



Antifreeze Disposal

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Introduction

America is a motorized and mechanized society, and Americans operate their vehicles and equipment in all kinds of weather, seasons and climates. In the early days of the automobile, motorists drove vehicles that did not have heaters or side windows. Needless to say, driving in inclement weather – particularly in the winter – could be extremely unpleasant. Not only were the driving conditions unpleasant and uncomfortable, the vehicle could be particularly hard to start in cold weather. Eventually, heaters and side windows were added, and operating or riding in the vehicle became less uncomfortable.

Technological innovation in lubricants and engine antifreeze and coolants progressed rapidly. These products made the operation of the vehicle in extreme weather more feasible. Early versions of antifreeze were water with such additives as honey, sugar, molasses, or other sugar type ingredients. However, the most popular additive was methyl alcohol. Although the methyl alcohol had much better performance and reliability than the other products, it was prone to boiling away, it had an odor and it was flammable. Even though the performance was better, drivers still faced a considerable amount of unpredictability about the ability of the car to start and operate in the cold.

As technology progressed, so did the ability to blend antifreeze/coolants. They are still made predominantly of water, but the additive now is primarily ethylene glycol or propylene glycol. Ethylene glycol and propylene glycol have the ability to lower the freezing point of water while at the same time raising its boiling point. This allows the vehicle to operate without freezing on very cold days and without boiling over on very hot days. Ethylene glycol is the most widely used automotive cooling-system antifreeze, although methanol, ethanol, isopropyl alcohol, and propylene glycol are also used.

In automotive windshield-washer fluids, an alcohol (e.g., methanol) is usually added to keep the mixture from freezing; it also acts as a solvent to help clean the glass. The brine used in some commercial refrigeration systems is an antifreeze mixture, and is ordinarily a water solution of calcium chloride or propylene glycol. In recent years, antifreezes designed for different applications have been developed and can often be distinguished by color. Green and orange antifreeze are engine coolants for vehicles and other machines, while pink antifreeze is often used to prevent freezing in pipes or plumbing systems.

A Wonderful, But Hazardous, Product

Antifreeze is hazardous. Ethylene glycol is a toxic chemical that requires proper handling, storage and disposal to avoid harming humans, animals and the environment. One of the properties of ethylene glycol is that it is a sweet-tasting liquid which makes it attractive to animals and small children. Unfortunately, it is very poisonous and each year thousands of dogs, cats and other animals die from lapping up pools of antifreeze that have accumulated on streets and in parking areas. There have been many cases of human poisonings and deaths over the years, predominantly among small children. The Centers for Diseases Control and Prevention provides a considerable amount of useful information about poisonings and poisoning prevention on its website at <http://www.cdc.gov/ncipc/factsheets/poisoning.htm>.

As a broad generalization, orange colored antifreeze is an indication that the antifreeze is manufactured for more extended uses, and has a longer service life than does green antifreeze. However, under no circumstances should green and orange antifreezes be mixed together because the enhanced properties of the orange antifreeze will be diminished.

Used antifreeze may also contain levels of dissolved heavy metals that can be toxic to animal life and may contaminate soils, water and sediments. If ethylene glycol biodegrades in large quantities, it can deplete the levels of dissolved oxygen in surface waters, killing aquatic organisms. Antifreeze picks up many contaminants from engine operation in addition to some heavy metals. It will also pick up toxins such as benzene. That is why antifreeze must be tested to determine whether or not it falls under the classification as being a hazardous waste.

There are some new antifreeze products on the market which purport to be environmentally safe and to be free of the common risks of antifreeze. While we note that the products are available, we did not search for nor encounter any independent analyses or verifications of the claims. If you are shopping for such products, we encourage you to research beyond the manufacturer statements to determine whether the claims have been independently verified.

Based upon our research, it appears that these “safe” alternatives are the ones manufactured with propylene glycol rather than ethylene glycol. Propylene glycol is not as immediately poisonous as ethylene glycol, nor does it have a sweet taste that makes it attractive to children and animals. However, propylene glycol is also hazardous even if it is less hazardous than ethylene glycol. As noted previously, all antifreeze will absorb contaminants while it is in the cooling system, and some of these contaminants, such as lead or chromium, are highly hazardous in their own right.

If an antifreeze spill or leak occurs, it should be cleaned up immediately. This can be done by spreading an absorbent material such as kitty litter or saw dust on top of the antifreeze. Once absorbed, it can be swept up and disposed of properly.

Disposing of Antifreeze

The best solution for disposing of antifreeze is full use or reuse. In many cases, individuals find containers with antifreeze still in them, and use it to top off cooling systems. If the antifreeze is still usable and in good condition, it can be used since antifreeze stores well for a long period of time. If the antifreeze cannot be used, give it to friends, family, neighbors or other potential users. When the antifreeze is in a container or a cooling system, it is not a likely pollutant or health hazard.

As we did our research for this discussion paper, we became concerned that there were a number of seemingly conflicting recommendations from equally credible experts and sources. While all agree that antifreeze should never be dumped on the ground or down storm drains, there were mixed recommendations about diluting and pouring old antifreeze (in very small quantities) down a sink drain. Some experts recommend against the practice entirely, while others held that small highly diluted quantities can be handled by municipal sewer treatment systems. However, even though antifreeze is biodegradable over time, this dilute and dispose opinion does not extend to household septic sewer systems. Home septic systems are bacteria driven systems that are confined to small areas and small amounts of waste. Antifreeze could harm the bacteria that process the wastes and impair the proper functioning of the septic system.

Because of the uncertainty, it is the strong recommendation of Colorado Recycles that you should check directly with the operators of the municipal sewer system for guidance and approval before considering pouring any amount of antifreeze, no matter how diluted it may be, down the sink drain. Colorado Recycles recommends that you assume that the wastewater treatment facility prohibits the disposal of antifreeze into its system until you have confirmed directly from the operator that such a disposal is permitted.

