

Switching to Water-Based
Cleaners in Repair and
Maintenance Parts Cleaning

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Water-Based Cleaners for Repair and Maintenance Parts Cleaning

Water-based cleaners and operation systems are a viable alternative to mineral spirits used in repair and maintenance parts cleaning operations. Depending on the type of water cleaning unit a shop decides to use, the labor for parts cleaning might be slightly higher or significantly lower. In contrast to mineral spirits cleaning units, the water cleaning units are heated to make the cleaner more effective. Because of the heating requirement, the cost of electricity is higher for the water cleaning process. Finally, because the oil and grease can be removed from the water cleaners, their useful lifetime is extended.

Can Mineral Spirits Be Used in Repair and Maintenance Cleaning in California?

Use of mineral spirits in repair and maintenance cleaning is still unregulated outside the South Coast Air Quality Management District (SCAQMD) and the Bay Area Air Quality Management District (BAAQMD). The SCAQMD passed a regulation that requires firms to use solvents that contain 50 grams per liter or less Volatile Organic Compound (VOC) content in repair and maintenance cleaning by January 1, 1999. The BAAQMD also passed a regulation that will go into effect on September 1, 1999 that will allow each repair and maintenance facility one cold cleaner with mineral spirits with a maximum solvent usage limit of 20 gallons per year. Any additional cleaners in a facility must use aqueous solution containing not more than 50 grams per liter or be permitted as an emission source.

Other air pollution control districts are also considering similar regulations to reduce or eliminate the use of mineral spirits. Check with your air quality management district representative if you have questions about use of mineral spirits.

What Are the Problems With the Mineral Spirits Used Today?

Mineral spirits are widely used in parts cleaners today. They are classified as VOCs that contribute to photochemical smog. The solvents also contain toxic components like benzene, toluene and xylene. Benzene is an established human carcinogen; toluene causes central nervous system damage; and xylene causes birth defects. The low vapor pressure blend contains a chemical called n-methyl pyrrolidone which is a reproductive and developmental toxin. These solvents pose a toxic risk to workers and the surrounding community. If the solvents are improperly handled, they can contaminate the site.

What Types of Businesses Use Mineral Spirits?

The businesses listed below use mineral spirits:

- auto repair shops
- trucking repair stations
- fleet servicing shops
- automotive dealers
- machine shops
- industrial maintenance operations
- government maintenance operations

What Are the Alternatives to Mineral Spirits?

The major alternatives to mineral spirits that can be used by businesses are water-based cleaners. These cleaners, if used properly, are safer for workers and the environment. Use of the water cleaners can also be less costly than use of mineral spirits.

Many different water-based cleaning systems are available to businesses for parts cleaning. Businesses should take the time to select the system that is optimal for them.

Are the Water-Based Cleaners Hazardous?

Aqueous cleaners may be hazardous because of pH (skin/eye irritation), chemical constituents (i.e., aquatic toxicity from surfactants) or elevated temperature. Even if the aqueous cleaner is label non-toxic and biodegradable you cannot assume that it is free of hazards. Read the MSDS sheet carefully. Also, spent cleaner can be hazardous because of the materials which became entrapped in the cleaning solution.

Spent aqueous cleaners in auto repair shops are usually classified as hazardous waste; unused cleaners could also be hazardous waste. The filters used in these systems may be hazardous waste. Hazardous waste cannot be poured in the sanitary sewer or the storm drain.

Water-Based Cleaning Formulations

The formulations can come in liquid or powder form. In some systems, which are described below, workers' hands will contact the cleaner during parts cleaning. In these cases, businesses should use neutral pH cleaning formulations so their skin will not be damaged. In other systems, where workers' hands do not contact the cleaner, a higher pH or a so-called alkaline cleaner can be used.

Cleaners that reject oil are the most practical. Physical oil removal methods like shop towels, filters or skimmers can extend the bath life, sometimes for months.

Some water-based cleaners contain solvents like glycol ethers, alcohol and terpenes. These solvents are VOCs and the cleaners they are contained in may exceed 50 gram per liter VOC content level. Other water-based cleaners contain parachlorobenzotrifluoride (PCBTF) which may have toxicity problems. All these solvents may damage workers' skin. Businesses should choose water-based cleaners without solvent additives.

Water-Based Cleaning Systems

A large variety of cleaning systems can be used with water-based cleaners. There are five major system types and these are described below.

