Vulcan CHEMICALS
A Division of Vulcan Materials Company

MATERIAL SAFETY DATA SHEET

24 Hour Emergency Phone 800-835-2030

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Methylene Chloride, Special Grade, Aerosol Grade and Degreasing Grade

CHEMICAL NAME
Dichloromethane

SYNONYMS
Methylene Chloride

MANUFACTURER
Vulcan Chemicals, P O Box 385015, Birmingham, AL 35238-5015

SECTION 2 COMPOSITION INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS NUMBER	% RANGE
* Dichloromethane	75-09-2	>98
* Propylene oxide	75-56-9	

* Denotes chemical subject to reporting requirements of Section 313 of Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA) and 40 CFR Part 372

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

A dense, nonflammable, colorless, clear liquid with a mildly sweet odor.
WARNING! Harmful if inhaled. May cause skin and eye irritation.
May cause liver damage.
POSSIBLE CANCER HAZARD: May cause cancer.

POTENTIAL HEALTH EFFECTS

INHALATION

Breathing high concentrations may be harmful. May cause central nervous system depression with symptoms including nausea, headache, dizziness, fatigue, drowsiness, or unconsciousness. Breathing excessively high concentrations of this material, for example, in an enclosed space or by intentionally breathing it, can have a direct sensitizing effect on the heart, which may lead to irregular heartbeats that may cause death.

SKIN

May cause skin irritation with redness, an itching or burning feeling, and swelling of the skin. Effects may become more serious with repeated or prolonged contact. Long-term contact can cause the skin to dry and crack or develop a rash. Skin contact may cause harmful effects in other parts of the body.

EYE

May cause eye irritation with tearing, redness, or a stinging or burning feeling. May cause swelling of the eyes with blurred vision. Effects may become more serious with repeated or prolonged contact.

INGESTION

Swallowing this material may be harmful. This material can get into the lungs during swallowing or vomiting. Small amounts in the lungs may cause lung damage, possibly leading to death.

SIGNS AND SYMPTOMS OF EXPOSURE

Depending upon level and duration of exposure, other possible signs and symptoms from breathing, swallowing, and/or entry of this material through the skin include: irritation of the nose, throat, airways, and lungs with cough, stomach or intestinal upset with pain, nausea, vomiting, and/or diarrhea, central nervous system depression with nausea, headache, dizziness, fatigue, drowsiness or unconsciousness, anesthesia, confusion,irregular heartbeats (which can lead to loss of consciousness and death) and carboxyhemoglobinemia (blood abnormality which may lead to unconsciousness)

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Preexisting disorders of the following organs or systems, which may be aggravated by exposure to this material include: respiratory system (including asthma and other breathing disorders), nervous system, liver, kidney, and blood-forming system.

INTERACTIONS WITH OTHER CHEMICALS WHICH ENHANCE TOXICITY

Consumption of alcoholic beverages may increase potential for development of toxic effects resulting from exposure to this product.

Carboxyhemoglobin levels can be elevated in persons exposed to methylene chloride and can cause a substantial stress on the cardiovascular system. This elevation can be additive to the increase caused by smoking and other carbon monoxide sources.

EFFECTS FOLLOWING REPEATED EXPOSURE

This material may cause the following effects depending upon level and duration of exposure: nervous system effects, liver damage. Observations in animal studies include effects on kidneys and blood. The relevance of these observations to humans is not clear at this time.

CARCINOGENICITY

Methylene chloride and propylene oxide are listed on the IARC and NTP carcinogen lists. See Section 11 for additional information.

MUTAGENICITY

This material is a mammalian somatic cell mutagen.

See Section 11 for additional toxicological information.

SECTION 4 FIRST AID MEASURES

INHALATION

If symptoms develop, remove individual to fresh air and get medical attention. If breathing is difficult, give oxygen. If breathing stops, give artificial respiration.

SKIN

Wash exposed skin well with plenty of soap and water. Remove contaminated clothing and shoes. Wash clothing and thoroughly clean shoes before reuse. If symptoms develop and continue, get medical attention.

EYES

Hold the eyelids apart and flush the eye gently with a large amount of water for at least 15 minutes. Get medical attention if irritation persists or if there are any effects on vision.

