MATERIAL SAFETY DATA SHEET

# ALSAN 500 F

| HMIS | PROTECTIVE CLOTHING | TRANSPORT OF DANGEROUS GOODS |
|---|---|---|
| 2 HEALTH<br>3 FLAMMABILITY<br>1 REACTIVITY<br>B PROTECTIVE EQUIPMENT |  |  <br>**PAINT**<br>**CLASS 3**<br>**UN 1263**<br>**P.G.: III** |

## SECTION II. CHEMICAL PRODUCT AND COMPANY INFORMATION

| | |
|---|---|
| **Product name:** | Alsan 500 F |
| **Use:** | Waterproofing polyurethane colored resin single-component used for finishing |
| **Manufacturer:** | Soprema, Inc.<br>310 Quadral Drive<br>Wadsworth, Ohio 44281<br>UNITED STATES |
| **Distributor:** | Soprema, Inc.<br>310 Quadral Drive<br>Wadsworth, Ohio 44281<br>UNITED STATES |
| **In case of emergency:** | SOPREMA (8:00am to 5:00pm - Eastern time): (800) 356-3521<br>CHEMTREC (USA) (24h.): (800) 424-9300<br>CANUTEC (Canada): (613) 996-6666<br>International: (703) 527-3887 |

## EMERGENCY OVERVIEW!!!

**Caution! Flammable liquid and vapours. The vapours are heavier than air and may spread long distances to a distant ignition source (such as a pilot light, and any object that sparks, such as an electric motor) and flash back.**
**May cause irritation to eyes, skin and respiratory tract. Harmful if inhaled. High vapour concentrations may cause depression of central nervous system (headache, nausea, dizziness, drowsiness, incoordination and unconsciousness). Harmful or fatal if swallowed. Ingestion of the product can cause severe lung injury when aspirated. May cause cancer. This product contains isocyanates. May cause allergic or asthmatic symptoms or breathing difficulties if inhaled. May cause allergic skin reaction. Irritating and/or toxic gases or fumes may be generated by thermal decomposition or combustion.**
**This product contains chemicals known to the state of California to cause cancer or reproductive toxicity.**

| SECTION II. COMPOSITION AND INFORMATION ON DANGEROUS INGREDIENTS | | | | |
|---|---|---|---|---|
| **Component** | **CAS#** | **% WEIGHT** | **EXPOSURE LIMIT (ACGIH)** | |
| | | | **TLV-TWA** | **TLV-STEL** |
| Light aromatic solvent naphtha (C8 to C10) | 64742-95-6 | 7-13 | Not established | Not established |
| Propyleneglycol methylethyl acetate (PGMEA) | 108-65-6 | 5-10 | 50 ppm | Not established |
| Toluene | 108-88-3 | 3-7 | 20 ppm | Not established |
| Carbamic acid, 1,6-hexanediylbis-, bis [2-[2-(1-methylethyl)-3-oxazolidinyl]ethyl] ester | 59719-67-4 | 1-5 | Not established | Not established |
| Calcium oxide | 1305-78-8 | 1-5 | 2 $mg/m^3$ | Not established |
| Isophorone diisocyanate (IPDI) | 4098-71-9 | 0.1-1 | 0.005 ppm | Not established |
| Benzoyl Chloride | 98-88-4 | 0.1-1 | 0.5 ppm | 1 ppm |
| Para-toluene sulfonyl-isocyanate | 4082-64-1 | 0.1-1 | Not established | Not established |
| Tris(nonylphenyl)phosphite | 26523-78-4 | 0.5-1.5 | Not established | Not established |
| Carbon black | 1333-86-4 | 0.1-1 | 3.5 $mg/m^3$ (breathable dust) | Not established |
| Xylene | 1330-20-7 | 0.1-1 | 100 ppm | 150 ppm |
| N-(trichloromethylthio)phthalimide | 133-07-3 | 0.1-1 | Not established | Not established |
| Toluene Diisocyanate (TDI) | 26471-62-5 | 0.1-1 | 0.005 ppm | 0.2 ppm |

## SECTION III. POTENTIAL HEALTH EFFECTS

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

**INHALATION:**

**Light aromatic solvent naphtha:** Forms high vapour concentration at normal temperatures. Mists or vapours can probably cause headache, nausea, dizziness, reduced concentration, incoordination and other symptoms of central nervous system depression. There is no specific human or animal information, but these effects have been observed in animals and humans exposed to comparable materials. (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 (PGMEA) vapour or mist would be expected. (1)

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 have caused mental confusion and incoordination. (1)

**Carbamic acid, 1,6-hexanediylbis-, bis [2-[2-(1-Methylethyl)-3-oxazolidinyl] ethyl] ester:** Harmful, and may cause sensitization by inhalation. Based on the available properties of the isocyanate content of this product, respiratory exposure may cause acute irritation and/or sensitization of the respiratory system, resulting in asthmatic symptoms, wheezing and a tightness of the chest. Sensitized persons may subsequently show asthmatic symptoms when exposed to airborne concentrations of isocyanates well below the occupational exposure limit. Repeated exposure may lead to permanent respiratory disability. Exposure to organic vapours may result in adverse health effects, especially when used in confined / unventilated areas, such as irritation of the mucus membrane and the respiratory system and adverse effects on the renal and central nervous systems. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases loss of consciousness. (2)

**IPDI:** Reports of occupational exposures to isophorone diisocyanate (IPDI) are restricted to spray painting operations. IPDI has a very low vapour pressure and airborne exposures are unlikely to occur unless IPDI is heated or forms an aerosol or mist during spraying operations. IPDI aerosol or mist can cause respiratory tract and mucous membrane irritation. Typical symptoms include eye and nose irritation, dry or sore throat, runny nose, shortness of breath, difficulty in breathing, 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. Short (1 to 5 minutes) exposures of volunteers to IPDI aerosol levels of 0.64 $mg/m^3$ caused slight throat irritation. Aerosol levels of 1.37 $mg/m^3$ caused unbearably strong nose and throat irritation. At 0.25 $mg/m^3$, the odour was hardly perceptible. High aerosol concentrations could cause inflammation of the lungs (chemical pneumonitis), chemical bronchitis with severe asthma-like wheezing, severe coughing spasms and accumulation of fluid in the lungs (pulmonary oedema) which could prove fatal. Symptoms of pulmonary oedema may not appear until several hours after exposure and are aggravated by physical exertion. Some people may become sensitized to IPDI. (1)

