

ALSAN FLASHING

WHMIS	PROTECTIVE CLOTHING	TRANSPORT OF DANGEROUS GOODS
		 <p>PAINT Class 3 UN 1263 P.G.: II</p>

SECTION I: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Use: Mono component waterproofing bitumen/polyurethane resin.

Formula number: 442.1

Manufacturer: Soprema Canada
1675 Haggerty Street
Drummondville (Quebec) J2C 5P7
CANADA
Tel.: 819 478-8163

Distributors: Soprema Inc.
44955, Yale Road West
Chilliwack (BC) V2R 4H3
CANADA
Tel.: 604 793-7100

Soprema USA
310, Quadral Drive
Wadsworth (Ohio) 44281
UNITED STATES
Tel.: 1 800 356-3521

In case of emergency:

SOPREMA (8:00am to 5:00pm): 1 800 567-1492

CANUTEC (Canada) (24h.): 613 996-6666

CHEMTREC (USA) (24h.): 1 800 424-9300

EMERGENCY OVERVIEW!!!

CAUTION! This product and its vapours are flammable. The vapours are heavier than air and may spread long distances. Distant ignition (such as a pilot light, and any object that sparks, such as an electric motor) and flash back are possible. Irritating and/or toxic gases or fumes may be generated by thermal decomposition or combustion.

May cause irritation to eyes, skin and respiratory tract. Harmful or fatal if swallowed. Ingestion of the product can cause severe lung injury when aspirated. Inhalation of high concentrations of this product may cause central nervous system (CNS) depression (headache, nausea, dizziness, drowsiness, incoordination and unconsciousness). This product contains isocyanates. May cause sensitization by inhalation and by contact with skin.

SECTION II: COMPOSITION AND INFORMATION ON DANGEROUS INGREDIENTS

NAME	CAS #	% WEIGHT	EXPOSURE LIMIT (ACGIH)	
			TLV-TWA	TLV-STEL
Asphalt	8052-42-4	15-40	0.5 mg/m ³	Not established
Methyl ethyl ketone (MEK)	78-93-3	7-13	200 ppm	300 ppm
Toluene	108-88-3	7-13	20 ppm	Not established
Calcium Oxide	1305-78-8	5-10	2 mg/m ³	Not established
Propylene glycol monomethyl ether acetate (PGMEA)	108-65-6	1-5	50 ppm	Not established
4,4'-Diphenylmethane diisocyanate 2,2'-Diphenylmethane diisocyanate (MDI)	101-68-8	0.1-1	0.005 ppm	Not established
p-Toluenesulfonyl Isocyanate (PTSI)	4083-64-1	0.1-1	Not established	Not established

SECTION III: POTENTIAL HEALTH EFFECTS

Effects of Short-Term (Acute) Exposure

SKIN CONTACT

Frequent or prolonged contacts can remove the natural fat from the skin and may cause redness, skin irritation and dermatitis. Isocyanates (MDI, PTSI) may cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Isocyanates can cause skin discoloration and hardening of the skin after repeated exposures. Toluene and MEK can be absorbed through the skin but skin contact is not expected to result in the absorption of harmful amounts. (1)

Toluene: Toluene is a moderate skin irritant, based on animal evidence. Prolonged contact is more irritating due to the defatting action of this solvent and dermatitis (dry, red skin) may result. (1)

EYE CONTACT

The vapours may cause eye irritation with tearing and discomfort, redness and pain. Eye contact with the product may cause moderate to severe irritation. Alterations in vision, for example, reduced acuity and suppressed colour vision, have been documented following exposure to mixed solvents. (1)

Toluene: Toluene is a mild eye irritant, based on animal evidence. Very short exposure (3 to 5 minutes) to the vapour has caused slight eye irritation at 300 ppm. Longer exposures (6 to 7 hours) to concentrations above 100 ppm have also caused slight irritation. Alterations in vision, for example, reduced acuity and suppressed colour vision, have been documented following exposure to mixed solvents. It is not possible to attribute these effects to toluene directly. (1)

INHALATION

Inhalation of vapours of toluene, MEK, PGMEA and isocyanates (MDI and PTSI) can occur. The exposition to vapours of solvents such as toluene and MEK over exposure limits may cause irritation of the respiratory system and central nervous system (CNS) depression (headaches, dizziness, nausea, tiredness, confusion and coma). MDI and PTSI may cause respiratory sensitization, an allergic reaction (e.g. asthma, difficulty to breathe, angina) which becomes evident upon re-exposure to this material.