INGESTION

Do not induce vomiting unless directed to do so by medical personnel -- this material is an aspiration hazard. Get immediate medical attention. Never give anything by mouth to an unconscious person.

NOTES TO PHYSICIAN

This material sensitizes the heart to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material.

This material is an aspiration hazard. Risk of aspiration must be weighed against possible toxicity of the material (see 'ingestion') when determining whether to induce emesis or to perform gastric lavage.

SECTION 5 FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT
None (TCC)

AUTOIGNITION TEMPERATURE
556°C (1032°F)

FLAMMABLE LIMITS IN AIR (PERCENT BY VOLUME)
12 - 19% (Vol.) @ 100°C

HAZARDOUS COMBUSTION PRODUCTS
Hydrogen chloride, phosgene, chlorine.

EXTINGUISHING MEDIA
Water spray, dry chemical, foam, carbon dioxide.

FIRE FIGHTING INSTRUCTIONS
Concentrated vapors can be ignited by high intensity energy source. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Use water spray to keep fire-exposed containers cool. Extinguish fire using an agent suitable for surrounding fire.

Firefighters should wear full protective clothing and use positive pressure, full facepiece SCBA.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Evacuate the area, ventilate, and avoid breathing vapors. Dike area to contain spill. If spill occurs indoors, turn off heating and/or air conditioning systems to prevent vapors from contaminating entire building. Clean up area (wear protective equipment - refer to Section 8) by mopping or with absorbent material and transfer to closed containers for disposal. Avoid contamination of ground and surface waters. Do not flush to sewer. All spills or leaks of this material must be handled and disposed of in accordance with local, state and Federal regulations.

Notify National Response Center (800/424-8802), and any state and local agencies as applicable, of uncontained releases to the environment in excess of the EPA Reportable Quantity (RQ). See Section 15 for regulatory information.

For all transportation accidents, call CHEMTREC at 800/424-9300.

SECTION 7 HANDLING AND STORAGE

HANDLING
Avoid contact with eyes, skin or clothing. Avoid breathing vapors. Do not taste or swallow. Do not eat, drink, or smoke in work area. Wash hands prior to eating, drinking, or using restroom. Any clothing or shoes which become contaminated with methylene chloride should be removed immediately and thoroughly laundered before wearing again.

Carefully monitor handling, use and storage to avoid spills and leaks. Follow protective controls set forth in Section 8 when handling this product. Do not use in poorly ventilated or confined spaces. Vapors are heavier than air and will collect in low areas. Do not enter confined spaces such as tanks or pits without following proper entry procedures as required by 29 CFR 1910.146.

STORAGE

STORAGE CONDITIONS
Store in labeled and sealed containers in a cool, dry, well-ventilated area out of sunlight. Keep containers tightly closed when not in use. Do not store in open, unlabeled or mislabeled containers. Do not remove or deface label. Prevent water or moist air from entering storage tanks or containers.

Do not reuse drum without recycling or reconditioning in accordance with any applicable Federal, state or local laws. Do not use cutting or welding torches, open flames, or electric arcs on empty or full containers.

SHELF LIFE LIMITATIONS

Methylene chloride has an indefinite shelf life when stored under recommended conditions.

INCOMPATIBLE MATERIALS FOR STORAGE OR TRANSPORT

Aluminum equipment should not be used for storage and/or transfer. Contact with aluminum parts in a pressurizable fluid system may cause violent reactions. Consult equipment supplier for further information.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

ENGINEERING CONTROLS

VENTILATION

Do not use in poorly ventilated or confined spaces. Open doors and/or windows. Use ventilation to maintain exposure levels below 25 ppm time-weighted average (TWA). Monitoring should be performed as required by 29 CFR 1910.1052 to determine exposure level(s). See Exposure Guidelines below.

PERSONAL PROTECTIVE EQUIPMENT

EYE AND FACE PROTECTION

Wear safety glasses. Contact lenses should not be worn. Facial protection, such as chemical goggles and face shields should be worn where splashing is a possible.

SKIN PROTECTION

Wear solvent-resistant gloves such as Viton or equivalent. Solvent-resistant boots, aprons and full face protection should be worn where splashing is a possible.

