



EPP Rapid Research

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EPP Rapid Research Safer Brake Cleaning Products Requested by Oregon EcoBiz

January 2010 (updated November 2011)

Request

Many auto repair shops use spray cleaners to clean hot brake and engine parts during diagnosis and repair. Cleaners with chlorinated solvents have a high flash point, which allows safe cleaning of hot surfaces, but are bad for the environment and human health. Are safer non-flammable cleaners available?

Key Findings

- Common spray brake cleaners contain highly toxic chemicals and probable carcinogens, such as dichloromethane (DCM, aka methylene chloride) and tetrachloroethylene (aka perchloroethylene or PERC).
- Large manufacturers and formulators of automotive cleaning products provide non-chlorinated solvent alternatives, but these are often similarly toxic and dangerous to human health.
- Many non-chlorinated brake cleaner formulations are highly flammable. Be sure to verify flammability characteristics of any new cleaner and re-evaluate job safety if products are changed to include flammable solvents.
- There are reports of adequate water-based cleaners, but PPRC could not verify the availability of any specific environmentally preferred product. Likely manufacturers were identified and should be contacted for information on current product alternatives.
- There are opportunities to replace aerosol can products with bulk products delivered from pressurized refillable canisters. These can both save cost of cleaning materials, but also reduce waste costs.

Background

Spray solvent mixtures are widely sold for cleaning and degreasing of automobile brake and engine parts. A wide variety of formulations are available, often under very similar product names. Common products contain tetrachloroethylene (also known as perchloroethylene, or PERC, CAS#: 127-18-4) and dichloromethane (DCM, also known as methylene chloride, CAS#: 75-09-2). Chlorinated compounds like these are often preferred for hot part cleaning because they are not flammable.

PERC and DCM are probable carcinogens and listed on California's [P65 list](#) of chemicals known to cause cancer or reproductive toxicity. They are also regulated by OSHA as carcinogens. A wide variety of other toxic effects are described in the Scorecard (sponsored by GoodGuide) pages for [PERC](#) and [DCM](#).

Alternatives to Chlorinated Brake Cleaners

Regulatory changes aimed at reducing chlorinated chemical use have led to increased use of non-chlorinated brake cleaning products. Some of these options were evaluated in a [2006 study](#) by the Toxics Use Reduction Institute (TURI) on PERC alternatives. The TURI study identified important performance characteristics of aerosol brake cleaners and considered cost, performance and safety of several alternatives. TURI found that

many of the non-chlorinated alternatives included toxic organic chemicals that were little better for human and environmental safety than PERC. Common ingredients include toluene and hexane which, in addition to their human health hazards, introduce the risk of flammable vapors. A water-based cleaner was identified as both safer and not flammable, but its technical performance was not evaluated.

The California Department of Toxic Substance Control investigated alternatives to chlorinated solvents in automotive cleaners in the early 2000s. Some of the health risks of common aerosol cleaner alternative solvents are described in [an excellent brochure](#) from the California Department of Public Health (a separate [brochure on n-hexane](#) is also available). Follow-up [work in San Francisco](#) (Department of Public Health) investigated trends in automotive cleaner use ca. 2005, looking at products available in retail shops and in use at automotive service facilities. Portable aqueous brake washers were in use, but described as “not as effective” as organic solvent-based cleaners. The report suggests some possible safer alternative products:

Internet research turned up three aerosol brake cleaners which are composed entirely of chemicals ranked as being less hazardous than most by the IRCH [from [Scorecard](#)] ranking system. Zep I.D.Clean, which was listed on the manufacturer's website as a degreaser and parts cleaner, contained only D-Limonene as an active ingredient. Two acetone based products included Gunk Ultra Low VOC Brake Cleaner and Wurth SCAQMD Brake and Parts Cleaner. Carbon Dioxide was listed as the only other ingredient on the MSDS.

The Institute for Research and Technical Assistance (IRTA) investigated brake cleaner replacements in 2005. A [presentation by Dr. Katy Wolf](#) (director of IRTA) mentions specific cleaners and performance tests and also covers general degreasers and carburetor cleaners. Both water-based cleaners and non-water-based cleaners were tested in California automobile service facilities. While not the best performers, water- and soy/acetone-based cleaners were generally judged adequate for brake cleaning purposes. Some product manufacturers participating in improved cleaner development are mentioned in the [project report](#).

Denver Pollution Partners have a two-page [guide to brake cleaning products](#). The guide recommends refillable canisters and offers recommendations for several brake cleaning products they consider as improvements over conventional chlorinated-solvent cleaning products.

Other Considerations

Some environmental and cost benefits may be obtained by alternative cleaning methods. Many brake cleaners are available in bulk and can be applied using refillable containers rather than aerosol cans. These containers are often charged using local facility compressed air. Cleaning of some parts may also be accomplished in spray or immersion cabinets, e.g., see the U.S. EPA Region 9 [Aqueous Parts Cleaning brochure](#).

Conclusions

In an effort to avoid use of chlorinated solvents, brake cleaner manufacturers have developed products with new formulations. Many of the non-chlorinated cleaners contain organic solvents that are very hazardous to human health and the environment. In some case, the solvents are flammable mixtures, which may require changes in some automotive cleaning procedures. Be sure to reconsider job safety aspects when changing away from chlorinated solvent cleaning products to flammable products.

Several recent sources report that water-based cleaners are available, though their performance is reportedly only adequate. These products could be used for routine cleaning, while reserving the more dangerous organic-solvent products for the most challenging cleaning problems.

When considering a new product, contact the manufacturer for a current MSDS. Look for any data indicating significant human health hazards or alerts to regulatory coverage of product ingredients. PPRC could not evaluate specific products, but possible manufacturers of safer products were identified for further research.

Additional Information

- The US HHS Household Products Database lists a wide variety of brake cleaners. This site provides a direct link to the health and safety information and is a good place to look for data on commercial products: <http://householdproducts.nlm.nih.gov/cgi-bin/household/prodtree?prodcat=Auto+Products&purpose=Brakes&type=cleaner>
- Some of the non-chlorinated formulations mentioned above use acetone; this makes sense as IRTA found acetone a suitable replacement for PERC in vapor-degreasing. A report describing these products is at: <http://www.dtsc.ca.gov/PollutionPrevention/upload/Alternatives-to-PERC.pdf>
- The NYC Bureau of Waste Prevention offers a few options for equipment and cleaner alternatives: http://www.nyc.gov/html/nycwasteless/html/resources/prod_serv_auto_brakecleaner.shtml
- Several companies were identified in IRTA research as possible sources of safer solvents or cleaning formulations (PPRC has not evaluated the companies nor their products):
 - Inland Technology, Inc.: <http://www.inlandtech.com/forms/100/finding-a-solvent-substitute>
 - Kyzen Corporation: <http://www.kyzen.com/Products.html>
- Some good information on working with flammable solvents can be found at:
 - <http://solvents.americanchemistry.com/Health-Safety/Handling-Flammable-Products>
 - <http://www.esig.org/en/library/publications/best-practice-guides>
 - [http://www.esig.org/uploads/ModuleXtender/Publications/86/Best%20Practice%20Guidelines%204%20\(EN\).pdf](http://www.esig.org/uploads/ModuleXtender/Publications/86/Best%20Practice%20Guidelines%204%20(EN).pdf)
- The San Francisco Department of Public Health has Green Resource Guide for Auto Repair at: <http://www.sfdph.org/dph/EH/Green/AutoRepair.asp>