**Para-toluene sulfonyl-isocyanate:** Isocyanate vapour/mists at concentration above the exposure limits can irritate (burning sensation) the mucous membranes in the respiratory tract. (2)

## SECTION III. POTENTIAL HEALTH EFFECTS

*Effects of Short-Term (Acute) Exposure*

**INHALATION (continued):**

**Carbon Black:** Carbon black does not appear to cause significant harmful effects after a single short-term exposure, except general effects that would be expected with any dust (high concentrations can cause coughing and mild, temporary irritation). (1)

**Xylene:** The main effect of inhaling xylene vapour is depression of the central nervous system (CNS) with symptoms such as headache, dizziness, nausea and vomiting. Volunteers have tolerated 100 ppm, but higher concentrations become objectionable. Irritation of the nose and throat can occur at approximately 200 ppm after 3 to 5 minutes. Exposures estimated at 700 ppm have caused nausea and vomiting. Extremely high concentrations (approximately 10,000 ppm) could cause incoordination, loss of consciousness, respiratory failure and death. In some cases, a potentially fatal accumulation of fluid in the lungs (pulmonary oedema) may result. Symptoms of pulmonary oedema, such as shortness of breath and difficult breathing, may be delayed several hours after exposure. However, these effects are rarely seen since xylene is irritating and identifiable by odour at much lower concentrations. The only reported death resulted from exposure to xylenes (unspecified isomer composition and unknown concentration) in a confined space. Reversible liver and kidney damage has been reported in cases of severe xylene exposure. Results of short-term studies on human volunteers indicate that xylenes can cause neurobehavioral effects such as impaired short-term memory and reaction time (300 ppm mixed xylenes, with exercise) and alterations in body balance (65 to 400 ppm m-xylene). Exposure to 300 or 400 ppm, mixed xylenes or 65 to 150 ppm p-xylene has not had similar effects. This variation in results is probably due to differences in the effects being studied, exposure conditions, development of tolerance and total xylene uptake (which increases during exercise). (1)

**N-(trichloromethylthio)phthalimide:** May be fatal if inhaled. (2)

**TDI:** Short-term exposure to isocyanates, such as toluene diisocyanate (TDI), can cause respiratory and mucous membrane irritation at vapour levels of 0.05 ppm and above. Symptoms include eye and nose irritation, dry or sore or burning 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 for several hours. High exposures could cause inflammation of the lung tissue (chemical pneumonitis), chemical bronchitis with severe asthma-like wheezing, severe coughing spasms and accumulation of fluid in the lungs (pulmonary oedema), which could prove fatal. Symptoms of pulmonary oedema may not appear until several hours after exposure and are aggravated by physical exertion. Effects such as euphoria, muscle incoordination and loss of consciousness have been reported after a single severe exposure to TDI. Headache, difficulty in concentration, poor memory and confusion may persist for up to 4 years. (1)

**SKIN CONTACT:**

**Light aromatic solvent naphtha:** Is probably not a skin irritant, based on animal information. There is no human information available. (1)

**Carbamic acid, 1,6-hexanediylbis-, bis [2-[2-(1-Methylethyl)-3-oxazolidinyl] ethyl] ester:** May cause sensitization by skin contact. (2)

**IPDI:** Liquid IPDI can cause severe skin irritation. Prolonged contact can cause severe inflammation with redness, rash, swelling and blistering. Isocyanates, in general, can cause skin discolouration (staining) and hardening of the skin after repeated exposures. IPDI caused severe skin irritation when applied to rabbit skin. IPDI is a very strong skin sensitizer. Skin sensitization may occur after only one contact with IPDI. (1)

**Benzoyl Chloride:** Benzoyl chloride is corrosive to skin based on animal information and because it reacts violently with moisture to produce heat, benzoic acid and hydrogen chloride gas, and with air to form corrosive fumes. Corrosive materials are capable of producing severe burns, blisters, ulcers and permanent scarring, depending on the concentration of the solution and the duration of contact. No human information was located. (1)

**Para-toluene sulfonyl-isocyanate:** Skin irritant. (2)

**Tris(nonylphenyl)phosphite:** Causes skin irritation. (2)

**Carbon Black:** Carbon black is not irritating to the skin. (1)

**Xylene:** Studies with xylene isomers have shown irritation, redness and a burning sensation can result from contact. These effects are reversible shortly (usually within 1 hour) after the contact stops. Xylene liquid or vapour can be absorbed through the skin, but not as readily as when inhaled or ingested. Significant harmful effects are not expected by this route of exposure. (1)

**N-(trichloromethylthio)phthalimide:** May cause an allergic skin reaction. (2)

**TDI:** Liquid TDI produces a marked inflammatory reaction. Prolonged or further contact can cause severe inflammation, redness, rash, swelling, blistering and burns. Isocyanates, in general, can cause skin discolouration (staining) and hardening of the skin after repeated exposures. Skin contact is not expected to result in the absorption of harmful amounts. Skin sensitization may occur in some individuals, but it is not common. TDI vapour and aerosols may also cause skin irritation. Usually, this only happens at levels higher than those that cause respiratory effects. (1)

**EYE CONTACT:**

**Light aromatic solvent naphtha:** Is probably not an eye irritant, based on animal information (1)

**Carbamic acid, 1,6-hexanediylbis-, bis [2-[2-(1-Methylethyl)-3-oxazolidinyl] ethyl] ester:** May cause irritation. (2)

## SECTION III. POTENTIAL HEALTH EFFECTS

**EYE CONTACT (continued):**

**IPDI:** IPDI liquid, aerosol or mist can cause eye irritation. People exposed to IPDI aerosol levels of 0.64 mg/m³ experienced slight eye irritation, while aerosol levels of 1.37 mg/m³ caused strong eye irritation. Liquid IPDI caused severe eye damage when applied to rabbit eyes. (1)