RESPIRATORY PROTECTION

Where vapor concentration exceeds or is likely to exceed 25 ppm, a NIOSH-approved, continuous flow supplied air-respirator, hood or helmet is acceptable. A NIOSH approved self-contained breathing apparatus or supplied-air respirator, with full face piece, is required for vapor concentrations above 625 ppm. A NIOSH approved self-contained positive pressure breathing apparatus, with full-face piece, is required for spills and/or emergencies. The minimum requirements for respiratory protection for methylene chloride appear in 29 CFR 1910.1052 (f).

GENERAL

Safety shower and eyewash station should be available. Protective equipment and clothing should be selected, used, and maintained according to applicable standards and regulations. For further information, contact the clothing or equipment manufacturer.

EXPOSURE GUIDELINES

The OSHA Occupational Health Standard for methylene chloride (29 CFR Part 1910.1052) became effective April 10, 1997. In addition to exposure limits, the standard also establishes an action level which triggers the requirement for additional compliance activities including medical surveillance.

Methylene Chloride:

ACGIH: 50 ppm TWA (8 hr)
(Based on CNS and anoxia effects)

OSHA: 25 ppm TWA (8 hr)
125 ppm STEL
12.5 ppm (8 hr TWA) Action Level

Propylene Oxide:

ACGIH: 2 ppm TWA (8 hr.) **OSHA:** 100 ppm TWA (8 hr.)

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH

2300 ppm

ODOR THRESHOLD

Odor threshold approximately 200-300 ppm; causes olfactory fatigue (temporary loss of odor perception for this product).

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

CHEMICAL FORMULA
CH_2Cl_2

MOLECULAR WEIGHT
84.94

APPEARANCE AND ODOR
Colorless, clear liquid; mildly sweet odor

SPECIFIC GRAVITY
1.31 @ 25/25°C

VAPOR PRESSURE
350 mm Hg @ 20°C

VOLATILES, PERCENT BY VOLUME
100

BOILING POINT
40.1°C. (104°F.)

VAPOR DENSITY
2.9

EVAPORATION RATE
(ether = 1): 0.7

SOLUBILITY IN WATER
1.32 gm/100 gm @ 25°C

SECTION 10 STABILITY AND REACTIVITY

CHEMICAL STABILITY
Stable

CONDITIONS TO AVOID
Avoid contact with open flame, electric arcs, or other hot surfaces which can cause thermal decomposition.

INCOMPATIBILITY WITH OTHER MATERIALS
Strong alkalies, oxygen, nitrogen peroxide, sodium, potassium, and other oxidizers and reactive metals.

HAZARDOUS DECOMPOSITION PRODUCTS
Hydrogen chloride, phosgene, chlorine.

HAZARDOUS POLYMERIZATION
Will not occur

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

ANIMAL TOXICOLOGY

Inhalation LC_{50}:	14,400 ppm - 7 hours (mouse)
Dermal LD_{50}:	Not determined
Oral LD_{50}:	2,100 mg/kg (rats)

Case studies of methylene chloride poisonings during industrial operations have demonstrated that inhalation exposure can be fatal to humans. Death appears be caused by narcosis and respiratory depression due to the acute effects of high concentration methylene chloride on the central nervous system. Concentrations greater than 50,000 ppm are regarded as immediately threatening to life. Studies indicate that methylene chloride is metabolized to carbon monoxide. Consequently, elevations in carboxyhemoglobin as high as 50% have been reported, and levels may continue to rise for several hours after exposure has ceased. Data in experimental animals also suggest there is a narrow margin between concentrations causing anesthesia and death.

Propylene oxide has been reported to cause an allergic skin reaction in sensitive individuals, although the evidence is limited.

EFFECTS FOLLOWING REPEATED EXPOSURE

A number of human and animal inhalation studies demonstrate that methylene chloride can produce nervous system effects at below lethal inhalation doses. Experimental and occupational studies report alterations in behavioral performance and various psychomotor tasks following exposure to methylene chloride. Other neurotoxic effects noted in occupational studies included dizziness, headaches, nausea, memory loss, paresthesia, tingling in hands and feet, and loss of consciousness. Dementia and gait impairment were reported in one case in humans following exposure to methylene chloride (500-1,000 ppm) for 3 years.

