

What we humans put into the holding tank in solid form contains friendly bacteria known as coliforms. This is the same bacterium that digests the food we eat and are necessary for the breakdown and liquefying of solid waste in the holding tanks.

The black holding tanks in RV's can be thought of as small septic tanks where the breakdown process begins and here, the proper use of chemicals is important. Using improper chemicals can kill the beneficial bacteria and cause improper waste breakdown that leads to odors.

A septic tank system consists of two major parts: a tank and a drain field or leach field. The septic tank or holding basin allows the solids to settle to the bottom. This settling process gives the bacteria time to break down and liquefy the waste.

During the breakdown process in the holding tanks and sewage treatment plant, it is important to keep the bacteria supplied with oxygen (in an aerobic condition) so the bacteria can liquefy the waste without producing the odor nobody likes.

This gas, hydrogen sulfide, is corrosive to both steel and cement. This is the reason waste treatment plants will aerate the sludge or add oxygen-releasing chemicals to the sludge to keep the bacteria working properly. Thus it is important to use a product that supplies oxygen to the bacteria and not use a harsh chemical that will kill the bacteria.

Waste treatment plants monitor the oxygen content and the goal is to maintain the oxygen content between three and five parts per million. Above five parts per million, the bacteria begin to die and below three parts per million there is not enough oxygen and the bacterium goes into an anaerobic (without oxygen) condition. This anaerobic condition produces the odor nobody likes to smell.

The use of harsh chemicals that kill the bacteria or retard bacterial growth will slow or stop the liquefying process in home septic tanks, campground or dump station septic systems and may lead to costly repairs or replacement of the septic system. Malfunctioning septic systems can contaminate underground water sources, surface water sources or even the soil.

The second major part of the septic system is the drain field or leach field, which allows final treatment of the wastewater through natural processes in the soil.

B. PRODUCTS ON THE MARKET FOR USE IN HOLDING TANKS

Chemical names will be used to avoid conflict with brand name protection.

1. ENZYMES

The labels on these products usually are not specific about the active ingredients. The word "enzyme" is usually associated with compounds that are needed for a chemical reaction to occur. The function of supplying oxygen to the friendly bacteria is difficult to determine. Most products containing enzymes do not specify the type or what kind of enzymes the consumer is buying.

2. NITRATES

Nitrates are useful to the RV holding tank and sewage treatment plants because the chemical compound breaks down to release oxygen to the friendly bacteria resulting in an aerobic condition as the bacteria process the sewage. This results in no odor during the breakdown process. In 1996 the use of nitrates was

awarded the prestigious Her Majesty the Queen's Award in the United Kingdom as new technology in the treatment of sewage. Many sewage treatment plants use it to supplement the aeration process.

3. FORMALDEHYDE

This most widely used chemical is mixed with methyl alcohol and is marketed as a blue-colored, perfumed liquid. The Environmental Protection Agency (EPA) in their publication 909-F-99-002, July 1999 states, "formaldehyde kills or retards bacterial growth; is recognized as a probable cancer-causing agent and is moderately toxic to humans." Moderately toxic means a lethal dose for a 150 lb person is 1 ounce to 1 pint". It does not supply oxygen to keep the bacteria in an aerobic condition.

In 2002, the company distributed a brochure with a by-line entitled "It time you learned the TRUTH about formaldehyde." One claim is that formaldehyde is 100% biodegradable.

Most chemical compounds are biodegradable, however uranium can take up to centuries to biodegrade. Chemicals or elements that are not biodegradable are the heavy metals, such as mercury, gold, silver, uranium, etc.

This feature of being biodegradable is a diversion away from the main issue and that is formaldehyde "kills or retards bacterial growth." No oxygen is provided to the bacteria for the proper breakdown of the solids and paper.

Do not base the selection of biodegradable as the sole reason for the use this or any product. While formaldehyde is being biodegraded, it probably is not harming the environment.

Even the State of Oregon recognized the harm formaldehyde products can do to their dumpsites at rest stops. A few years ago too much "blue stuff" was dumped into a rest area dumpsite damaging a nearby sewage treatment plant. This resulted in Oregon closing all the dumpsites in the rest areas. (The dumpsites in their state parks are still open.)

Oregon State Parks distributes a pamphlet entitled "Recreational Vehicle Waste Disposal Locations in Oregon" 73410/1655(11/00) which states, "Please use environmentally safe products in holding tanks. Products such as formaldehyde harm many waste disposal systems."

Wisconsin also recognizes the problem. While the article does not specifically mention formaldehyde, it uses the words "harsh chemicals." See the *Highways Magazine*, June 2003 issue, page 10 printed article entitled "Wisconsin Closes Rest Area Dump Stations." Wisconsin is closing dump stations due to budget constraints and the use of harsh chemicals.

