




ALSAN LDH

Disponible en français

WHMIS	PROTECTIVE CLOTHING	TRANSPORT OF DANGEROUS GOODS
		 <p>PAINT Class 3 UN1263 P.G.: II</p>

SECTION I. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product name: Alsan LDH
Use: Mono-component waterproofing bitumen/polyurethane resin.

Code of MSDS: CA U DRU SS FS 099
Formula Number : 510.1
Revision date: June 8, 2007
Revised by: Marie-Claude Fontaine, Health and Safety Supervisor
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In case of emergency:

SOPREMA (8:00am to 5:00pm – Eastern time): (800) 567-1492
 CANUTEC (Canada) (24h.): (613) 996-6666
 CHEMTREC (USA) (24h.): (800) 424-9300
 Poison Control Centre: Consult local telephone directory

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	30-60	0.5 mg/m ³	Not established
Toluene	108-88-3	10-30	20 ppm	Not established
4,4'-Diphenylmethane diisocyanate 2,2'-Diphenylmethane diisocyanate (MDI)	101-68-8	7-13	0.005 ppm	Not established
Methyl ethyl ketone (MEK)	78-93-3	7-13	200 ppm	300 ppm
Propylene glycol monomethyl ether acetate (PGMEA)	108-65-6	1-5	50 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

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 depression (headaches, dizziness, nausea, tiredness, confusion and coma). MDI and PTSI may cause respiratory sensitization, an allergic reaction (e.g. asthma, difficulty to breath, angina) which becomes evident upon re-exposure to this material.

Toluene: The main effect of inhaling toluene vapour is on the central nervous system (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. (1)

MEK: Brief (3-5 minutes) exposures to methyl ethyl ketone (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 central nervous system 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)

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)

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)

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)

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)

SECTION III. POTENTIAL HEALTH EFFECTS

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, MEK, PGMEA: No human or animal information is available.

NERVOUS SYSTEM:

Toluene and MEK: Inhalation of solvent such as toluene and MEK may cause nervous system problems. Numerous studies of rotogravure printers, painters and rubberized-matting workers with chronic exposure to toluene are inconclusive about chronic central nervous system (CNS) damage. 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)

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

TARGET ORGANS:

Toluene: In two cases of acute occupational exposure of toluene, there were no blood disorders, liver or kidney damage. Historical reports of blood effects caused by toluene are more than likely due to benzene contamination. Liver and kidney effects, as well as heart disturbances, have been reported in cases of solvent abuse (glue-sniffing). These extreme exposures are not relevant to occupational situations. Reversible kidney failure has resulted from a severe occupational exposure in a paint factory. 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, MDI, MEK, PTSI, PGMEA: No human or animal information is available.

CARCINOGENICITY:

No ingredient of this product is reported to cause cancer.

Toluene: There have been several human population studies which have examined the possible relationship between toluene exposure and cancer. Cancers of most sites were not significantly associated with toluene exposure in any study. Stomach cancer mortality, lung cancer rates and colorectal cancers were evaluated in some studies, but not others. Considering the multiple exposures in most studies and the inconsistencies in findings, it is not possible to conclude that toluene exposure is associated with cancer in humans. The International Agency for Research on Cancer (IARC) has concluded there is inadequate evidence for the carcinogenicity of toluene in humans. There is evidence suggesting a lack of carcinogenicity to o-toluene in experimental animals. The International Agency for Research on Cancer (IARC) has concluded that this chemical is not classifiable as to its carcinogenicity to humans (Group 3). The American Conference of Governmental Industrial Hygienists (ACGIH) has designated this chemical as not classifiable as a human carcinogen (A4). The US National Toxicology Program (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. The International Agency for Research on Cancer (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. The International Agency for Research on Cancer (IARC) has concluded that this chemical is not classifiable as to its carcinogenicity to humans (Group 3). 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)

SECTION III. POTENTIAL HEALTH EFFECTS

CARCINOGENICITY: *(continued)*

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)

Asphalt, PGMEA: No human or animal information is available. The International Agency for Research on Cancer (IARC) has not evaluated the carcinogenicity of these chemicals. The American Conference of Governmental Industrial Hygienists (ACGIH) has no listing any of these chemicals. The US National Toxicology Program (NTP) has not listed any of these chemicals in its report on carcinogens. (1)

