

This reference sheet provides a list of suppliers that offer stripping and cleaning chemicals marketed as alternatives to chlorinated solvents.

## Safer cleaning and stripping chemicals for coatings and polymers

These stripping and cleaning chemicals are marketed as alternatives to chlorinated solvents—especially methylene chloride. In some cases, these solvents require more time or stronger physical action for cleaning surfaces. All have lower rates of evaporation and drying than the chlorinated solvents they replace.

### Safety Information

Most alternatives are safer than chlorinated solvents because their slow evaporation rates result in low worker exposure. Consider the following safety information when selecting an alternative chemical.

### Exposure limit

Exposure limit estimates, based on eight-hour exposure, given in the following table are made by the Occupational Safety and Health Administration (OSHA), the American Congress of Governmental Industrial Hygienists (ACGIH) or the product manufacturer. OSHA establishes the legally enforceable standard. But, the ACGIH standard is generally recognized as the prudent industrial standard in the absence of an OSHA limit or when new information suggests an established OSHA limit is too lenient.

### Vapor hazard ratio

The vapor hazard ratio is the likelihood that an exposure limit will be exceeded with normal use. It does not apply if the solvent will be sprayed or atomized. It is estimated by dividing the vapor pressure of a product, the tendency of a solvent to get into the air, by the exposure limit, its risk. The higher the number, the greater the chance the exposure limit will be exceeded due to solvent evaporation. This is a comparison of relative risks, this scale does not indicate a chemical is unsafe.

### Hazard rating

A hazard rating for health, flammability and reactivity is assigned to pure chemicals by the National Fire Protection Association (NFPA). A similar rating can be assigned to products by their manufacturer using the National Paint and

Coatings Association (NPCA) Hazardous Materials Information Systems (HMIS) criteria. Because the HMIS is more subjective, the table on the following pages gives HMIS ratings only in the absence of NFPA ratings.

### Alternative Chemicals

The cleaning claims in this reference list are made primarily by the manufacturer. Some claims are augmented by reports from the U.S. Environmental Protection Agency (EPA) and third parties. MnTAP maintains the following list of alternative stripping and cleaning chemicals for coatings and polymers solely as a service to Minnesota companies. This is not a complete list of available products and does not represent an endorsement by MnTAP. MnTAP, by providing the list, does not represent that the products do or do not ensure compliance with environmental and safety laws in any specific application.

### Table Key

- <sup>1</sup> Vapor pressure measured at approximately 20° C.
  - <sup>2</sup> Vapor hazard ratio is calculated by dividing the vapor pressure by 760 millimeters mercury (mmHg), multiplying by one million to estimate the equilibrium vapor concentration in parts per million (ppm), and then dividing by the exposure limit in ppm.
  - <sup>3</sup> Estimated by the manufacturer, based on the HMIS criteria.
  - <sup>4</sup> Based on status as a suspected carcinogen.
- NA: not established.

### For More Information

MnTAP provides technical assistance to help Minnesota businesses implement industry-tailored solutions that prevent pollution at the source, maximize efficient use of resources, and reduce energy use and cost. For more information and resources, visit <[www.mntap.umn.edu](http://www.mntap.umn.edu)> or call MnTAP at 612.624.1300 or 800.247.0015.

Supplier	Products/Residues Removed	Flash Point	Exposure Limit	Vapor Pressure (mmHg) <sup>1</sup>	Vapor Hazard Ratio <sup>2</sup>	Hazard Rating
Chemetall Americas New Providence, NJ 800.526.4473 <www.chemetallamericas.com>	<b>Eurostrip</b> Two part alkaline stripper. Removes: acrylic, epoxy, polyester, powder paint and urethane.	>200° F	not established	not established	NA	NA
	<b>Guardostrip acidic stripper</b> Removes: epoxy, lacquer, melamine/ acrylic and vinyl.	>200° F	not established	NA	NA	NA
Chemical Marketing Corp. Blaine, MN 866.388.6827	<b>Enviro Strip 1 N-methyl-2-pyrrolidone (NMP) Dibasic esters (DBE) blend</b>	>195° F	100 ppm (International Specialty Products [ISP])	0.29	38	2:1:0
	<b>Enviro Strip 3 NMP blend</b> Both remove: acrylic, epoxy, polyester and urethane.	>180° F	100 ppm (ISP)	<1	20	2:1:0
Cook Composites and Polymers Kansas City, MO 800.821.3590 <www.ccponline.com>	<b>DBE and NMP solvent blends.</b> Removes: epoxy, phenolic, polybutadiene, polyester, urethane and vinyl ester.	>200° F	1.5 ppm (DuPont) 100 ppm (ISP)	0.2	175	2:1:0 <sup>3</sup>
	<b>Petroleum solvent blends.</b> Removes: adhesive, epoxy, EVA resin, grease, ink, oil, paint and urethane.	142° F	50 ppm	<1	NA	2:2:0 <sup>3</sup>
	<b>Replacetone and aqueous resin emulsifiers</b> Removes: epoxy, paint and polyester. Waterbased.	>220° F	not established	22	NA	0:0:0 <sup>3</sup>
	<b>Thermaclean products</b> Aqueous cleaners. Removes: alkyd, grease, oil, polyester and wax.	200° F	not established	NA	NA	1:1:0 <sup>3</sup>
Dynaloy, Inc. Indianapolis, IN 800.669.5709 <www.dynaloy.com>	<b>Dynasolve</b> , Family of 14 products made from combinations of glycol ethers, NMP and petroleum solvents. Removes: acrylic resin, adhesive, cured silicone, cyanoacrylate, epoxy, hot melt, paint, polyimide and urethane.	varies	varies with each, typically 100 ppm	<2 varies	NA	NA
Gaylord Chemical Corp. Slidell, LA 985.649.5464 <www.gaylordchemical.com>	<b>Dimethyl sulfoxide (DMSO)</b> Removes: acrylic, epoxy, paint, photo resist and polyurethane.	192° F	100 ppm (DuPont)	0.46	0	1:1:0
	Note: If placed in a reducing environment, like a wastewater stream, DMSO will create strong odors even at low concentrations. Odors can be neutralized by oxidizing releases with bleach, peroxide or ultra violet (UV) light.					