MEK: Brief (3-5 minutes) exposures to MEK vapours produced slight nose and throat irritation at 100 ppm and definite nose and throat irritation at 350 ppm in approximately 10 people. 143 volunteers exposed to 200 ppm for 4 hours reported throat irritation, unpleasant odour, nausea, and headache (in order of frequency reported). Higher exposures are expected to cause CNS depression with symptoms such

as headache, nausea, dizziness, drowsiness, and confusion. Extremely high concentrations may cause loss of consciousness and possibly death. Neurobehavioral effects of exposures to MEK (200 ppm for 4 hours) were studied with 137 volunteers. There were no statistically significant effects observed in biochemical, psychomotor, sensorimotor and psychological tests. Similar findings have been reported in other studies. Four volunteers were exposed to 90 to 270 ppm MEK for 4 hours/day for 4 days. Minor disturbances in time perception were observed. (1)

Toluene: The main effect of inhaling toluene vapour is on the CNS. Symptoms are related to exposure concentration. At approximately 50 ppm, slight drowsiness and headache have been reported. Irritation of the nose, throat and respiratory tract has occurred between 50 and 100 ppm. Concentrations of about 100 ppm have caused fatigue and dizziness; over 200 ppm have caused symptoms similar to drunkenness (giddiness), numbness, and mild nausea; over 500 ppm have caused mental confusion and incoordination. At higher concentrations (estimated at 10 000 ppm) further depression of the CNS can result in unconsciousness and death. Most serious incidences of exposure have occurred when the vapour has accumulated in confined spaces. In two cases of acute occupational exposure, there were no blood disorders, liver or kidney damage. Reversible kidney failure has resulted from a severe occupational exposure in a paint factory. (1)

MDI and PTSI: MDI has a very low vapour pressure. Therefore, airborne exposures are unlikely to occur unless MDI is heated or forms an aerosol or mist during pouring, frothing or spraying operations. Short-term inhalation exposure to isocyanates can cause respiratory and mucous membrane irritation. Symptoms include eye and nose irritation, dry or sore throat, runny nose, shortness of breath, wheezing and laryngitis. Coughing with chest pain or tightness may also occur, frequently at night. These symptoms may occur during exposure or may be delayed several hours. Some people may become sensitized to isocyanates. (1)

PGMEA: PGMEA is not expected to cause any effects based on the low concentration level of this chemical in the product. Based on the effect of the chemically-similar propylene glycol monomethyl ether (PGME), irritation of the nose and throat from inhalation of propylene glycol monomethyl ether acetate (PGMEA) vapour or mist would be expected. (1)

INGESTION

It is unlikely that toxic amounts of this product would be ingested with normal handling and use. If significant amount of the product were ingested, symptoms as described for inhalation might occur. This product may cause irritation, mouth and throat burns and abdominal pains. The product can be aspirated (inhaled) into the lungs during ingestion or vomiting. Aspiration of even a small amount of liquid could result in a life threatening accumulation of fluid in the lungs. Severe lung damage (oedema), respiratory failure, cardiac arrest and death may result. (1)

SKIN ABSORPTION

Toluene: Liquid toluene is absorbed through the skin slowly. Therefore, harmful effects are not expected by this route of exposure. Despite widespread use of toluene, there are no reports of skin sensitization. (1)

Effects of Long-Term (Chronic) Exposure

RESPIRATORY EFFECTS

MDI and PTSI: Respiratory sensitization has developed in people working with isocyanates. The sensitization is usually caused by a very large exposure or by multiple exposures. Although varying periods of exposure (1 day to years) may elapse before sensitization occurs, it develops more often during the first few months of exposure. Sensitized individuals react to very low levels of isocyanates (for MDI, as low as 0.0014 ppm) that have no effect on unsensitized people. At first, the symptoms may appear to be a cold or mild hay fever. However, severe asthmatic symptoms can develop and include wheezing, chest tightness, shortness of breath, difficult breathing and/or coughing. Fever, chills, general feelings of discomfort, headache and

fatigue can also occur. Symptoms may occur immediately upon exposure, within an hour or several hours after exposure or both and/or at night. Typically the asthma improves with removal from exposure (e.g. weekends and vacations) and returns, in some cases, in the form of an "acute attack", on renewed exposure. Sensitized people who continue to work with isocyanates may develop symptoms sooner after each exposure. The number and severity of symptoms may increase. Following removal from exposure, some workers may continue to have persistent respiratory problems such as asthmatic symptoms, bronchial problems and hypersensitivity to isocyanates. Others may recover fully and may gradually lose their sensitivity within several years. Isocyanates may also cause hypersensitivity pneumonitis, another allergic lung disease, which is characterized by symptoms such as shortness of breath, fever, tiredness, non-productive cough, and chills. Several studies have shown that continued exposure to low levels of MDI and other isocyanates may cause impaired lung function, such as diminished respiratory capacity. Other studies have shown that extremely low levels of MDI (e.g. less than 0.003 ppm) do not decrease lung function. Cross-sensitization between different isocyanates may occur. People sensitized to toluene diisocyanate (TDI) or hexamethylene diisocyanate (HDI) may show sensitization to MDI, without having previous exposure to this chemical. Exposure to isocyanates is likely to cause aggravation to individuals with existing respiratory disease, such as chronic bronchitis and emphysema. (1)

Asphalt, Toluene, Calcium Oxide, MEK, PGMEA: No human or animal information is available.