Sink-On-A-Drum

This is the most common type of system. It is a sink mounted on a drum which contains the water-based cleaner. The sink has a drain and contains a faucet and flow brush for cleaning the parts. The water-



based cleaner is heated to about 105 degrees F. Many units have filters for removing particulates and oil; some units have oil skimmers. The units are made of metal or plastic. Because the workers' hands contact the cleaner, the formulations used with a sink-on-a-drum must have a neutral pH to prevent skin damage.



Enzyme Cleaning System

These systems are generally modified sink-on-a-drum units. They are made of plastic and the cleaner is



heated to about 105 degrees F. The system includes an enzyme cleaning formulation that supports the growth of microbes which are introduced either directly into the cleaning formulation or in a filter. Because there are microbes, the formulation is of neutral pH. The microbes biodegrade the oil. An advantage of this system is that the bath cleans itself and may last indefinitely without requiring changeout. The majority of debris, oil, grease, and dirt should be removed prior to placement in cleaning unit. Heavily soiled parts may overload the system.



Immersion Parts Washer

This type of unit consists of a sink with a false bottom. The bottom can be removed or opened so the parts can soak in the reservoir (above). Like the sink-on-a-drum, there is a faucet and flow brush for hand detailing the parts. The units are heated to about 105 degrees F and can contain filters and oil skimmers. Both metal and plastic units are available.



Spray Cabinet

In this type of system, the parts are placed inside a cabinet and the door is closed. High pressure spray from nozzles flushes the parts and cleans them just like a dishwasher. This is a more aggressive cleaning method than the other systems. The formulation can be neutral or alkaline since the workers' hands do not contact it. The formulation is generally heated to between 120 and 180 degrees F. These units are made of metal and often have filters or oil skimmers. Spray cabinets, because they are automated, reduce labor costs for cleaning.

(NOTE: never use mineral spirits in a spray cabinet as this could create a fire/explosive hazard.)



Ultrasonic System

This type of system relies on sound energy to accomplish cleaning. Through a process called cavitation, the energy causes bubbles to form; these bubbles explode in crevices and holes to clean the parts. These systems are most appropriate for cleaning complex parts like transmissions and carburetors. Higher pH cleaners can be used in these units since workers' hands do not contact the cleaner. Like the spray cabinet, these systems are automated so they reduce labor costs for cleaning. Similarly, you should avoid using mineral spirits in this kind of system.



System Selection

The matrix below provides guidance to firms in choosing a cleaning system. Because workers' hands come in contact with the cleaner in the sink-on-a-drum, enzyme and immersion units, they should use neutral pH cleaners. In the case of the automated systems, the spray cabinet and the ultrasonic system, either a neutral or alkaline pH cleaner can be used. The spray cabinet and ultrasonic systems are more expensive than the other units but the higher cost is justified if the shop uses a lot of labor for parts cleaning. In shops with multiple bays, a combination of sink-on-a-drum systems and one or two spray cabinets might be an optimal choice.

System	Cleaner	Applications/ Characteristics	Cost
Sink-on-a-drum	neutral	hand scrub	\$500-\$1,500
Enzyme system	neutral	hand scrub	\$1,000-\$1,500
Immersion unit	neutral	hand scrub/ soak parts	\$800-\$1,700
Spray cabinet	neutral/ alkaline	automated labor saving	\$2,000-\$6,000
Ultrasonic unit	neutral/ alkaline	automated, labor saving, transmissions, carburetors	\$3,000-\$12,000

Most shops will probably purchase systems. Vendors are offering equipment leasing and this may be more convenient in some cases. Some vendors will service the units regularly.

Enzyme systems use microbes to “eat” the oil and keep the bath clean. In other types of systems, vendors are offering filters and oil skimmers to keep the bath clean so it does not need to be changed out as often. In most cases, the water-based cleaning baths will last much longer before they require changeout than mineral spirits baths. As discussed below, it is important to handle the spent filters, filter sludge and spent cleaning baths properly (usually as hazardous waste).

Disposal

In a study performed in Southern California, it was found that about three-quarters of the spent water-based cleaning baths were classified as hazardous waste. None of the spent baths met discharge standards set by local Publicly Owned Treatment Works (POTWs) or sanitary sewerage districts.

Spent water-based cleaners should never be poured into the storm drain or sanitary sewer. The Los Angeles area POTWs allow spent aqueous cleaners to be sewered only after they are tested and written permission is obtained. Testing may cost between \$200 and \$400 and, as indicated earlier, the baths will not meet discharge levels, generally because they contain metals at levels that exceed the discharge limits.

