

Chlorinated Solvents



What is a chlorinated solvent?

- Also known as chlorinated hydrocarbons.
- Organic compounds that contain at least one covalently-bonded chlorine atom.

Examples and Uses

- Methylene Chloride (dichloromethane)
Paint strippers, brake/carb. cleaners
- Chloroform (trichloromethane)
Production of Teflon, laboratory solvent
- 1,1,1-Trichloroethane (methyl chloroform)
Solvents, degreasers – phased out



Examples and Uses

- Trichloroethylene
Solvents, degreasers
- Perchloroethylene (tetrachloroethylene)
Dry cleaning, solvents, degreasers
- Vinyl Chloride
Production of polyvinyl chloride (PVC)



Examples and Uses

- DDT, Aldrin, Chlordane, 2,4-D, etc.

Pesticides

- 1,4-Dichlorobenzene

Mothballs

- Chlorinated biphenyls (i.e., PCBs)

Dielectric fluids



Properties

- Generally Non-flammable

Good solvent properties and non-flammable nature made them the best choice to replace gasoline, kerosene, acetone, etc. as industrial solvents.

- Generally insoluble in water

Health Effects

- All can cause chloracne or other rashes and skin irritation due de-fatting of the skin.
- Most have an anesthetic or narcotic effect (chloroform and TCE).
- Systemic effects

Carbon tetrachloride – liver, kidney, CNS

Perchloroethylene – liver, CNS

Methylene Chloride – CNS

Trichloroethylene – liver, kidney



Carcinogen Status

□ **Carbon Tetrachloride**

EPA – Probable Human Carcinogen

IARC – Possibly carcinogenic to humans

NIOSH – Potential occupational carcinogen

NTP – Reasonably anticipated human carcinogen

TLV – Suspected human carcinogen

Carcinogen Status

□ **Perchloroethylene**

IARC – Probably carcinogenic to humans

NIOSH – Potential occupational carcinogen

NTP – Reasonably anticipated human carcinogen

TLV – Confirmed animal carcinogen,
unknown relevance to humans

Carcinogen Status

□ Methylene Chloride

EPA – Probable human carcinogen

IARC – Possibly carcinogenic to humans

NIOSH – Potential occupational carcinogen

NTP – Reasonably anticipated human carcinogen

OSHA – Carcinogen defined with no further categorization

TLV – Confirmed animal carcinogen, unknown relevance to humans

Carcinogen Status

□ Trichloroethylene

IARC – Probably carcinogenic to humans

NIOSH – Potential occupational carcinogen

NTP – Reasonably anticipated human carcinogen

TLV – Confirmed animal carcinogen,
unknown relevance to humans



Environmental Impact

- ❑ Many chlorinated solvents are considered persistent environmental pollutants.
- ❑ Among the most common ground water pollutants.
- ❑ Biomagnification through the food chain (DDT, PCBs).

Product Examples

- NAPA Brake and Electric Motor Cleaner
Valvoline

| | |
|--------------------|------|
| Perchloroethylene | 89% |
| Methylene Chloride | 8% |
| Carbon Dioxide | 1-8% |

Flashpoint = N/A – Non-flammable

Product Examples

- Brakleen Brake Parts Cleaner
CRC

Tetrachloroethylene > 95%

Carbon Dioxide < 5%

Flashpoint = N/A – Non-flammable

Comparison

| | OSHA PEL | ACGIH TLV | NIOSH REL |
|-----------------------|-------------|-----------|-----------|
| Methylene Chloride | 25 | 50 | LFC |
| Perchloroethylene | 100 | 25 | LFC |

Carcinogen status – Match exactly except OSHA

Product Examples

□ Non-Chlorinated Brake Cleaner Radiator Specialty

| | |
|-------------|--------|
| 2-propanone | 40-70% |
| Heptane | 10-30% |
| Methanol | 10-30% |
| Propane | 7-13% |

Flashpoint = -10°F

Exposure Level Comparison

| | OSHA PEL | ACGIH TLV | NIOSH REL |
|--------------------------|----------|-----------|-----------|
| 2-propanone (acetone) | 1000 | 500 | 250 |
| Heptane | 500 | 400 | 85 |
| Methanol | 200 | 200 | 200 |
| Propane | 1000 | 1000 | 1000 |

Carcinogen status - None

Chlorinated Solvents – What's Next?

- Don't rush out to rid your plant of all chlorinated solvents – you probably couldn't run the plant without them.
- Continue to rid your plant of methylene chloride. While it's no worse than many of the others, OSHA is watching. If you have MC at your site, you are likely not in compliance with the OSHA standard.



Chlorinated Solvents – What's Next?

- Use the MSDS Database to search for products with high percentages of chlorinated solvents – start with MC, TCE and Perc.
- Are they still on site, how are they used, how much exposure, how much time?
- Identify tasks with possible elevated exposure.
- Possible exposure monitoring.



Chlorinated Solvents – What's Next

- ❑ Be aware of chlorinated solvents in new products submitted for approval.
- ❑ Investigate replacement products that contain no chlorinated solvents or less harmful versions.
- ❑ Continue to be mindful of flammability.
- ❑ Investigate more natural products (citrus, etc.)

Questions