NERVOUS SYSTEM

MEK: Inhalation of solvent such as MEK may cause nervous system problems. Some studies report changes such as memory loss, sleep disturbances, loss of ability to concentrate, or incoordination, while others report no effects. Recent studies using sensitive neurobehavioral tests have shown altered scores for exposed workers but whether or not these indicate CNS damage is not clear. (1)

Toluene: Numerous studies of rotogravure printers, painters and rubberized-matting workers with chronic exposure to toluene are inconclusive about chronic CNS damage. Some studies report changes such as memory loss, sleep disturbances, loss of ability to concentrate, or incoordination, while others report no effects. (1)

Asphalt, Calcium Oxide, MDI, PTSI, and PGMEA: No human or animal information is available.

TARGET ORGANS:

Toluene: In epidemiological studies on workers exposed long-term to levels up to 200 ppm, there was no clear evidence of kidney damage. Occupational exposure to up to 500 ppm toluene has not been associated with liver effects. There is some evidence to suggest that long-term exposure to toluene may affect hearing. However, the limited information available does not allow a conclusion to be drawn. Although minor changes in blood parameters have been observed, it is generally accepted that toluene does not cause significant blood disorders. (1)

Asphalt, Calcium Oxide, MDI, MEK, PTSI, and PGMEA: No human or animal information is available.

CARCINOGENICITY

No ingredient of this product is reported to cause cancer.

MEK: A mortality study of 446 people who had worked at MEK dewaxing plants concluded that there was no evidence of a cancer hazard. The average follow-up was 14 years. This study is limited by the small size of the cohort and the relatively short follow-up period. Therefore, it does not necessarily prove that MEK is not a carcinogen. There is no other information available. The International Agency for Research on Cancer (IARC) has not evaluated the carcinogenicity of this chemical. The American Conference of Governmental Industrial Hygienists (ACGIH) has not assigned a carcinogenicity designation to this chemical. The US National Toxicology Program (NTP) has not listed this chemical in its report on carcinogens. (1)

Toluene: IARC has concluded there is inadequate evidence for the carcinogenicity of toluene in humans. IARC has concluded that this chemical is not classifiable as to its carcinogenicity to humans (Group 3). ACGIH has designated this chemical as not classifiable as a human carcinogen (A4). NTP has not listed this chemical in its report on carcinogens. (1)

MDI and PTSI: The risk of cancer associated with exposure to isocyanates has been examined in 4 human population studies. No strong association or consistent pattern has been observed. There is one isolated report of a non-smoking painter who developed lung cancer after being exposed to MDI and TDI for 15 years. He also had a 10-year history of lung disease thought to be caused by exposure to MDI and TDI. It is not possible to draw any conclusions from this case report. IARC has determined there is inadequate evidence for the carcinogenicity of MDI or polymeric MDI in humans. There is limited evidence for the carcinogenicity of a mixture containing MDI and polymeric MDI in experimental animals. IARC has concluded that this chemical is not classifiable as to its carcinogenicity to humans (Group 3). ACGIH has not assigned a carcinogenicity designation to this chemical. NTP has not listed this chemical in its report on carcinogens. (1)

Asphalt, Calcium Oxide, PGMEA: No human or animal information is available. IARC has not evaluated the carcinogenicity of these chemicals. ACGIH has not listed any of these chemicals. NTP has not listed any of these chemicals in its report on carcinogens. (1)

TERATOGENICITY, EMBRYOTOXICITY, FETOTOXICITY

MEK: Some researchers have pointed to a concern that solvent exposure may have led to congenital defects in children born to female workers. One of the solvents mentioned is MEK, but it is not possible to implicate any particular solvent due to the extent of combined exposure. Three animal studies have shown fetotoxicity (skeletal anomalies) at doses which did not produce any or only very slight maternal toxicity. (1)

Toluene: Toluene is a developmental toxicity hazard, based on information obtained from animal studies. Fetotoxicity (reduced foetal weight), behavioural effects (effects on learning and memory) and hearing loss (in males) have been observed in the offspring of rats exposed by inhalation to 1 200 or 1 800 ppm toluene. These effects were observed in the absence of maternal toxicity. A detailed review of toluene and its potential to cause teratogenicity/embryotoxicity in occupational situations has been published. This review concludes that although many occupational studies have evaluated general solvent exposure and pregnancy outcomes, few studies have specifically investigated toluene exposure. (1)

PGMEA: Animal studies have shown that the chemically-similar PGME has no teratogenic or embryotoxic effects. Thus, none are expected for PGMEA. (1)

MDI, PTSI, Asphalt, and Calcium Oxide: No human or animal information is available.