Findings from animal studies include evidence of liver and kidney damage. In rats, cats, dogs, and guinea pigs, oral or inhalation exposure to methylene chloride has resulted in liver necrosis, fatty changes and elevated plasma enzymes. Renal tubular vacuolization and/or nonspecific renal tubular degenerative and regenerative change were observed in dogs, rats, and/or mice following chronic inhalation exposures.

Exposure to methylene chloride also has been associated with changes in the blood. In occupationally exposed women (but not men), methylene chloride at concentrations up to 475 ppm was associated with increases in the red cell count, hemoglobin, and hematocrit. Similar findings were observed in rodents exposed orally for 3 months, but not in rodents chronically exposed by inhalation at concentrations up to 3,500 ppm. In mice and rats, methylene chloride in drinking water for 2 years produced an increase in the number of leukocytes, red blood cells, hematocrit and hemoglobin levels.

CARCINOGENICITY

Several epidemiological studies have detected no excess risk of death from malignant neoplasms in workers exposed to methylene chloride at levels up to 475 ppm. In 1999, the US Agency for Toxicological Studies and Disease Registry reviewed all of these studies and concluded: “Epidemiological studies of human occupational cohorts show no increase in cancer of the lung, liver, or any other organs from occupational inhalation exposure.”

Animals exposed via inhalation have demonstrated that methylene chloride can increase the incidence of naturally-occurring tumors. In mice and rats, inhalation of very high levels of methylene chloride increases the incidence of liver and lung cancer and benign mammary gland tumors. Rats also had an increased incidence of salivary gland sarcoma and leukemias. The incidence of liver tumors that appeared in mice after exposure to concentrations of 2,000 ppm or greater was also higher than controls.

Propylene oxide has caused increased incidence of nasal tumors in rats exposed by inhalation, forestomach tumors in rats exposed by gavage (forced-fed in oil) and injection site tumors when injected under the skin of rats.

The International Agency for Research on Cancer (IARC) has concluded that, with respect to both methylene chloride and propylene oxide, there is sufficient evidence of the carcinogenicity to experimental animals and inadequate evidence for carcinogenicity to humans (Group 2B: Possibly carcinogenic to humans). NTP has classified methylene chloride and propylene oxide as substances reasonably anticipated to be human carcinogens. ACGIH classifies methylene chloride and propylene oxide as an A3 - “Confirmed Animal Carcinogen with Unknown Relevance to Humans.” Recent evidence suggests that polymorphisms in genes that metabolize methylene chloride may be associated with an increased risk of cancer in humans.

GENOTOXICITY

Methylene chloride has been evaluated for its potential to induce genotoxic effects in both *in vivo* and *in vitro* systems in mammalian and bacterial cells with mixed results. Based on this evidence, methylene chloride may be considered to be a weak mutagen in mammalian systems.

Propylene oxide is mutagenic *in vitro* and animal data indicate that it can produce somatic cell mutations *in vivo*, particularly in tissues at the site of contact. Propylene oxide is able to react directly with and, under certain conditions, damage genetic material. The significance of this effect in animals or humans has not been established."

DEVELOPMENTAL TOXICITY

In general, studies in animals indicate that methylene chloride causes minor fetal effects at relatively high doses that also affect the mother. It appears that the maternal liver metabolizes methylene chloride at a higher rate than the fetus, but that the metabolite carbon monoxide equilibrates between the dam and fetus. The high affinity of fetal hemoglobin for both carbon monoxide and oxygen suggests that fetuses may be at risk from hypoxia following maternal exposures to high levels of methylene chloride.

Reports suggesting a possible increased risk of spontaneous abortion among women exposed to methylene chloride have been found to have significant flaws. Another study using estimated exposure data and birth weights in various census tracts did not find an association between possible methylene chloride exposure and birth weight.

Methylene chloride is metabolized to carbon monoxide and results in increased carboxyhemoglobin levels in both animals and humans. In pregnant women, carbon monoxide poisoning is associated with intrauterine fetal death and with neurological deficits in surviving infants; however, toxicity of this sort has been seen only when the poisoning has been severe enough to cause maternal symptoms.

