Why Do They Break Down?

Here's a practical explanation for hydrogen sulfide erosion in septic tanks — and why some tanks are affected and others not

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It is a fact of chemistry and physics that hydrogen sulfide gas will be produced in all septic tanks as organic waste decomposes and breaks down. The big question is why this seems to affect the integrity of some concrete septic tanks and not others.

Hydrogen sulfide is heavier than air, so it generally affects the concrete just above the waterline in the lowest part of the system. If the gas cannot escape the structure, the level will slowly rise and begin to affect the concrete higher above the waterline.

The waste from every residence or business will produce hydrogen sulfide at different rates, depending on the organic volume of the waste, the temperature, and the retention time in the structure. Regardless of the rate of hydrogen sulfide production, if the gas can flow out of the structure along the waste stream, then the gas level in the tank should never build up to the point where it damages the concrete.

Running downhill

Think of it this way: hydrogen sulfide is heavier than air, so when it first begins to develop, it will lie right on the surface of the water. Being heavier than air, it will flow downhill, just as water does. So in a properly installed septic system, it will flow from the first tank into the second tank, and from there in a gravity system it will flow through the outlet pipe to the drainfield and be dispersed into the soil.

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Many people believe this gas follows the plumbing system back toward the house and out the roof vents. This is true of other gases in the tank, especially methane, which is lighter than air. But getting hydrogen sulfide to exit the tank via the roof vents would be like trying to get water to flow 10 to 20 feet uphill — it's just not going to happen.

To escape, hydrogen sulfide needs to be able to flow out to the soil treatment area. Gases will follow the piping back from the drainfield to escape through the house vents, but this will not hinder the flow of hydrogen sulfide to the drainfield, just as it does not hinder the flow of the wastewater. Hydrogen sulfide flowing out of the tank in a properly functioning system will be in the very bottom of the pipe, letting the other gases flow over it in the other direction.

Flow blockages

The reason the gas attacks some tanks and not others is that in the systems being attacked, the gas is not able to flow freely to the soil treatment area and disperse into the soil. The flow could be stopped by a number of things, such as:

• A sag in the outgoing pipe.

• A pipe pitched in the wrong direction.

• A pipe pitched too steeply and inserted too far into the tank.

• An overloaded drainfield.

• Roots in the outlet line.

• Overly saturated or compacted soils.

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• Heavy biomat.

In other words, a hydrogen sulfide buildup could be caused by anything that hinders that gas from entering the soil.

This problem is likely to be more prevalent in today's systems installed under current codes. In the 1980s and earlier, mottled soils and groundwater were not much of a concern to installers when putting in septic systems. Mound systems were not very common, and far fewer pump tanks were being installed on trench systems.

In that era, you simply hooked onto the sewer line leaving the building and installed everything deeper from that point. Drainfields were installed as deep as they needed to be to keep the water flowing. This way in older septic systems, the hydrogen sulfide always had an easy escape route from the tank to the drainfield. That is most likely the reason the problem of tank erosion seemed less prevalent then.

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What about pump tanks?

Next question: Why is the gas not reacting in all pump tanks? After all, the gas is trapped inside those tanks. The only explanation I can give is that in pump tanks the water level is always moving.

It is actually bacteria that cause the breakdown of the concrete, and this happens right on the surface. The water level in a pump tank is almost always moving up or down, and the reactions that break down concrete cannot occur underwater. So the rinsing action of the water level rising and falling, along with the bacteria becoming submerged as the tank refills, must be hindering the rate of concrete degradation.

There is also increased airflow in and out of the tank during the pump cycles that may contribute to the slowing of the hydrogen sulfide attack. Hydrogen sulfide is present in pump tanks, so in time the tank will start to show signs of decomposition just above the high waterline. But this breakdown could take much longer to appear because the gas is not kept at a high level for an indefinite amount of time.

If this theory is correct, there are two ways to solve the problem of concrete breakdown. The first is to figure out why the hydrogen sulfide gas is not able to make it to the soil treatment area and disperse into the soil. The second is to protect the septic tank from the gas by impregnating the concrete with protective additives or installing a chemical resistant liner. n

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