**Benzoyl** Chloride: Benzoyl chloride is corrosive to eyes based on animal information and because it reacts violently with moisture to produce heat, benzoic acid and hydrogen chloride gas, and with air to form corrosive fumes. Corrosive materials are capable of producing severe eye burns, and permanent injury, including blindness, depending on the concentration of the solutions and duration of contact. No human information was located. (1)

**Para-toluene sulfonyl-isocyanate:** Contact with eyes can cause severe damage. (2)

**Tris(nonylphenyl)phosphite:** May cause eye irritation. (2)

**Carbon Black:** Carbon black dust is not irritating to the eyes except as a "foreign object". (1)

**Xylene:** The liquid is probably a mild irritant, based on animal information. Eye irritant has been reported at vapour levels as low as 200 ppm. Corneal vacuoles (pockets of fluid or air in the cornea) have also been reported following exposure to undefined vapour concentrations. This effect was reversible within 8 to 11 days for 7 of 8 workers. (1)

**N-(trichloromethylthio)phthalimide:** Causes severe eye irritation. May cause tissue damage. (2)

**TDI:** Liquid TDI can cause watering of the eyes, severe irritation and possible clouding of the cornea. Exposure to high TDI vapour concentrations can lead to formation of solid particles in the eye fluid which can cause mechanical irritation hours after exposure. (1)

**INGESTION:**

**Light aromatic solvent naphtha:** Animal toxicity information indicates that this product is not very toxic following ingestion. Ingestion of large amounts would produce symptoms of central nervous system depression, as described in "Inhalation" above. Like other petroleum distillates, it may cause an aspiration hazard. If it is drawn into the lungs during ingestion or vomiting, it could cause a potentially life-threatening accumulation of fluid (pulmonary oedema). Ingestion is not a typical route of occupational exposure. (1)

**Carbamic acid, 1,6-hexanediylbis-, bis [2-[2-(1-Methylethyl)-3-oxazolidinyl] ethyl] ester:** May cause discomfort and risk of lung damage if vomiting results. (2)

**IPDI:** There have been no reports of people ingesting IPDI and ingestion is unlikely to occur in the workplace. Animal studies indicate that IPDI has low oral toxicity. Ingestion could cause irritation of the tissues of the mouth, throat and digestive tract. (1)

Para-toluene sulfonyl-isocyanate: May cause severe irritation of the mouth, oesophagus and stomach. (2)

Xylene: Based on animal information, xylene is only slightly toxic by ingestion. Ingestion of large amounts is likely to cause CNS effects such as dizziness, nausea and vomiting. In one case, ingestion of food probably contaminated with xylene caused pulmonary oedema, liver impairment and coma. The man recovered within 2 hours after treatment. Ingestion is not a common route of occupational exposure. Although there are no case reports, xylene may be aspirated, based on its physical properties (viscosity and surface tension). Aspiration is the inhalation of a material into the lungs during ingestion or vomiting. Severe lung irritation, damage to the lung tissues and death may result. (1)

**N-(trichloromethylthio)phthalimide:** Not a hazard under normal use conditions. (2)

**TDI:** TDI is not expected to be toxic if ingested based on animal toxicity values. Swallowing TDI could cause irritation and corrosion of the tissues lining the mouth, throat and stomach. Ingestion is not a typical route of occupational exposure. (1)

### *Effects of Long-Term (Chronic) Exposure*

**SKIN CONTACT:**

**Light aromatic solvent naphtha:** Repeated or prolonged contact may cause red, dry, itchy, scaling skin (dermatitis). (1)

Carbon Black: Fine particles can become embedded in the skin and trapped in hair follicles causing discolouration (carbon black "tattoos") and follicular blackheads. (1)

**SKIN SENSITIZATION:**

**IPDI:** IPDI is a very strong sensitization agent. Sensitization may occur after a single exposure or develop gradually over time. Symptoms include a rash on the hands, arms, neck, face, chest or abdomen even upon contact with a small amount of IPDI. Other effects such as coughing, a burning sensations in the throat, or redness and swelling of the eyes. In a case study, a single 1-hour exposure to IPDI caused a rash in 3 of 4 workers. Only one worker had previous contact with IPDI, the rest had worked with TDI and MDI (suggesting cross-sensitization). Cross-sensitivity has been shown to occur between IPDI and isophorone diamine (IPD). (1)

**Tris(nonylphenyl)phosphite:** May cause skin sensitization. (2)

**Xylene:** Repeated contact can produce dermatitis (dryness and cracking) due to degreasing action. Skin sensitization was not produced in any of 24 volunteers. There is one case report of a person developing an allergic skin reaction (contact urticaria) following exposure to xylene (unspecified composition) vapour. The person subsequently tested positive in a patch test. No information was provided regarding previous history of allergies. No conclusions can be drawn regarding the potential for xylene to produce allergic skin reactions, based on this single case report. (1)

## SECTION III. POTENTIAL HEALTH EFFECTS

**SKIN SENSITIZATION (continued):**

**TDI:** Repeated skin contact with TDI has caused skin sensitization in humans, although the condition is not common. Once a person is sensitized, contact with even a small amount of TDI can cause outbreaks of dermatitis with symptoms such as redness, rash, itching and swelling. This can spread from the hands or arms to the face and body. Some people who inhaled TDI developed extensive skin rashes that lasted 1-1.5 weeks. There was no direct skin contact with the liquid. (1)

**INHALATION:**

**Carbon Black:** Carbon black dust is extremely fine and light and can be breathed deeply into the lungs, where it can accumulate. Normally the dust is cleared gradually from the lungs and has no harmful effects. However, high concentrations of dust can overwhelm the clearance capacity of the lungs, obstruct the lungs, and interfere with lung function. Symptoms may include coughing, increased phlegm production, and shortness of breath. It is unlikely that toxic amounts of this product would be ingested with normal handling and use. (1)