Under no circumstances should antifreeze ever be poured on the ground, in gutters, in storm drains, or in sanitary sewers. It is an almost absolute certainty that antifreeze will pollute the aquifers, streams and bodies of water that it comes in contact with. Nor should antifreeze be disposed of in the trash. Waste haulers will not accept it under most circumstances, and landfills operators will not allow liquid antifreeze to be deposited in the landfill because compacting will damage the container and cause the antifreeze to leak into the landfill, its leachate and into aquifers.

Antifreeze would be considered hazardous waste if it is mixed with a hazardous waste (such as gasoline, motor oil or various solvents). Antifreeze could be hazardous if it comes from an older vehicle where the antifreeze has been sitting for years and has picked up enough metals (primarily lead) to be characteristically hazardous for metals content. If the antifreeze is determined to be a hazardous waste, it must be managed in accordance with all hazardous waste notification, generation and transportation requirements, laws and regulations. If there is any question at all whether the antifreeze would be considered a hazardous waste, check directly with the Colorado Department of Public Health and Environment for a determination and guidance.

It should go without saying that antifreeze, whether new or used, should never be stored in open containers that might be easily accessed by children or animals. And, antifreeze should never be collected in containers that have been used to hold other substances (such as oil or gasoline) unless the container has been thoroughly cleaned so that no harmful substances can leach from the sides of the container into the antifreeze. All containers that contain antifreeze should be labeled so that individuals know that the product is potentially hazardous. And, containers that could be mistaken by children for food or drink products should never be used.

Leftover, unused, antifreeze should be stored in its original container because the container and lid were designed for safe storage. The container also has a label that will clearly indicate what the product is, its hazards and its proper handling.

Reclaiming/Recycling Used Antifreeze

About 12 percent of all antifreeze produced in the United States is recycled each year, and that amount is increasing.

There are essentially three strategies for recycling antifreeze that can be used: on-site recycling, mobile recycling services, and off-site recycling. Under most circumstances, these strategies are more applicable to larger users (i.e., fleet operations or vehicle repair and service operations) than to household or “do-it-yourself” activities.

On-site recycling occurs when the operator channels all the waste antifreeze into containers purchased or leased by the facility, and which are located on the premises, and are operated by the personnel of the facility.

Mobile-recycling services exist to make periodic visits to a facility and use specially designed or equipped vans or trucks to collect the waste antifreeze and recycle it while still on the site.

Off-site recycling services exist to collect and transport waste antifreeze to a specialized facility for the recycling of the antifreeze. Very often these services will supply the customer with replacement supplies of new or recycled antifreeze.

For the small user, household and “do-it-yourselfer”, disposing of used antifreeze at an established household hazardous waste facility or through a community household hazardous waste collection or roundup event is likely to be the most feasible alternative. Some automotive service operations will accept antifreeze for recycling from customers as part of the service provided. Some will accept small amounts from the public and may charge a small fee for the disposal.

Recycling used antifreeze makes sense for two reasons: first, it is cost-effective, and second, it saves resources. Ethylene glycol, the primary active ingredient in antifreeze, is produced from natural gas, which is a finite, non-renewable resource. For businesses that use a lot of antifreeze, like automobile repair shops, setting up an antifreeze recycling program can significantly reduce management costs and decrease the amount of new materials purchased. Using commonly available technology, these businesses can recycle antifreeze on site and recondition it with additives at a cost that is significantly lower than the cost of purchasing new antifreeze.

All antifreeze recycling involves two steps:

*Removing contaminants such as emulsified oils and heavy metals either by filtration, distillation, reverse osmosis, or ion exchange. Distillation and ion exchange systems restore the antifreeze to a high level of purity. Filtration may remove undissolved solid contaminants, but may not capture those that are dissolved. For that reason, mechanical filtration systems are often combined with chemical filtration to have a more complete impact on the contaminants.

*Restoring critical antifreeze properties with additives. Additives typically contain chemicals that raise and stabilize pH, inhibit rust and corrosion, reduce water scaling, and slow the breakdown of ethylene glycol.

Conventional antifreeze lasts only 2 or 3 years. The new extended-life coolants represent a major advancement over the more conventional coolants and greatly reduce the need to purchase new antifreeze. Different chemicals in the antifreeze made with extended-life coolants allow it to last 5 years or 150,000 miles. Heavy-duty, extended-life antifreeze lasts between 400,000 and 600,000 miles with the use of a one-time extender. Manufacturers expect that over the coming years, this technology will replace conventional antifreeze and become the industry standard.

The acceptance of recycled antifreeze for the purposes of warranty coverage may vary with manufacturer and type of vehicle. Some of the major manufacturers will recognize the use of recycled antifreeze as being

consistent with warranty requirements. However, the manufacturer and dealer should be contacted to make certain that the use of recycled antifreeze is approved.

Finding Recycling Resources

Many Colorado counties and municipalities sponsor household hazardous waste collection centers and roundup events. The Colorado Department of Public Health and Environment maintains a current list of scheduled roundup events on its website at <http://www.cdphe.state.co.us/hm/hmhom.asp>. To access this data base directly, please use the following link: Household Hazardous Waste Collection Events at <http://www.cdphe.state.co.us/hm/hhwcollect.asp>.

Colorado Recycles maintains a list of antifreeze recyclers as part of our Recycling Guide. Go to our website at www.colorado-recycles.org and click on Recycling Guide on the menu bar. Simply click on the word “Antifreeze” in the table, and the list of known recycling options by county will display. The recyclers are listed for each county that we have information that they serve.