Supplier	Products/Residues Removed	Flash Point	Exposure Limit	Vapor Pressure (mmHg) <sup>1</sup>	Vapor Hazard Ratio <sup>2</sup>	Hazard Rating
Henkel Corporation Aerospace Bay Point, CA 925.458.8000 <www.aerospace.henkel.com>	<b>Turco 6776LO</b> Aqueous solution containing 5% formic acid.	none	5 ppm (formic acid/OSHA)	<2	26	NA
	<b>Turco 6813</b> Aqueous solution containing 2% ammonia. Both remove: alkyd paint, cured epoxy, enamel and polyurethane.	none	25 ppm (ammonia/OSHA)	<2	2.1	NA
Inland Technology, Inc. Tacoma, WA 800.552.3100 <www.inlandtech.com>	Formulated solvents: <b>Citrex</b> Removes: carbon grease and paint.	144° F	not established	<2	NA	1:2:0
International Specialty Products (ISP) Wayne, NJ 800.622.4423 <www.ispcorp.com>	<b>NMP</b> Formulated products: Ship Shape, Isoprep and GAF Solver. Removes: ABS, epoxy, ink, lacquer, polyamide, polycarbonate, polyester, polyurethane, polyvinyl chloride (PVC) and varnish.	200° F	100 ppm (ISP)	0.29	3.9	2:1:0
Invista Wilmington, DE 800.231.0998 <www.dbe.invista.com>  Distributors: Ashland Specialty Chemical 859.357.7777 <www.ashland.com>  Univar USA Inc. 425.889.3400 <www.univarusa.com>	<b>DBE</b> Removes: acrylic, ink, paint, polyester, polystyrene and polyurethane.	212° F	1.5 ppm (DuPont)	0.2	175	1:1:0
LyondellBasell Industries Houston, TX 713.309.7200 <www.lyondellbasell.com>	<b>NMP</b> Removes: ABS, epoxy, ink, lacquer, polyamide, polycarbonate, polyester, polyurethane, PVC and varnish.	200° F	100 ppm (ISP)	0.29	3.9	2:1:0
	Propylene carbonate Removes: alkyd paint, epoxy resin and urethane resin.	226° F	not established	0.03	NA	1:1:0

Supplier	Products/Residues Removed	Flash Point	Exposure Limit	Vapor Pressure (mmHg) <sup>1</sup>	Vapor Hazard Ratio <sup>2</sup>	Hazard Rating
PURAC America, Inc. Lincolnshire, IL 847.634.6330 <www.purac.com>	<b>Butyl lactate</b>	174° F	4.1 ppm (PURAC)	1.7	545	2:2:0 <sup>3</sup>
	<b>Ethyl lactate</b>	131° F	3.3 ppm	1.5	598	1:1:0
	<b>Methyl lactate</b> All remove: epoxy, grease, ink, isocyanate, mold release, oil, paint, polyamide resin, rosin flux and urethane.	136° F	not established	2.6	NA	1:2:0 <sup>3</sup>
Shell Chemical Company Houston, TX 713.241.6161 <www.shell.com/chemicals>	<b>Diacetone alcohol</b> Removes: acrylic resin, epoxy resin and fiberglass reinforced plastic.	133° F	50 ppm (OSHA)	0.95	26	2:2:0

### Chlorinated Solvent for Comparison

Supplier	Products/Residues Removed	Flash Point	Exposure Limit	Vapor Pressure (mmHg) <sup>1</sup>	Vapor Hazard Ratio <sup>2</sup>	Hazard Rating
Various	<b>Methylene chloride</b> (DiChloroMethane) Removes: most coatings and resins.	none	25 ppm (OSHA)	380	20,000 <sup>4</sup>	2:1:0



### For More Information

MnTAP has a variety of technical assistance services available to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution, increase energy efficiency, and reduce costs. Our information resources are available online at <mntap.umn.edu>. Please call MnTAP at 612.624.1300 or 800.247.0015 for personal assistance.