**RESPIRATORY SENSITIZATION:**

**IPDI:** In general, isocyanates are well known to cause respiratory sensitization. There are two case reports of respiratory sensitization caused by exposure to IPDI in spray paint. It has been suggested that IPDI is a weak respiratory sensitizer. Isocyanate respiratory 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 airborne isocyanates 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, tightness of the chest, shortness of breath, difficulty 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), several hours after exposure or both, and/or at night. Typically, the asthma improves with removal from exposure (e.g. weekends or vacations) and returns, in some cases, in the form of an “acute attack”, on renewed exposure. Sensitized people who continue to be exposed to isocyanates at work may develop symptoms sooner after each exposure. The number and severity of symptoms may increase. Following removal from isocyanate exposure, some sensitized people may continue to show a slow decline in lung function and have persistent respiratory problems, such as chronic bronchitis for months or years. Others may recover fully and gradually lose their sensitivity within several years. Cross-sensitization between different isocyanates may occur. Exposure to isocyanates is likely to aggravate individuals with existing respiratory disease, such as chronic bronchitis and emphysema. (1)

**Para-toluene sulfonyl-isocyanate:** May cause sensitization by inhalation. This product is a recognized allergen that can cause chronic respiratory obstructive airway diseases. (2)

**TDI:** Respiratory sensitization has developed in people working with TDI. Sensitization is usually caused by a very large exposure, or by multiple exposures. However, symptoms of sensitization have occurred in some workers exposed frequently to low levels of TDI (0.0003 to 0.03 ppm). 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 TDI (below 0.001 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, difficulty 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), several hours after exposure or both, and/or at night. Typically, the asthma improves with removal from exposure (e.g. weekends or vacations) and returns, in some cases, in the form of an “acute attack”, on renewed exposure. Sensitized people who continue to work with TDI may develop symptoms sooner after each exposure. The number and severity of symptoms may increase. Death has occurred in sensitized individuals accidentally exposed to relatively low concentrations of TDI. Animal studies indicate that respiratory sensitivity to TDI may result from dermal as well as inhalation exposures. Following removal from exposure, some sensitized workers may continue to show a slow decline in lung function and have persistent respiratory problems such as asthmatic symptoms, chronic bronchitis and hypersensitivity to TDI for months or years. Others recover complete lung function within months if they have no further isocyanate exposure. TDI may also cause hypersensitivity pneumonitis, another allergic lung disease, which is characterized by symptoms such as shortness of breath, fever, malaise, non-productive cough, and chills. Several studies have shown that long-term exposure to TDI at levels as low as 0.002-0.003 ppm may cause impaired lung function such as diminished respiratory capacity. Cross-sensitization between different isocyanates may occur. People sensitized to TDI have shown sensitization to methylene bisphenyl isocyanate (MDI) and hexamethylene-1,6-diisocyanate (HDI), where no previous exposure to MDI or HDI was known. Exposure to isocyanates is likely to cause aggravation to individuals with existing respiratory disease, such as chronic bronchitis, and emphysema. (1)

**PGMEA, Toluene, Calcium oxide:** No human or animal information is available.

**NERVOUS SYSTEM:**

**Light aromatic solvent naphtha:** Long-term, high level exposure to organic solvents has been associated with a condition called “organic solvent syndrome”. Symptoms such as excessive fatigue, reduced memory, pain and numbness in the legs, arms, hands and feet and behavioural changes have been observed in some people with long-term, high-level occupational exposure to organic solvents. (1)

## SECTION III. POTENTIAL HEALTH EFFECTS

**NERVOUS SYSTEM (continued):**

**Toluene:** Inhalation of solvent such as toluene 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)

**Xylene:** Long-term xylene exposure may cause harmful effects on the central nervous system, but there is not enough information available to draw firm conclusions. Symptoms such as headaches, irritability, depression, insomnia, agitation, extreme tiredness, tremors, and impaired concentration and short-term memory have been reported following long-term occupational exposure to xylene and other solvents. This condition is sometimes generally referred to as "organic solvent syndrome". Unfortunately, there is very little information available which isolates xylenes from other solvent exposures in the examination of these effects. Other study deficiencies include inadequate reporting on the duration of exposure and the exposure levels, and poor matching of controls. In a recent study, 175 employees were exposed to an average xylene concentration of 21 ppm for an average of 7 years. Subjective symptoms such as anxiety, forgetfulness, inability to concentrate and dizziness were reported. Xylenes accounted for greater than 70% of the total exposure. This study is also limited by factors such as those described above. (1)

**PGMEA, Calcium Oxide, Carbon Black:** 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)

**Xylene:** BLOOD EFFECTS: Historical reports sometimes associate xylene exposure with certain blood effects, including leukemia, which are now known to be caused by benzene. Uncontaminated xylene is not known to cause these effects. Reduced blood platelet counts were observed in 12 of 27 men exposed to mixed xylene (unspecified composition) at a level up to 200 ppm. When exposure stopped, platelet counts returned to normal. There is insufficient information to draw any conclusions from this study. LIVER AND KIDNEY EFFECTS: A number of case reports and occupational studies have suggested that liver and kidney damage may result from long-term occupational exposure to xylene. However, it is not possible to attribute these effects directly to xylene exposure because generally there was exposure to other chemicals at the same time, particularly other solvents, and there was no information provided on the exposure levels or duration of exposure. In a recent study, 175 employees were exposed to a mean xylene concentration of 21 ppm for an average of 7 years. Liver and kidney effects were not reported. Xylenes accounted for greater than 70% of the total exposure. (1)

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

**CARCINOGENICITY:**

**Light aromatic solvent naphtha:** There is no human or animal 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 no listing for this chemical. The US National Toxicology Program (NTP) has not listed this chemical in its report on carcinogens. (1)

**PGMEA, Calcium Oxide:** 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 of these chemicals. The US National Toxicology Program (NTP) has not listed these chemicals in its report on carcinogens. (1)

**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)

## SECTION III. POTENTIAL HEALTH EFFECTS

**CARCINOGENICITY (continued):**

**IPDI:** No human or animal information is available on the carcinogenicity of IPDI. 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)