A great amount of space is devoted in the brochure to putting the blame of the failure of campground sewage systems on low-water-use toilets and morning volume dumping by RVers leaving at or near the same time. The TRUTH cannot be avoided: the EPA states formaldehyde kills or retards bacterial growth.

The label on the containers of formaldehyde products are required by federal law to have the words "Danger", "Poison", and a picture of a skull and cross bones (the universal symbol for a poison).

Arsenic and strychnine and a few pesticides carry the same label. Does the average camper, RVer, etc. have these poisonous containing products in their homes? Probably not. Yet not a second thought is given to having a product with formaldehyde in their RV even with small grandchildren or pets around.

4. BENZALDEHYDE

The label on this package states it is formaldehyde-free. Here is a deception in marketing. True, it does not contain formaldehyde. It contains benzaldehyde, which is in the same chemical family as formaldehyde. Most chemicals in the same chemical family act the same way. In researching for this article I requested information from the marketing company and was sent a glossy brochure with no scientific or pertinent information. An Internet search provided no information to change the scientific fact that chemicals in the same chemical family have the same properties.

5. PARAFORMALDEHYDE

EPA states this is a variation of formaldehyde. When heated, paraformaldehyde releases formaldehyde. According to the EPA it is also a bacterial pesticide and very toxic to humans. The lethal dose for a 150 lb person is between one teaspoon and one ounce.

The chemical comes packaged in dry form in individual packages. Use caution when tearing the individual package to avoid inhaling any loose powder.

6. GLUTARALDEHYDE

This chemical is better known as embalming fluid. For many years it was used as gray water treatment product. In late 2002 or early 2003 the gray water treatment package was redesigned and the glutaraldehyde was removed. The label now states the product contains surfactants. Surfactants are chemicals that make water "wetter". Water clings to a shower wall because of the surface tension of the water bubble. The surface tension tends to act as a suction cup. Surfactants reduce that surface tension; the water loses its suction, and falls down the shower wall. These products are usually lemon-scented.

7. BRONOPOL

The Environmental Protection Agency (EPA) in their publication 909-F-99-002, July 1999 states that Bronopol is a bacterial pesticide (kills bacteria). It also states Bronopol break down into formaldehyde. It is a common ingredient in products marketed in tablets and green liquids.

These products are labeled as formaldehyde-free. Here again is another deception. Yes, the product is labeled correctly. What is little known to the average RVer or campground owner is that in the presence of sewage, bronopol breaks down into formaldehyde. This information should be included on the label so the environmentally conscious RV consumer and RV park owners can make an informed choice in the use of chemicals.

8. DOWICIL

The EPA states this chemical is a bacterial pesticide. (A bacterial pesticide kills bacteria). The EPA also states, "Do not discharge effluent containing this product to sewer systems without previously notifying the local sewer treatment plant authority."

Dowicil has a long chemical name, which you do not need to remember. The company marketing this product makes it easier for the buyer to remember the name by the use three capital letters on the label.

In 2004 a major campground company endorsed this product by the use of their logo on the label. I wonder if the decision makers in the company are aware of the above EPA warning. This is flagrant corporate irresponsibility and the company should be held accountable.

9. AMMONIUM COMPOUNDS

These are bacterial pesticides that kill bacteria. They are often found in sprays for surface bacteria. This chemical and most of the chemicals discussed above do not provide a source of oxygen to the friendly bacteria to conform to normally practiced and recognized sewage treatment methods.

10. PRODUCTS THAT DO NOT LIST ANY INGREDIENTS

A recent addition is a product in a new disposable package made by a company on the east coast. Its marketing ploy is to throw the entire package into the holding tank hoping the packaging dissolves and does not clog any holding tank valves.

The label on this package is interesting. It states "formaldehyde free" but lists no active ingredient. In researching for this article, I contacted the company that sells the product and was e-mailed a Material Safety Data Sheet (MSDS).

This is the list of other components and disclaimer:

OTHER COMPONENTS CONSISTING OF BETWEEN 20 & 40% BY WEIGHT ARE CONSIDERED A TRADE SECRET AND NOT DISCLOSED UNDER TERMS OF OSHA 29CFR 1926.59 AND 29CFR 1928.21. SUCH COMPONENTS MAY BE DISCLOSED UNDER EMERGENCY CONDITIONS TO HEALTH PROFESSIONALS, IF NECESSARY.

In this era of full disclosure and informed consumerism, the environmentally concerned RVer and RV park owner should know the chemical being purchased and used and whether or not the chemical is harmful to the environment and the sewage treatment system. They can hide behind OSHA and other government regulation, but no other manufacturer is doing so.

Based on the available chemicals for use in waste treatment, my guess the “trade secret” ingredient is bronopol, which converts into formaldehyde in the presence of sewage.