REPRODUCTIVE TOXICITY

Toluene: No conclusions can be drawn based on the available human information. Reproductive effects have not been observed in animal studies. (1)

Asphalt, Calcium Oxide, MDI, MEK, PTSI, and PGMEA: No human or animal information is available.

MUTAGENICITY

MEK: There is no human information available. In vivo animal studies, mammalian in vitro studies and virtually all short-term mutagenicity studies on test cell systems have been negative. (1)

Toluene: Results from the available human studies are inconclusive. Both positive and negative results have been obtained in human studies, but no studies were carried out with toluene exposure only, or with adequate control of other factors. (1)

MDI: In one case report, MDI caused DNA damage in human white blood cells after inhalation exposure to 5 to 20 ppb. This report

provides insufficient information for determining the mutagenicity of MDI. No other human or animal in vivo studies have been reported. MDI induced chromosome aberrations in cultured human lymphocytes, with and without metabolic activation. It only marginally increased sister chromatid exchanges at a high dose, with and without metabolic activation. (1)

Asphalt, Calcium Oxide, PTSI, PGMEA: No human or animal information is available.

TOXICOLOGICALLY SYNERGISTIC MATERIALS

MEK: There are several human case reports of neurological effects resulting from high exposure to MEK in combination with other solvents. Animal studies have confirmed synergism between MEK and ethyl n-butyl ketone, methyl n-butyl ketone, n-hexane, carbon tetrachloride, 2,5-hexanedione and chloroform. Principal target organs involved in toxicological interactions are the nervous system and liver, although the lung has also been implicated. (1)

Toluene: Exposure to other solvents such as benzene, xylene and ethanol (alcohol) slows the rate of clearance of toluene from the body, thereby enhancing the toxicity of toluene. (1)

Asphalt, Calcium Oxide, MDI, PTSI, and PGMEA: No human or animal information is available.

POTENTIAL FOR ACCUMULATION

Toluene: Toluene is readily absorbed by inhalation or ingestion and tends to be deposited more in tissues that are fatty or have a rich blood supply (e.g. brain, liver, kidney, and fat). Toluene is metabolized in the liver and excreted by the kidneys in the urine. It can also be exhaled unchanged. (1)

Calcium Oxide: Does not accumulate in the body. Calcium ions are normally found in the body. About one third of ingested calcium ion is absorbed. Calcium ion is excreted mainly in the feces and the urine. (1)

PGMEA: Does not accumulate. PGMEA is rapidly metabolized to PGME and acetic acid. Animal studies indicate that PGME is rapidly metabolized and eliminated from the body. PGMEA was rapidly and extensively metabolized to propylene glycol monomethyl ether and acetic acid (which is a normal body substance), and eliminated in the same manner as propylene glycol monomethyl ether (in the expired air as carbon dioxide, in the urine and very small amounts in the feces). At very high doses of PGMEA, the acetic acid formed in the hydrolysis, may have adverse effects. (1)

Asphalt, MDI, MEK, PTSI: No human or animal information is available.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT

Remove contaminated clothing. Wash thoroughly with soap and water. If irritation persists, get medical attention.

EYE CONTACT

Flush thoroughly with water for at least 15 minutes. If irritation persists, get medical attention.

INHALATION

In case of gas or vapour inhalation, move victim to fresh air. If breathing is difficult, give oxygen. If breathing stops, give respiratory assistance. Obtain medical assistance.

SWALLOWING

Do not induce vomiting. Immediately contact local poison control centre. Should vomiting occur, be sure to keep the victim's head below hips to avoid aspiration of vomit into the lungs. Maintain the victim at rest and obtain immediate medical attention.

SECTION V: FIRE-FIGHTING MEASURES

FLAMMABILITY: Flammable liquid, Class IB (NFPA)

EXPLOSION DATA: Sensitivity to mechanical impact: No
Sensitivity to static charge: Can accumulate static charge by flow.

FLASH POINT: 10.5°C

AUTO-IGNITION TEMPERATURE: Not available
FLAMMABILITY LIMITS IN AIR: (% in volume) Not available

FIRE AND EXPLOSION HAZARDS

This product may be ignited by heat, sparks of flames. Vapours are heavier than air and may travel a considerable distance to a source of ignition and flash back to a leak or open container. The product may ignite on contact with strong oxidizing agents. Do not cut, puncture or weld empty containers.

COMBUSTION PRODUCTS

Irritating and/or toxic gases or fumes may be generated by thermal decomposition or combustion. Toxic and/or irritating gases or fumes can emanate from empty containers when submitted to high temperatures as carbon oxide, nitrogen oxide, trace of cyanhydric acid.