**Benzoyl Chloride:** Small human population studies have shown an increase in lung cancers in employees with combined exposure to benzoyl chloride and alpha-chlorinated toluenes. The International Agency for Research on Cancer (IARC) has determined that there is limited evidence for the combined exposure of alphachlorinated toluenes and benzoyl chloride to humans. There is inadequate evidence for the carcinogenicity of benzoyl chloride to experimental animals. The International Agency for Research on Cancer (IARC) has concluded that this chemical is probably carcinogenic to humans (Group 2A). 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)

**Carbon Black:** The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for the carcinogenicity of carbon black to humans and that there is sufficient evidence that carbon black is carcinogenic to experimental animals. The International Agency for Research on Cancer (IARC) has concluded that this chemical is possibly carcinogenic to humans (Group 2B). 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)

**Xylene:** Xylene has been mentioned as an exposure in 4 case-control studies. Cancers at most sites were not significantly associated with xylene exposure in any study. Most results were based on small numbers, most studies involved exposure to other potentially harmful substances, and the consistency of findings is weak. Therefore, the International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of xylene in humans. No conclusions can be drawn from the available animal information. 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)

**TDI:** The International Agency for Research on Cancer (IARC) has concluded that this chemical is possibly carcinogenic to humans (Group 2B). The American Conference of Governmental Industrial Hygienists (ACGIH) has designated this chemical as not classifiable as a human carcinogen (A4). ACGIH has published a Notice of Intended Change proposing that the carcinogenicity designation be changed to A3 (animal carcinogen). The US National Toxicology Program (NTP) has listed this chemical as reasonably anticipated to be a human carcinogen. (1)

**TERATOGENICITY, EMBRYOTOXICITY, FETOTOXICITY:**

**Light aromatic solvent naphtha:** There is no human information available. Harmful effects have been observed in the offspring of rats and mice exposed by inhalation, but only in the presence of 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)

**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 of 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 in general or to some 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 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)

## SECTION III. POTENTIAL HEALTH EFFECTS

**TERATOGENICITY, EMBRYOTOXICITY, FETOTOXICITY (continued):**

**Xylene:** Several human population studies have suggested a link between exposure to organic solvents (including xylene) and increased occurrence of miscarriages or birth defects in children. However, in the majority of cases, there was exposure to a variety of solvents at the same time, exposures were ill-defined, and the number of cases examined was small. Overall, no conclusions can be made on the effects of exposure to xylenes on the unborn child because of the inadequacy of the available information. Xylene (mixed isomers) has produced fetotoxic effects (delayed ossification and behavioural effects) in animals, in the absence of maternal toxicity. Animal information suggests that xylenes are not teratogenic or embryotoxic at exposure levels that are not harmful to the mother. (1)

**IPDI, TDI, Calcium Oxide, Carbon Black:** No human or animal information is available. (1)

**REPRODUCTIVE TOXICITY:**

**Light aromatic solvent naphtha:** There is no human information available. A three-generation study showed no consistent effects on reproductive parameters in rats, despite significant toxicity. (1)

**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)

**Xylene:** An increase in menstrual disorders has been reported in women exposed to organic solvents such as benzene, toluene and xylenes. It is not possible to attribute these effects to xylenes in particular. The limited animal information available suggests that xylenes do not cause reproductive effects. (1)

**IPDI, PGMEA, TDI, Calcium Oxide, Carbon Black:** No human or animal information is available. (1)

**MUTAGENICITY:**

**Light aromatic solvent naphtha:** No reports of mutagenicity in humans or human cell cultures were located. Consistently negative results have been obtained in studies using live animals, cultured mammalian cells and bacteria. (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. 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)

**Xylene:** There have been a few studies investigating the mutagenic potential of mixed xylenes (undefined composition) in workers exposed occupationally. In one study, xylene contained ethylbenzene, and in the other there was co-exposure to other solvents including benzene. These studies (induction of sister chromatid exchanges and chromosomal aberrations in human lymphocytes [white blood cells]) were negative. Negative results were also obtained in a study where volunteers were exposed to 40 ppm mixed xylenes over two weeks. However, no conclusions can be drawn because of limitations such as small study populations and exposure to other chemicals at the same time. There were no increases in chromosome aberrations and sister chromatid exchanges without metabolic activation, in cultured human lymphocytes. (1)

**IPDI:** No studies are available. (1)

**PGMEA, Calcium Oxide, Carbon Black:** No human or animal information is available.

**TDI:** It is not possible to conclude that TDI is mutagenic. There is no human information available. (1)

**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)

**Xylene:** Exposure to related solvents, such as benzene, toluene and ethanol (alcohol) slows the rate of clearance of xylenes from the body, thus enhancing its toxic effects. Exposure to xylene in combination with other solvents has had an additive effect with respect to harming the hearing of rats. (1)

**IPDI, PGMEA, TDI, Calcium Oxide:** No human or animal information is available. (1)

**POTENTIAL FOR ACCUMULATION:**

**Light aromatic solvent naphtha:** Probably does not accumulate in the body. In general, alkyl benzenes are metabolized in the liver and converted to substituted benzoic acids and phenols. Phenolic compounds are subsequently metabolized and excreted in 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)

## SECTION III. POTENTIAL HEALTH EFFECTS

**POTENTIAL FOR ACCUMULATION (continued):**

**IPDI:** Information about the absorption, metabolism and excretion of IPDI is limited. Like other isocyanates, it probably does not accumulate. (1)

**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)

**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)

**Xylene:** The three xylene isomers are readily absorbed by inhalation and ingestion and are widely distributed throughout the body. A small amount may be absorbed through the skin. Xylenes are largely broken down by the liver and most of the absorbed material is rapidly excreted in the urine as breakdown products. Small amounts are eliminated unchanged in the exhaled air. There is low potential for accumulation. (1)

**TDI:** TDI probably does not accumulate in the body. It can enter the body by inhalation or by ingestion. It is probably metabolized to toluenediamine, which is metabolized further and excreted. (1)

## 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 immediate 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.