SECTION 12 ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE

Water: Methylene chloride in water is subject to rapid evaporation, with estimated evaporative half-lives ranging from 3 to 5.6 hours under moderate mixing conditions. Hydrolysis is not significant in water under normal environmental conditions. Biodegradation may occur in groundwater, but will be very slow compared with evaporation. Methylene chloride is not expected to bioconcentrate, with an estimated bioconcentration factor of 5. Henry's Law Constant is 3.19×10^{-3} atm m^3/mol.

Octanol/Water Partition Coefficient (log K_{OW}) is 1.25

Soil: Methylene chloride is expected to evaporate rapidly from near-surface soil. It is probable that methylene chloride can leach through subsoil into groundwater. Soil adsorption potential is low. Calculated Adsorption Coefficient (log K_{OC}) is 1.68.

Air: Methylene chloride in the atmosphere will degrade by reaction with hydroxyl radicals, with a half-life of several months. It is not subject to direct photooxidation.

ECOTOXICITY

Acute LC_{50} (96 Hours, flow-through) for Fathead Minnow:	193 mg/L
Acute LC_{50} (96 Hours, static) for Fathead Minnow:	310 mg/L
Acute LC_{50} (96 Hours, static) for Bluegill:	220 mg/L @ 21-23 °C
Acute LC_{50} (96 Hours) for Mysid Shrimp	256 mg/L

SECTION 13 DISPOSAL CONSIDERATIONS

All disposals of this material must be done in accordance with Federal, state and local regulations. Waste characterization and compliance with disposal regulations are the responsibilities of the waste generator.

SPILL RESIDUES

Recovered liquids may be sent to an EPA permitted reclaimer or incineration facility. Contaminated material must be disposed of in a permitted waste management facility. Do not dump into any sewers, on ground, or into any body of water. Any disposal must be in compliance with Federal, state, or local regulations.

SECTION 14 TRANSPORT INFORMATION

DOT IDENTIFICATION NO.

UN 1593

DOT SHIPPING DESCRIPTION (49 CFR 172.101)

Dichloromethane, 6.1, UN 1593, PG III, RQ

PLACARD REQUIRED

POISON, 1593, Class 6

LABEL REQUIRED

POISON, Class 6
Label as required by OSHA Hazard Communication Standard and any applicable state and local regulations.

IMO REQUIREMENTS

EmS No.: 61.02

SECTION 15 REGULATORY INFORMATION

U S FEDERAL REGULATIONS

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Occupational exposures to methylene chloride are regulated under 29 CFR 1910.1052.

REPORTABLE QUANTITY (RQ)
Reportable Quantity is 1000 lbs.

TOXIC SUBSTANCES CONTROL ACT
Listed on TSCA Inventory

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III
Components identified with an asterisk (*) in Section 2 are subject to the reporting requirements of Section 313 of Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA) and 40 CFR Part 372.

SARA HAZARD CATEGORIES (40 CFR 370.2)
HEALTH: Immediate Health, Delayed Health

INTERNATIONAL REGULATIONS

CANADA

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) CLASSIFICATION
WHMIS Classifications applicable to this product:
D-1B (Toxic Material) based on assignment to TDG Class 6.1, PG III
D-2A (Very Toxic Material) based on classification as 2B carcinogen by IARC

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)
All components of this product are on the Domestic Substances List (DSL).

HAZARDOUS PRODUCTS ACT
This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR).

EUROPE
EINECS No.: 200-838-9

STATE REGULATIONS

CALIFORNIA PROPOSITION 65
The State of California has listed methylene chloride and propylene oxide under Proposition 65 as chemicals known to the state to cause cancer.

SECTION 16 OTHER INFORMATION

NFPA RATINGS
Health 2, Flammability 1, Instability 0

Emergency Information:
Call toll-free 24 hours a day:
800-835-2030

Outside USA, call:
316-524-5751

For any other information contact:
Vulcan Chemicals, Technical Service Department
P O Box 385015, Birmingham, AL 35238-5015

Phone: 800-873-4898

8 AM - 5 PM, Central Time, Monday through Friday

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