FIRE FIGHTING INSTRUCTIONS

Evacuate area. Wear self-contained breathing apparatus and appropriate protective clothing in accordance with standards. Approach fire from upwind and fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Always stay away from containers because of the high risk of explosion. Stop leak before attempting to put out the fire. If leak cannot be stopped, and if there is no risk to the surrounding area, let the fire burn itself out. Move containers from fire area if this can be done without risk. Cool containers with flooding quantities of water until well after fire is out.

EXTINGUISHING MEDIA

Foam anti-alcohol or universal, dry chemical powder, CO₂, foam. Use of water spray when fighting fire may be inefficient because of the low flash point of the product.

SECTION VI: ACCIDENTAL RELEASE MEASURES

RELEASE OR SPILL

Ventilate area. Wear appropriate protective equipment during cleanup. Eliminate all sources of ignition. Shut off source of leak if you can do it without risk. Contain the spill. Absorb or cover with absorbent material, dry earth, sand or other non-combustible material and transfer to containers. Sweep or shovel into containers with lids, use clean non-sparking tools to collect absorbed material. Cover and remove to appropriate well ventilated area until disposal. Do not touch or walk through spilled material. Wash spill area with soap and water. Prevent entry into waterways, sewers, basements or confined areas.

SECTION VII: HANDLING AND STORAGE

HANDLING

This product is flammable and toxic. Avoid contact with eyes, skin and clothing. Do not ingest. Avoid breathing mist, vapour or dust. Wash thoroughly after handling. Persons with antecedents of asthma, chronic or periodic respiratory disorders should never manipulate this product. Before handling, it is very important that ventilation controls are operating and protective equipment requirements are being followed. People working with this product should be properly trained regarding its hazards and its safe use. Eliminate all ignition sources (e.g. sparks, open flames, hot surfaces). Keep away from heat. Ground transfer containers to avoid static accumulation. Tightly reseal all partially used containers. Do not cut, puncture or weld empty containers.

STORAGE

Store containers in a cool well-ventilated area out of direct sunlight and away from humidity, heat and ignition sources. Keep storage areas clear of combustible materials. No smoking near storage area. Store away from incompatible materials. Store the product according to occupational health and safety regulations and fire and building codes. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks. Have appropriate fire extinguishers and spill clean-up equipment near storage area. Inspect all containers to make sure they are properly labelled.

SECTION VIII: EXPOSURE CONTROLS / PERSONAL PROTECTION

HANDS: Wear gloves made from butyl rubber or Teflon.

RESPIRATORY: If the TLV is exceeded, if use is performed in a poorly ventilated confined area, use an approved respirator in accordance with standards.

EYES: Wear chemical safety goggles in accordance with standards.

OTHERS: Eye bath and safety shower.

CONTROL OF VAPOURS: Local exhaust is needed to control vapour and dust level to below recommended limits.

SECTION IX: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:	Liquid
ODOUR AND APPEARANCE:	Brown liquid with solvent odour
ODOUR THRESHOLD:	Not available
VAPOUR DENSITY (air = 1):	Heavier than air
EVAPORATION RATE (Butyl acetate = 1):	Not available
BOILING POINT (760 mm Hg):	Not available
FREEZING POINT:	Not available
SPECIFIC GRAVITY (H₂O = 1):	1.07 kg/L
SOLUBILITY IN WATER (20°C):	Not soluble
VOLATILE ORGANIC COMPOUND (V.O.C.) CONTENT:	250 g/L
VISCOSITY:	Not available

SECTION X: STABILITY AND REACTIVITY

STABILITY: This material is stable at handling and storage conditions recommended under the section VII.

CONDITIONS OF REACTIVITY: Avoid excessive heat. Exposed to high temperatures this product can emit dangerous decomposition products, such as fumes, carbon oxide, nitrogen oxide, trace of hydrocyanic acid, trace of formaldehyde, trace of hydrochloric acid.

INCOMPATIBILITY: Keep away from oxidizing agent and from highly acid and basic materials to avoid exothermic reactions.

HAZARDOUS DECOMPOSITION PRODUCTS: This product slowly reacts with water and causes an emanation of carbonic gas which would lead to pressure increasing in closed container.

HAZARDOUS POLYMERISATION: None

SECTION XI: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL DATA

MEK: (1)

LC50 (inhalation, rat):	11 700 ppm (4-hour exposure)
LD50 (oral, rat):	2 740 mg/kg cited as 3.4 ml/kg
LD50 (dermal, rabbit):	> 5 000 mg/kg

Toluene: (1)

LC50 (inhalation, rat):	7 350 ppm (4-hour exposure)
LD50 (oral, rat):	2 600-7 500 mg/kg
LD50 (dermal, rabbit):	12 225 mg/kg

MDI: (1)

LC50 (inhalation, rat):	369-490 mg/m ³ (4-hour exposure)
LD50 (oral, rat):	178 mg/m ³
LD50 (dermal, rabbit):	> 10 000 mg/kg

Asphalt, Calcium Oxide, PGMEA, PTSI: No information available.