TERATOGENICITY, EMBRYOTOXICITY, FETOTOXICITY:

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 1200 or 1800 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. Most of these studies have involved exposure to solvents in general or to certain solvent classes, with toluene exposure addressed as a co-exposure or identified as a common exposure in a sub-group. Outcomes of concern included spontaneous abortion (miscarriage) and teratogenicity (congenital malformations). Six studies examined the association of toluene exposure with spontaneous abortions. Four of the six studies were performed on similar groups of Finnish workers, by the same group of researchers, which can reduce overall confidence in the conclusions. Despite this and other limitations (e.g. recall bias, multiple chemical exposures), these studies do provide evidence suggesting there may be an association between occupational toluene exposure and the occurrence of spontaneous abortions. Nevertheless, further research is required before it will be possible to conclude that there is a causal relationship between toluene exposure and an increased incidence of spontaneous abortions. One study has reported an increased incidence of malformations (renal-urinary and gastrointestinal) in children born to women with a history of exposure to aromatic solvents, particularly toluene. However, it is not possible to draw specific conclusions regarding toluene from this study, because the toluene-specific results were based on a very small number of workers who were exposed to multiple chemicals. Concerns about the potential teratogenicity of toluene in humans have also arisen due to effects (usually renal/urinary) seen in solvent abuse cases (glue-sniffing). These extreme exposures to toluene, as well as other confounding factors such as tobacco and alcohol abuse, are not relevant to occupational situations. (1)

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)

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: 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. A review of toluene and its potential to cause reproductive toxicity in workers has been published. Three cross-sectional studies evaluated fertility in women exposed to toluene or in the wives of exposed men. No conclusions can be drawn based on these studies, due to limitations such as selection bias, recall bias, and the fact that the workers were exposed to other potentially harmful chemicals. Another study suggests that menstrual function is not affected by exposure to toluene. Another report describes testicular atrophy and reduced spermatogenesis in one man who abused toluene for 10 years. This extreme exposure situation is not relevant to occupational exposures. (1)

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

MUTAGENICITY:

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. Positive results have been obtained in some studies using live animals, but the studies either used an irrelevant route of exposure (intraperitoneal) or there are insufficient details available for evaluation. (1)

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)

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)

SECTION III. POTENTIAL HEALTH EFFECTS

MUTAGENICITY: (continued)

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

TOXICOLOGICALLY SYNERGISTIC MATERIALS:

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)

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)

Asphalt, MDI, PTSI, 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, fat). There was no evidence of accumulation in rats with repeated inhalation exposure to 300 ppm. Toluene is metabolized in the liver and excreted by the kidneys in the urine. It can also be exhaled unchanged. (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: 2.5°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 or 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):	1.00 kg/L
SOLUBILITY IN WATER (20°C):	Not soluble
VOLATILE ORGANIC COMPOUND (V.O.C.) CONTENT:	230 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 cause an emanation of carbonic gas which would lead to pressure increasing in closed container.
HAZARDOUS POLYMERISATION:	None

SECTION XI. TOXICOLOGICAL INFORMATION**TOXICOLOGICAL DATA:****Toluene (1):**

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

MDI (1):

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

MEK (1):

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

Asphalt, PGMEA, PTSI: No information available.

Effects of Short-Term (Acute) Exposure**INHALATION:**

Toluene: The major effect of toluene is on the central nervous system (CNS). Studies with rats have shown that up to approximately 1000 ppm causes excitation and increased activity. At approximately 2000 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 1000 ppm) and orally (620 mg/kg/day for 4 weeks). This effect has also been observed in a mouse strain that had a genetic predisposition to hearing loss. (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)

MEK: Very high concentrations have produced irritation of the nose and eyes, followed by central nervous system 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 3300 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)

Asphalt, PGMEA, PTSI: No information available.

EYE IRRITATION:

Toluene: Toluene is a mild eye irritant. In an OECD-compliant test, application of 0.1 ml undiluted toluene produced no to mild irritation in rabbits. Application of 0.1 ml of undiluted toluene in another OECD-compliant test protocol produced slight irritation in rabbits. Application of 0.005 ml of in excess of a 40% solution of toluene caused severe eye injury in rabbits. These results are not consistent with the reports that used undiluted toluene in OECD-compliant tests. The results of this study are therefore questionable. (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)

MEK: Application of 0.005 ml of undiluted methyl ethyl ketone (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)

Asphalt, PTSI: No information available.