If a company decides to treat the spent cleaning bath and it is hazardous waste, a tiered permit from Cal/EPA’s Department of Toxic Substances Control (DTSC) will be required. This type of permit will be necessary if the discharge is treated or if the spent cleaner is treated in an evaporator.

Filters or spent filter sludge may or may not be classified as hazardous waste. These materials often contain metals that exceed the threshold for hazardous waste. If they are hazardous waste, these filters cannot be disposed with used oil filters.

Oil generated from the use of oil skimmers in the parts cleaners can be combined with other used oil and picked up by an oil recycler.

Workers should never use brake cleaner, engine cleaner or other solvent cleaning products near or in a parts cleaner. These materials commonly contain solvents that will contaminate the spent water cleaning bath. This will make it impossible to discharge the bath after treatment or to ship the material off-site as non-hazardous waste.

The best strategy for companies is to ship the spent water cleaning baths and the filters or filter sludge off-site either as hazardous waste or non-hazardous waste. The waste can be tested and if it is hazardous waste, then the generator can use this knowledge for similar waste in the future. Because it is expensive to test, however, it may be more practical to dispose of the materials as hazardous waste. If the waste is hazardous, it must be stored properly and it must be transported by a licensed hazardous waste hauler.

Commonly Asked Questions

Q: What is the best system for my shop?

A: If your shop is small with only one mineral spirits parts cleaner, your workers devote a small amount of time to cleaning and you have light contamination, a sink-on-a-drum or an enzyme system will be best. If you need to soak parts, an immersion system would be suitable. If you have multiple parts cleaners and devote a lot of time to parts cleaning, a spray cabinet would help reduce the labor cost. If you clean many transmissions or carburetors, an ultrasonic cleaning unit might be a good choice. Enzyme systems minimize waste generation but they are suitable for only light or medium contamination. Spray cabinets and ultrasonic systems are aggressive cleaning systems.

Q: What kind of aqueous cleaner should I use?

A: Neutral pH cleaners should be used in equipment (like a sink-on-a-drum, enzyme or immersion unit) where workers' hands contact the cleaner. Higher pH alkaline cleaners should be used only in equipment (like spray cabinets and ultrasonic cleaning units) where there is no hand contact. The safest cleaners are those with no solvent additives.

Q: Where can I find out about the cleaning systems that are available?

A: Check your Yellow Pages under the automobile parts and supplies. Some vendors supply equipment, other vendors supply cleaning formulations and still others provide waste hauling services.

Q: Can I test systems in my shop?

A: Most vendors will offer their systems free of charge for a testing period ranging from a week to a month. Shops should take advantage of this trial period because it helps the workers select the system that is best for their shop.

Q: Should I use a filter and an oil skimmer?

A: Filters and oil skimmers will extend the bath life of the cleaner before changeout is required. Filters are effective for all types of units. Oil skimmers are often used with spray cabinets.

Q: How should I handle the spent water cleaning bath?

A: Spent cleaners should never be discharged to the sewer or storm drain. Most firms should ship the spent cleaner off-site either as hazardous or non-hazardous waste. Another option is to use a properly authorized service provider. If the spent bath is hazardous waste and treated on-site, a DTSC tiered permit from your local Certified Unified Program Agency (CUPA) will also be needed for the treatment process. Also, if an evaporator is used to treat the spent cleaner; an air district permit and a DTSC tiered permit from your CUPA will be needed, if the spent bath is hazardous waste.

Q: How should spent filters and filter sludge be handled?

A: Filters and filter sludge could be classified as hazardous waste. If they are hazardous waste, they must be stored properly and shipped off-site by a licensed hazardous waste hauler. If they are not hazardous waste, they may be handled in any convenient manner.

Q: Are water-based cleaning systems more expensive than mineral spirits cleaners?

A: Water-based cleaning systems are often less expensive than mineral spirits systems because they do not require changeout as often. Filters and oil skimmers can extend the bath life of the cleaners. Shops that devote a lot of time to cleaning can save on labor costs by using a spray cabinet or ultrasonic system. These systems are automated and the worker can devote time to other tasks while the cleaning is done.

For information on the air regulation, call your local air pollution control district.

For information on the hazardous waste regulations, call your local CUPA or your nearest Department of Toxic Substances Control (DTSC) Office.

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