Effects of Short-Term (Acute) Exposure

INHALATION

MEK: Very high concentrations have produced irritation of the nose and eyes, followed by CNS depression with incoordination, unconsciousness, gasping respiration and death. Guinea pigs were exposed to 3 300 to 100 000 ppm for 13.5 hours. No abnormal signs were observed during or following exposure to 3 300 ppm for 810 minutes. Exposure to 10 000 ppm produced irritation (2-4 minutes), lacrimation (40 minutes), incoordination (90 minutes) and unconsciousness (240-280 minutes). Gasping respiration was produced during 20 and 180-minute exposures to 33 000 and 100 000 ppm. Death resulted from 45 and 200-minute exposures to 33 000 and 100 000 ppm. Slight congestion of the brain and marked congestion

and emphysema of the lungs, liver and kidneys were observed in animals that died during exposure. Animals that survived subsequently recovered. The concentration which reduced the respiratory rate of mice by 50% (RD50) was 10 745 ppm (which was very high compared to other irritants tested). This indicates that MEK is a sensory irritant (causes burning and painful irritation of the nose and eyes) at very high concentrations. (1)

Toluene: The major effect of toluene is on the CNS. Studies with rats have shown that up to approximately 1 000 ppm causes excitation and increased activity. At approximately 2 000 ppm, there is CNS depression with drowsiness, incoordination and unconsciousness. Death at higher concentrations is from respiratory failure. Animal studies have indicated that toluene is not directly toxic to the cardiovascular system. Recovery is rapid following cessation of exposure. Studies indicate no permanent damage to body systems. Studies in rats have shown hearing loss at high frequencies following toluene exposure both by inhalation (threshold concentration between 700 and 1 000 ppm) and orally (620 mg/kg/day for 4 weeks). (1)

MDI: MDI has a very low vapour pressure and it is difficult to achieve vapour concentrations necessary for inhalation toxicity testing. Therefore, inhalation toxicity studies have focused on the effects of the aerosol. No significant effects were found when rats were exposed to 2, 5 and 15 mg/m³ of MDI aerosol for 6 hours/day, 5 days/week for 2 weeks. Mice were exposed to MDI aerosols varying from 7 to 59 mg/m³ for 4 hours. The overall effect was a decline in respiratory rate which was determined to be due mainly to MDI's action as a pulmonary irritant. The RD50 (concentration required to reduce the respiratory rate by 50%) was 32 mg/m³. (1)

Asphalt, Calcium Oxide, PGMEA, PTSI: No information available.

EYE IRRITATION

MEK: Application of 0.005 ml of undiluted MEK to rabbit eyes produced severe irritation. Application of pure, 30%, 10% and 1% solutions of MEK in a standard Draize test using rabbits resulted in moderate/severe irritation for pure MEK and mild irritation for all other concentrations. In an interlaboratory comparison study, where eye irritation was evaluated in rabbits using a standard Draize test, 71% of the laboratories rated MEK as an eye irritant (degree not specified). The corneas of guinea pigs exposed to 10 000 ppm vapour for 30 minutes or more became opaque. In some cases, this effect persisted for the 8-day observation period. (1)

Toluene: Toluene is a mild eye irritant. (1)

MDI: MDI has been reported to cause slight eye irritation. Application of 100 µg in a Standard Draize test caused mild irritation. A 1 mg dose of 10% MDI produced mild inflammation and tearing. Application of 0.1 ml caused lesions, abrasions and inflammation of the cornea. These lesions healed within 10-14 days without complications. (1)

PGMEA (rabbit): Somewhat painful and irritating to the eyes. (1)

Asphalt, Calcium Oxide, PTSI: No information available.

SKIN IRRITATION

MEK: Application of 0.01 ml of undiluted MEK to the clipped rabbit skin for 24 hours (uncovered) resulted in mild irritation. Application of full strength MEK to intact or abraded rabbit skin for 24 hours under occlusion was moderately irritating. In an interlaboratory comparison study, where skin irritation was evaluated in rabbits by covered application of 0.5 ml to shaved skin for 24 hours, over 70% of the laboratories rated MEK as a mild skin irritant. MEK did not produce sensitization in the mouse ear thickness test. (1)

Toluene: Toluene is a moderate skin irritant. (1)

MDI: Application of 0.5 ml MDI (under a cover for 24 hours) caused slight (92 to 94% MDI) to moderate irritation (95% MDI). The sensitizing potency of MDI was investigated using the mouse ear-swelling test (MEST). The dose required to sensitize 50% of the animals was 0.73 mg/kg. In this test, MDI was less potent than hexamethylene diisocyanate (HDI) and dicyclohexylmethane diisocyanate (HMDI), but more sensitizing than toluene diisocyanate

(TDI). Cross reactivity was observed between MDI and HDI, HMDI and TDI. (1)

PGMEA (rabbit): Repeated applications were not very irritating to rabbit and did not cause absorption of significant amounts, even when applied repeatedly for a 2-week period. (1)

Asphalt, Calcium Oxide, PTSI: No information available.