SECTION XI. TOXICOLOGICAL INFORMATION

SKIN IRRITATION:

Toluene: Toluene is a moderate skin irritant. In an OECD-compliant test, administration of 0.5 ml of undiluted toluene to intact skin, under a semi-occlusive cover, for 4 hours produced moderate irritation in rabbits. Another OECD-compliant test, showed slight irritation in rabbits following the application of 0.5 ml of undiluted toluene for 4 hours. There is insufficient information provided to properly evaluate these test results. Other test protocols have shown moderate irritation in intact and abraded skin, with prolonged exposure (23 hours), and in a study that does not strictly meet OECD guidelines. Application of 0.5 ml of undiluted toluene for 4 hours, to intact and abraded skin, produced moderate irritation in rabbits. Application of 0.5 ml of undiluted toluene for 23 hours, to intact and abraded skin, produced moderate irritation in rabbits. Application of 0.01 ml of undiluted toluene produced moderate irritation in rabbits. (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)

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)

Asphalt, PTSI: No information available.

Effects of Long-Term (Chronic) Exposure

INHALATION:

Toluene: Daily inhalation by rats of toluene concentrations below 400 ppm for up to 24 months resulted in no significant toxicity. Evidence for chronic CNS neurotoxicity is inconclusive. Numerous studies on rats and mice have shown reduced performance on some neurobehavioral tests but not others, both during and after toluene inhalation exposures (usually at greater than 500 ppm). Where tests were repeated after an exposure-free period, most results were the same as controls. The significance of minor changes in brain cells or in behavioural tests is not known. (1)

PGMEA (rat, mouse): Repeated exposures at 300 and 1000 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 (3000 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)

MEK: Exposure to 5000 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 nor 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 6000 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 1125 ppm continuously for up to 55 days with no neurotoxicity. (1)

MDI, Asphalt, PTSI: No information available.

INGESTION:

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)

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)

Asphalt, PTSI: No information available.

CARCINOGENICITY:

Toluene: The International Agency for Research on Cancer (IARC) has concluded there is inadequate evidence for the carcinogenicity of toluene in experimental animals. Toluene was not carcinogenic in mice and rats exposed by inhalation to up to 1200 ppm for 24 months. (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. The International Agency for Research on Cancer has determined there is limited evidence for the carcinogenicity of a mixture containing monomeric and polymeric MDI to experimental animals. (1)

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

SECTION XI. TOXICOLOGICAL INFORMATION**TERATOGENICITY, EMBRYOTOXICITY, FETOTOXICITY:**

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 1200 or 1800 ppm toluene. These effects were observed in the absence of maternal toxicity. Rats (16/group) were exposed to 1800 ppm toluene or clean air on days 7-20 of pregnancy. The dose was targeted so as not to induce marked toxicity in the mothers and no toxicity was seen. Fetotoxicity, as evidenced by reduced birth weight, was observed in the offspring. (1)

MEK: One rat study indicated that fetotoxicity (skeletal anomalies) occurred at 1000 ppm. This study also points to teratogenicity at a higher dose (3000 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, 1000 and 3000 ppm on days 6 to 15 of gestation. At 3000 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 1000 ppm. Maternal toxicity was not observed. In subsequent studies, rats and mice were exposed to 0, 400, 1000 or 3000 ppm by inhalation during days 6 to 15 of gestation. There were no embryotoxic or teratogenic effects at any exposure level. At the 3000 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)

MDI, Asphalt, 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. Two generations of mice exposed intermittently by inhalation to 2000 ppm (6 hours/day, 7 days/week) had no reproductive effects. (1)

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

MUTAGENICITY:

Toluene: There is insufficient information available to conclude that toluene is mutagenic. There is some evidence that toluene can cause chromosome damage in vivo when administered to mice by injection, although conflicting results have been obtained and this route of exposure is not considered relevant to occupational situations. Negative results were obtained following oral administration. There is one report of positive results (chromosomal aberrations) in the bone marrow cells of rats exposed by inhalation. Insufficient details are available in English to evaluate this report. Positive and negative results have been obtained in tests using cultured mammalian cells. Negative results have been obtained in tests using bacteria. Positive and negative results have been obtained in fruit flies. (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)

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)

Asphalt, 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.