**TDI:** Symptoms of pulmonary oedema can be delayed up to 48 hours after exposure. (1)

**INGESTION:**

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 Class IC (NFPA 30)

**EXPLOSION DATA:**

**Sensitivity to mechanical impact:** No

**Sensitivity to static charge:** Can accumulate static charge by flow, agitation or pouring. Vapours from the heated liquid at concentrations in the flammable range, can probably be ignited by a static discharge.

**FLASH POINT:** ~ 30°C

**AUTO-IGNITION TEMPERATURE :** Not available

**FLAMMABILITY LIMITS IN AIR:** (% in volume) Not available

**FIRE AND EXPLOSION HAZARDS:**

This product and its vapours are easily ignited by heat, sparks or flames. Vapours may form explosive mixtures with air. 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 (1-methoxy-2-methylene (vinyl ether), acetic acid, carbon oxides, nitrogen oxides, nitrous acids, trace of hydrocyanic acid, trace of hydrochloric acid, formaldehyde, acetaldehyde, methylglyoxal, hydrogen cyanide, phosphorous oxides). Toxic and/or irritating gases or fumes can emanate from empty containers when submitted to high temperatures.

**FIRE FIGHTING INSTRUCTIONS:**

Irritating and/or toxic gases or fumes may be generated by thermal decomposition or combustion. Approach fire from upwind. Evacuate area 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. Wear self-contained breathing apparatus and appropriate protective clothing in accordance with standards. Stop leak before attempting to put out the fire. Move containers from fire area if this can be done without risk. If leak cannot be stopped, and if there is no risk to the surrounding area, let the fire burn itself out. Cool containers with flooding quantities of water until well after fire is out.

## SECTION V. FIRE-FIGHTING MEASURES

**FIRE FIGHTING INSTRUCTIONS (continued):**

**TDI:** Water or water-based foam, if used in very large quantities, may be effective for fighting fires involving toluene diisocyanate (TDI). However, care must be taken since the reaction between water or water-based foam and not TDI can be vigorous. TDI and its decomposition products, such as hydrogen cyanide and nitrogen oxides, are extremely hazardous to health. (1)

**MEANS OF EXTINCTION:**

Dry chemical powder, $CO_2$, 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 with absorbents or cover with 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. Wash spill area with soap and water. Prevent entry into waterways, sewers, and basements. Dispose of this product according to environmental regulations.

## SECTION VII. HANDLING AND STORAGE

**HANDLING:**

This product is flammable and toxic. Avoid contact with eyes, skin and clothing. Do not ingest. Avoid breathing vapour or dust. Wash thoroughly after handling. 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. Tightly reseal all partially used containers. Do not cut, puncture or weld empty containers.

**STORAGE:**

Store in a cool well-ventilated area out of direct sunlight and away from moisture, 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 labeled.

## SECTION VIII. EXPOSURE CONTROLS / PERSONAL PROTECTION

| | |
|---|---|
| **HANDS** | Wear gloves made from butyl rubber, polyvinyl alcohol or Teflon. |
| **RESPIRATORY** | If the exposure limit 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 VAPORS** | Local exhaust is needed to control vapour and dust level to below recommended limits. |

## SECTION IX. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **PHYSICAL STATE** | Liquid |
| **ODOR AND APPEARANCE** | Grey liquid with solvent odor |
| **ODOR THRESHOLD** | Not available |
| **VAPOR DENSITY (air = 1)** | Heavier than air |
| **EVAPORATION RATE (ether = 1)** | Not available |
| **BOILING POINT (760 mm Hg)** | Not available |
| **FREEZING POINT** | Not available |
| **SPECIFIC GRAVITY ($H_20$ = 1)** | 1.09 |
| **SOLUBILITY IN WATER (20° C)** | Insoluble |
| **VOLATILE ORGANIC COMPOUND (VOC) CONTENT** | 280 g/L |
| **VISCOSITY** | 1500 cP |

## SECTION X. STABILITY AND REACTIVITY

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

**INCOMPATIBILITY:**
Keep away from oxidizing agent and from highly acid or basic materials to avoid exothermic reactions.
**Strong oxidizing agents** - Reacts violently with fire or explosion risk.
**Water** – Reacts non-violently at room temperature with release of heat to form carbon dioxide and inert material made up of polyureas which could rupture closed containers. Toluenediamine is formed as an intermediate product in the reaction. Above 50°C, the reaction becomes progressively more vigorous.
**Amines, alcohols, acids, or bases** – May react violently with generation of heat. METAL COMPOUNDS (e.g. organometallic catalysts, such as organotin compounds) – May polymerize with the generation of heat and pressure.
**Alkaline metals** – The reaction is exothermal and flammable compounds can emanate.
**Metal compounds (e.g. organometallic catalysts, such as organotin compounds)** – May polymerize with the generation of heat and pressure.
**Halogens** – The reaction is exothermal and flammable compounds can emanate.
**Amides, phenols, mercaptans, urethanes, ureas and surface active agents (surfactants, e.g. non-ionic detergents)** – May react vigorously or violently with the generation of heat. (1)

**HAZARDOUS DECOMPOSTION PRODUCTS:**
This product slowly reacts with water and may cause an emanation of carbonic gas which would lead to pressure increasing in closed containers. Peroxides can also form and generate the same situation. TDI will produce toluenediamine in reaction with water. IPDI will form isophorone diamine by contact with water.

**HAZARDOUS POLYMERIZATION:**
IPDI can be subjected to an uncontrolled exothermal polymerisation in case of contact with incompatible materials, more specifically strong bases, some metallic compounds and heat. TDI can be subjected to an uncontrolled exothermal polymerisation by contact with water at high temperatures.