Effects of Long-Term (Chronic) Exposure

INHALATION

MEK: Exposure to 5 000 ppm for 13 weeks produced an exposure-related effect on body and liver weights in male and female rats, as well as a depression in brain weight in females. Guinea pigs and rats were exposed to 235 ppm for 12 weeks (5 days/week, 7 hours/day). There were no deaths or signs of intoxication for rats. There were deaths in both control and experimental guinea pigs (2 in each group). Extensive neurological studies with high exposures have shown no effects. In one study, rats were initially exposed to 10 000 ppm which was reduced to 6 000 ppm due to severe irritation of the upper respiratory tract. Temporary signs of muscle incoordination and gait disturbances were observed throughout the exposure. Exposures continued for only 7 of the planned 15 weeks since animals died of bronchopneumonia with no neurological symptoms. In the other study, rats were exposed to 1,125 ppm continuously for up to 55 days with no neurotoxicity. (1)

Toluene: Evidence for chronic CNS neurotoxicity is inconclusive. (1)

PGMEA (rat, mouse): Repeated exposures at 300 and 1 000 ppm for two weeks (6 hours/day, 5 days first week, 4 days second week) produced no adverse effects. There were minor changes found at very high exposures (3 000 ppm) - slight increase in liver weight for females, slight effect on kidney function and slight to moderate injury to the lining of the nose. The latter effect was more severe with mice. It was suggested that this effect was related to acetic acid resulting from hydrolysis of PGMA in the nose. There were no effects on thymus and spleen weights, on bone marrow or blood. (1)

MDI, Asphalt, Calcium Oxide, PTSI: No information available.

INGESTION

MEK: Exposure of mice in LD50 studies has resulted in incoordination, unconsciousness, respiratory depression and death. MEK is easily aspirated into the lungs. When aspiration of MEK was induced in 6 rats, there was a high mortality with rapid onset. (1)

Toluene: No significant toxicity was seen after oral administration of up to 590 mg/kg to female rats for up to six months. (1)

MDI: Rats were given daily doses of 4.3 to 5 g/kg for 5 days. The only effect was a slight enlargement of the spleen in 2 of 5 rats. (1)

PGMEA (rat): A single dose of 3 ml/kg produced no deaths; 10 ml/kg caused death in 3 of 5 animals tested. (1)

Asphalt, Calcium Oxide, PTSI: No information available.

CARCINOGENICITY

Toluene: IARC has concluded there is inadequate evidence for the carcinogenicity of toluene in experimental animals. (1)

MDI: There is no animal information on the carcinogenicity of MDI itself. In one study, polymeric MDI containing 44.8-50.2% monomeric MDI was tested for carcinogenicity by inhalation in rats. An increased incidence of lung tumours was observed. IARC has determined there is limited evidence for the carcinogenicity of a mixture containing monomeric and polymeric MDI to experimental animals. (1)

MEK, Asphalt, Calcium Oxide, PGMEA, PTSI: No information available.

TERATOGENICITY, EMBRYOTOXICITY, FETOTOXICITY

MEK: One rat study indicated that fetotoxicity (skeletal anomalies) occurred at 1 000 ppm. This study also points to teratogenicity at a higher dose (3 000 ppm). Maternal toxicity was not produced at either dose. Two follow-up studies by the same researchers also showed fetotoxicity in rats and mice in the presence of very slight maternal toxicity. Rats were exposed by inhalation to 0, 1 000 and 3 000 ppm on

SECTION XIV: TRANSPORT INFORMATION

CLASSIFICATION (TDG - DOT): Class 3
IDENTIFICATION NUMBER: UN 1263
SHIPPING NAME: Paints
PACKING GROUP: II
CONTAINERS FOLLOW THE STANDARDS.

SECTION XV: REGULATORY INFORMATION

WHMIS

B2: Flammable material (flash point below 37.8°C)
D1A: Very toxic material causing immediate and severe effects (LC50 of MDI)
D2A: Very toxic material causing other toxic effects (respiratory sensitization, sensitization and skin irritation caused by the MDI)
DSL: All constituents of this product are included on the Domestic Substances List (DSL – Canada)
TSCA: All constituents of this product are included on the Toxic Substances Control Act Inventory (TSCA – United States).