SECTION XIV. TRANSPORT INFORMATION

NAME OF PRODUCT:	Alsan LDH	IDENTIFICATION NUMBER:	UN 1263
CLASSIFICATION (TDG - DOT):	Class 3	SHIPPING NAME:	Paints
CONTAINERS FOLLOW THE STANDARDS OF:		PACKING GROUP:	II
Canada:	CAN / CGSB-43.150-97		
USA:	CFR 49 parts 100 to 199		

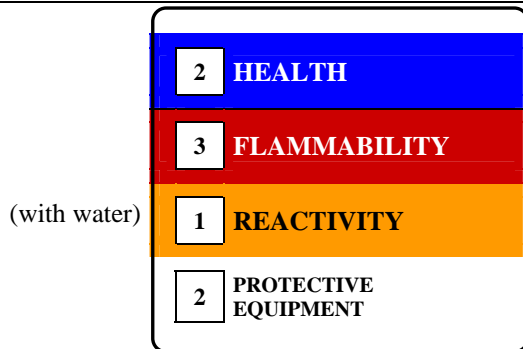
SECTION XV. REGULATORY INFORMATION

WHMIS: Class B2: Flammable material (flash point below 37.8°C)
 Class D1A: Very toxic material causing immediate and severe effects (LC50 of MDI)
 Class D2A: Very toxic material causing other toxic effects (respiratory sensitization, sensitization and skin irritation caused by the MDI)

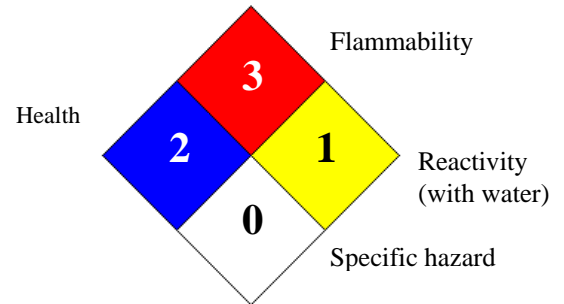
DSL: All constituents of this product are included on the Domestic Substances List (DSL – Canada)

TSCA: All constituents of this product are included on the Toxic Substances Control Act Inventory (TSCA – United States).

HMIS (USA):



NFPA (USA):



SECTION XVI. OTHER INFORMATION

Glossary:

ACGIH: American Conference of Governmental Industrial Hygienists
ANSI: American National Standards Institute
ASTM: American Society for Testing and Materials
CAS: Chemical Abstract Services
CFR: Code of Federal Regulations (United States)
CSA: Canadian Standardisation Association
DOT: Department of Transportation (United States)
DSL: Domestic Substances List (Canada)
EPA: Environmental Protection Agency (United States)
HMIS: Hazardous Material Information System
IARC: International Agency for Research on Cancer
LC50: (Lethal concentration₅₀) Concentration of a substance in air that causes death of 50% mortality of a defined animal population
LD50: (Lethal dose₅₀) Single dose of a substance that, when administered by a defined route in an animal assay, is expected to cause the death of 50% of a defined animal population.
NFPA: National Fire Protection Association (United States)
NIOSH: National Institute for Occupational Safety and Health
NTP: National Toxicology Program
OSHA: Occupational Safety & Health Administration (United States)
PEL: Permissible Exposure Limit
RCRA: Resource Conservation and Recovery Act (United States)
RTECS: Registry of Toxic Effects of Chemical Substances
TDG: Transportation of Dangerous Goods
TLV: Threshold Limit Value
TWA: Time-weighted average
TSCA: Toxic Substances Control Act (United States)
WHMIS: Workplace Hazardous Materials Information System (Canada)

References:

(1) CHEMINFO (2007) Canadian Centre of Organisational Health and Safety, Hamilton (Ontario) Canada

This MSDS has been prepared by: Marie-Claude Fontaine
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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 Exposure Limit (TLV-TWA) of Toluene. (Section II)

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.

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