C. QUESTIONS AND ANSWERS

1. Isn't there air (oxygen) in the holding tanks?

The oxygen must be in solution for the bacteria to be able to use it. This is why sewage treatment plants will aerate the sludge or add chemicals such as nitrates that provide oxygen to the bacteria. The oxygen content of the sludge is monitored and must be in a pre-determined range. Above the range the oxygen kills the bacteria. Below the range the bacteria do not function properly and then the surrounding neighborhood knows there is a problem.

2. When I am hooked up in an RV park, the black tank has a terrible odor. How can I get rid of it?

Solid waste material could be clinging to the top and sidewalls of the tanks and were not properly cleaned out. Use a toilet wand attached to a garden hose, bathroom faucet, or an installed tank sprayer.

Another source of the odor could be coming from cracked seal at the bottom of the commode allowing the odors to escape into the bathroom. If this is determined to be the problem, replacing the seal should correct the problem.

Another source could be from the gray tank. Usually the odor can be noticed when the tank is almost full. Add chemical through the kitchen sink, bathroom sink or shower.

3. What can I do if the black holding tank has a buildup of toilet paper?

Use a pail or bucket full of hot water and pour the hot water directly into the holding tank through the commode. Repeat several times if necessary.

4. In hot weather I seem to get an odor with any chemical I use. What causes this?

All chemical reactions tend to slow down in extremes of temperature. It may be necessary to add more chemical.

5. How effective are tablets?

Tablets must be compressed under high pressure to retain their shape. These tablets at times may not dissolve due to high compression. Most products that come in tablet form contain Bronopol, which breaks down into formaldehyde in the presence of sewage.

6. Will these chemicals harm the environment?

All these chemicals are 100% biodegradable and should not be harmful to the environment. As stated above, do not focus on the issue of biodegradability. This is a Trojan horse to focus attention away from the active chemical and how it affects the bacteria.

7. At some RV shows I see a demonstration of five or six products in test tubes with water and toilet paper. What does this show?

Be a little suspicious of this demonstration. This is not a scientific test. It allows the demonstrator's product to look the best in dissolving tissue and the others to be less effective. Some of the products compared were never intended to dissolve tissue so the test is not in any sense scientific. This is another of the untruths and hocus-pocus that goes on in the marketing of RV holding tank chemicals.

The dissolving of tissue implies that the product will dissolve the solid waste and this may not be true. The product could contain cellulase, an enzyme that breaks down tissue. The other products may not have that enzyme and therefore will not dissolve tissue in a test tube.

The break down of tissue should not be the sole criteria for selecting a holding tank chemical.

8. Should chemicals be mixed?

Usually it is not a good practice to mix holding tank chemicals. Carefully follow the directions on the label for proper use and do not mix.

9. I keep my gray water (shower) valve open when at a RV park. Is this a good practice?

At the end of the holding tank hose is the septic system. Methane gas is produced when sewage is breaking down. Methane gas has the potential to enter the RV through the sewer hose and open valve into the RV. A spark and the results will not be pleasant. How inconvenient is it to empty the holding tanks every few days as compared to the inconvenience of a methane explosion?

10. I like to use a home brew. Will this work?

Home brews contain harsh chemicals that do not release oxygen to the bacteria and these chemicals might even harm the holding tank seals.

WHY WE SHOULD BE CONCERNED:

As RVers we must be concerned about the chemicals we use in our holding tanks. Most of the products are harsh chemicals designated by the EPA as bacterial pesticides that either kill or slow down the growth of the bacteria. Unpleasant odors are still present so perfumes or deodorizers are added to these products to hide the smell making these products nothing more than glorified tank deodorants.

Of concern to us RVers is the closing of dumpsites. Every year another state or city will close their usually "free" dumpsite because of the overuse of these "harsh chemicals." Local tax dollars are used to put the system back in use and with government bodies being squeezed by higher demands from voters and resistance to tax increases, these "free" privileges for us may very well vanish in the future. So it is to the benefit of all RVer's to become familiar with the sewage treatment process and chemicals they buy. It may take a little effort to remember the chemical names but the effort is worth the cause.

SO NOW WHAT?

I asked Joseph how a consumer could use this information to choose a product. Products that use chemicals like formaldehyde, that breakdown into formaldehyde, or are equally harsh are actually harmful. Other ingredients have questionable value. What is necessary are ingredients that promote the growth of helpful bacteria.

Joseph, of course, has determined that Odorless is the best product because it contains potassium and magnesium nitrates that supply oxygen to the bacterium. The oxygen maintains an aerobic condition in which the bacterium can break down the solids and paper without producing an odor. The use of nitrates was recognized in England a few years ago by an environmental award. It is easy to use and fairly priced.

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