**STABILITY AND REACTIVITY COMMENTS:**
Isocyanates are very reactive compounds and are highly reactive toward a large number of compounds with active hydrogens, particularly at high temperatures and in the presence of catalysts. (1)

## SECTION XI. TOXICOLOGICAL INFORMATION

**TOXICOLOGICAL DATA**

| | | |
|---|---|---|
| Light aromatic solvent naphtha: (1) | LD50 (oral, rat): | 2900-3200 mg/kg (unconfirmed) |
| 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 |
| Tri(nonylphenyl)phosphite: (2) | LD50 (inhalation, rat): | > 2000 mg/kg |
| TDI: (1) | LC50 (inhalation, rat): | 14 ppm (4-hour exposure) (composition unspecifed) |
| | LD50 (oral, rat): | > 4000 mg/kg (80% 2,4-TDI: 20% 2,6-TDI) |
| | LD50 (dermal, rabbit): | 10,000 mg/kg (composition unspecified) |
| Carbon black: (1) | LC50 (inhalation, rat): | 6 750 mg/kg (4-hour exposure) |
| | LD50 (oral, rat): | Not available |
| | LD50 (dermal, rabbit): | Not available |
| N-(trichloromethylthio)phthalimide: (1) | LC50 (inhalation, rat): | 1.89 mg/1 (4-hour exposure) |
| | LD50 (oral, rat): | > 9 000 mg/kg |
| | LD50 (dermal): | > 2 000 mg/kg |
| Benzoyl chloride: (1) | LC50 (rat): | 230 ppm (4-hour exposure); cited as 1.87 mg/L (2-hour exposure) |
| | LD50 (oral, rat): | 1900 mg/kg |
| | LD50 (dermal, rabbit): | 790 mg/kg |

## SECTION XI. TOXICOLOGICAL INFORMATION

**TOXICOLOGICAL DATA**

| | | |
|---|---|---|
| IPDI: (1) | LC50 (rat): | 123-160 mg/m$^3$ (13.6 - 17.6 ppm) (4-hour exposure) (aerosol) |
| | LD50 (oral, rat): | > 2500 mg/kg |
| | LD50 (dermal, rabbit): | approx. 1000 mg/kg (4-hour exposure); approx. 500 mg/kg (4-day exposure) |
| Xylene: (1) | LC50 (rat): | 6350 mg/kg (4-hour exposure) (unspecified isomers and ehtyl-benzene) |
| | LD50 (oral, rat): | 5 400 mg/kg |
| | LD50 (dermal, rabbit): | 12 180 mg/kg; greater than 1 700 mg/kg (mixed xylenes - undefined composition) |

**Carbamic acid, 1,6-hexanediylbis-, bis [2-[2-(1-methylethyl)-3-oxazolidinyl]ethyl] ester, Calcium Oxide, Para toluene sulfonyl Isocyanate:** No information available.

**EYE IRRITATION:**

**Light aromatic solvent naphtha:** Slight redness was observed in rabbits following application of an unspecified amount of a commercial product which is comparable to light aromatic solvent naphtha. (1)

**TDI:** Application of 80% toluene-2,4-diisocyanate (2,4-TDI):20% 2,6-TDI (possibly undiluted) caused moderate pain, redness, swelling and discharge in rabbits. Washed eyes healed completely in 14 days. Corneal injury and redness were seen in the unwashed eyes at 21 days. (1)

**Benzoyl Chloride:** Benzoyl chloride is corrosive. Application of 0.1 ml of benzoyl chloride was corrosive in rabbits. No scoring information was provided. (1)

**SKIN IRRITATION:**

**Light aromatic solvent naphtha:** Essentially no irritation was observed in rabbits following the application of an unspecified amount of a commercial product that is comparable to light aromatic solvent naphtha. (1)

**TDI:** Application of 0.5 ml in a covered test for 4 hours caused corrosion in 6/6 rabbits tested. Prolonged contact with the skin can cause redness, swelling, blistering and burns. (1)

**Benzoyl Chloride:** Prolonged exposure (24-hour) to benzoyl chloride caused corrosion. Application of 0.5 ml benzoyl chloride, under a cover for 24 hours, was corrosive to the ears of rabbits. No scoring information was provided. (1)

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

**INHALATION:**

**Light aromatic solvent naphtha:** Female rats were exposed to 8.7 mg/L (8700 mg/m$^3$) of a high aromatic solvent aerosol for 8 hours. This material is similar to light aromatic solvent naphtha, but has a higher C10 component. This high aromatic solvent is expected to be less volatile, but to have similar toxicity. Observed effects included eye and nose irritation and salivation within 20 minutes, progressive tremors, incoordination, unconsciousness, convulsions and death in 2/10 animals within 24 hours following exposure. In survivors, recovery was noted after 4 days. Four male cats exposed to 8.2 mg/L (8200 mg/m$^3$) high aromatic solvent aerosol for 6 hours showed muscle incoordination, tremors, salivation and a decrease in constriction of the pupils when exposed to light. No deaths were reported. Recovery occurred within one day. (1)

**Toluene:** The major effect of toluene is on the central nervous system (CNS). Studies with rats have shown that a concentration 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 (concentration threshold 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)

**IPDI:** IPDI causes respiratory irritation in rats. (1)

**Carbon Black:** Some effects on the lower lung (alveolar thickening and atelectasis) were observed in rats following continuous inhalation of 4 mg/m$^3$ channel black for 16 days. Conflicting or insignificant results were obtained in 3 other studies. (1)

**Xylene:** The major effect of xylene inhalation is on the central nervous system (CNS). There is initial excitation followed by depression, drowsiness, incoordination and unconsciousness at approximately 2000 ppm. Death at higher concentrations is from respiratory failure due to CNS depression and/or accumulation of fluid in the lungs (pulmonary oedema). Irritation of the respiratory tract, causing a decrease in the respiratory rate, has been reported. The RD50, the concentration which produces a 50% decrease in the respiratory rate of mice, is 2440 ppm. This concentration is expected to produce intolerable eye, nose and throat irritation (sensory irritation) in humans. Behavioural effects such as effects on learned behaviours and avoidance conditioning have been observed in animals following short-term inhalation. Hearing loss, mainly at mid-frequencies, has been observed in rats following short-term exposures (800 ppm and above for 6 weeks or 1450 ppm for 3 days) to xylene. A no-effect level was not determined and reversibility was not assessed. (1)

## SECTION XI. TOXICOLOGICAL INFORMATION

**INHALATION: (continued)**

**TDI:** Inhalation of sublethal concentrations by mice, rats, rabbits and Guinea pigs caused severe respiratory effects such as bronchitis, bronchopneumonia, emphysema, and bleeding of the lungs. TDI is a sensory irritant. Sensory irritants inhibit respiration. (1)