HMIS (USA):	NFPA (USA):		
Health:	2	Health:	2
Flammability:	3	Flammability:	3
Reactivity:	1	Reactivity:	1
Protective equipment:	B	Specific hazard:	-

SECTION XVI: OTHER INFORMATION

Glossary:

ANSI: American National Standards Institute
ASTM: American Society for Testing and Materials
CAS: Chemical Abstract Services
CSA: Canadian Standardisation Association
DOT: Department of Transportation (United States)
EPA: Environmental Protection Agency (United States)
HMIS: Hazardous Material Information System
LD50/LC50: Less high lethal dose and lethal concentration published
NFPA: National Fire Protection Association (United States)
OSHA: Occupational Safety & Health Administration (United States)
RCRA: Resource Conservation and Recovery Act (United States)
TDG: Transportation of Dangerous Goods
TLV: Threshold Limit Value – Time-Weighted Average
WHMIS: Workplace Hazardous Materials Information System (Canada)

References:

(1) CHEMINFO (2008) Canadian Centre of Occupational Health and Safety, Hamilton (Ontario) Canada

Code of MSDS: CA U DRU SS FS 011
This MSDS has been prepared by: Michel Galtier
mgaltier@soprema.ca
1 800 567-1492

For information:

The Material Safety Data Sheets of SOPREMA are available on Internet at the following site: <http://www.soprema.ca>

Justification of the update:

- Modification of the flash point.

This MSDS contains all the information required by ANSI Z-400.1-1998 standard (United States), by regulation 29 CFR Part 1910.1200 of the Hazard Communication Standard of OSHA, and is in accordance with standard DORS/88-66 OF WHMIS Canada.

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

days 6 to 15 of gestation. At 3 000 ppm, in 4/21 litters (1 foetus/litter), there was a low but statistically significant increase in malformations. Sternebral and soft tissue anomalies were also increased. There was also a statistically significant increase in total skeletal anomalies at 1 000 ppm. Maternal toxicity was not observed. In subsequent studies, rats and mice were exposed to 0, 400, 1 000 or 3 000 ppm by inhalation during days 6 to 15 of gestation. There were no embryotoxic or teratogenic effects at any exposure level. At the 3 000 ppm, there were fetotoxic effects (increased incidence of minor skeletal variations; delayed bone formation; reduced foetal weight) with very slight maternal toxicity (decreased weight gain in rats; increased liver weights in mice). (1)

Toluene: Toluene does cause developmental effects in animals, based on fetotoxicity (reduced foetal weight), behavioural effects (effects on learning and memory) and hearing loss (in males) observed in the offspring of rats exposed by inhalation to 1 200 or 1 800 ppm toluene. These effects were observed in the absence of maternal toxicity. (1)

MDI, Asphalt, Calcium Oxide, PGMEA, PTSI: No information available.

REPRODUCTIVE TOXICITY

Toluene: No adverse effects on reproduction were observed in several studies on both rats and mice, even at maternally toxic exposures. (1)

MDI, MEK, Asphalt, Calcium Oxide, PGMEA, PTSI: No information available.

MUTAGENICITY

MEK: MEK was not mutagenic in in vivo micronucleus cytogenetic assays with mice injected with 1.96 ml/kg or hamsters injected with 411 mg/kg. It also did not produce chromosomal aberrations or sister chromatid exchanges in Chinese hamster ovary cells. MEK was not mutagenic in several cultured mammalian test systems in vitro, including human lymphocytes, both with and without metabolic activation. MEK was not mutagenic in Salmonella typhimurium, Escherichia coli and Saccharomyces cerevisiae, both with and without metabolic activation. In two other studies with Saccharomyces cerevisiae yeast, MEK gave positive results. (1)

Toluene: There is insufficient information available to conclude that toluene is mutagenic. (1)

MDI: It is not possible to conclude that MDI is mutagenic. MDI formed low-level DNA adducts in female rats exposed to 0.7-2.0 mg/m³ for 17 hours/day, 5 days/week for 1 year. There are no studies available using cultured animal cells. MDI has produced mostly negative results in short-term bacteria tests (Salmonella typhimurium). MDI has given positive results in 2 strains of Salmonella typhimurium (TA98 and TA100), with metabolic activation. (1)

Asphalt, Calcium Oxide, PGMEA, PTSI: No information available.

SECTION XII: ECOLOGICAL INFORMATION

ENVIRONMENTAL EFFECTS

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May be harmful to aquatic life.

SECTION XIII: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL

This product is listed as hazardous waste. Consult local, state, provincial or territory authorities to know disposal methods. Also listed as hazardous waste by the RCRA (USA); waste disposal as to follow EPA regulations. Do not dispose of waste with normal garbage or sewers systems.