**PGMEA, Calcium Oxide:** No information available.

**EYE IRRITATION:**

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

**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 an 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)

**Tris(nonylphenyl)phosphite:** Not irritating for eyes of rabbits. (2)

**Carbon Black:** Suspensions of carbon and graphite produced no signs of inflammation even when injected into the eyes of rabbits. (1)

**Xylene:** Application of xylene caused mild irritation and very slight, transient corneal damage in rabbits. Vapour exposure (unknown concentration) to mixed xylenes (undefined composition) resulted in fine vacuoles in the corneas of cats which disappeared in 24 hours. (1)

**N-(trichloromethylthio)phthalimide:** Severely irritating to rabbit eye. (2)

**SKIN SENSITIZATION:**

**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)

**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 of undiluted toluene produced moderate irritation in rabbits. (1)

**IPDI:** IPDI caused moderate skin sensitization in Guinea pigs. Mice showed statistically significant allergic response when sensitized with a concentration of 1% IPDI. It was estimated that IPDI was probably equivalent to toluene diisocyanate in sensitizing potential. (1)

**Para-toluene sulfonyl-isocyanate :** Isocyanates are known to cause skin sensitization in humans. (2)

**Tris(nonylphenyl)phosphite:** Skin irritant for rabbit. (2)

**Xylene:** A single application of an unspecified amount of xylenes (unspecified composition) caused irritation and swelling in rabbits and guinea pigs. Application of 0.5 ml of the xylene mixture (unspecified composition) to rabbit skin for 24 hours caused moderate irritation. Repeated application, 10-20 times over a 2 to 4-week period, of mixed xylene to rabbit skin caused moderate to marked irritation, swelling and tissue death. (1)

**N-(trichloromethylthio)phthalimide:** Mildly irritating to rabbit skin. (2)

**SENSITIZATION:**

**N-(trichloromethylthio)phthalimide:** Sensitizer (Guinea pig).

**INGESTION:**

**Light aromatic solvent naphtha:** Rats exposed to lethal oral doses showed CNS effects, such as decreased activity, abnormal gait, body tremors and laboured breathing, as well as diarrhea. Rats were administered 3000 or 5000 mg/kg of a commercial product which is comparable to light aromatic solvent naphtha. Observations included salivation, tearing of the eyes, decreased activity, prostration, laboured breathing and diarrhea.

**TDI:** TDI has been reported to have gastrointestinal and liver effects when administered orally to animals. (1)

***Effects of Long-Term (Chronic) Exposure***

**INHALATION:**

**Light aromatic solvent naphtha:** Reduced body weight was observed in male rats following a 13-week exposure to very high concentrations. Increased liver and kidney weights were observed in male rats exposed to high concentrations for up to 12 months. Females had reduced blood cell (eosinophil) counts that persisted throughout a 4-month recovery period. No signs of neurotoxicity or harmful changes were observed. (1)

## SECTION XI. TOXICOLOGICAL INFORMATION

**INHALATION (continued):**

**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)

**TDI:** Rats, Guinea pigs and rabbits exposed to 0.1 ppm, 6 hours/day, 5 days/week for up to 58 exposures or 6 hours/day for 38 consecutive days, developed lung inflammation. Lung damage generally increased in severity for several days after exposure ended. (1)

**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)

**Para-toluene sulfonyl-isocyanate:** This product may cause chronic respiratory and obstructive airway diseases. Allergic reactions may develop after inhalation of low concentrations, also several hours after exposure. (2)

**Carbon Black:** Many inhalation exposure studies have been conducted in experimental animals. In general, these studies show that excessive accumulation of carbon black in the lungs can result in significant inflammatory responses (chronic bronchitis, alveolitis and alveolar proteinosis). In 2 studies, slight to moderate lung scarring (fibrosis) was observed in rats following exposure to 11.6 $mg/m^3$ and a marked fibrotic response was observed in rats following exposure to high concentrations (approximately 52.8 $mg/m^3$). Only mild fibrotic effects were observed at airborne concentrations of approximately 7.1 $mg/m^3$. Other studies have not shown fibrotic effects. IARC has suggested that the inflammatory response to an excessive lung burden of carbon black may subsequently result in fibrotic changes. Some research has been conducted using the intratracheal route of administration. This research has not been evaluated here because of its questionable relevancy to occupational exposures. (1)

**SKIN SENSITIZATION:**

**Para-toluene sulfonyl-isocyanate:** This product may cause skin disorders and allergies. (2)

**Tris(nonylphenyl)phosphite:** Sensitizing for Guinea pig. (2)

**TDI:** Skin and respiratory sensitization were produced in animals by direct application of 2,4-TDI to the skin. No dermal or respiratory sensitization was detected in animals exposed to 0.02 ppm for 15 weeks. (1)

**RESPIRATORY SENSITIZATION:**

**TDI:** Concentration dependent respiratory sensitization has been produced in Guinea pigs. Threshold levels of 0.25 to 0.36 ppm TDI (80% 2,4-TDI:20% 2,6-TDI) have been observed. (1)

**Para toluenesulfonyl Isocyanate:** Isocyanates are known to cause respiratory sensitization in humans. (2)

**INGESTION:**

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

**TARGET ORGANS:**

**Xylene:** In general, animal studies have provided little evidence of damage to the liver, kidney or lungs, nor any other significant long-term health effects following long-term inhalation. No effects were observed following exposure of rats or dogs to mixed xylenes up to 810 ppm, 6 hours/day for 13 weeks. Some studies have shown subtle, reversible blood effects at concentrations above 1000 ppm. However, xylenes have not been shown to cause benzene-like cancer of the blood. No important findings were observed following oral administration of 1000 mg/kg (rats) and 2000 mg/kg (mice) of mixed xylenes for 90 days. Similarly, only reduced body weight was observed in male rats fed 500 mg/kg of the same mixed xylene for 103 weeks. No significant effects were noted in mice fed up to 1000 mg/kg for 103 weeks. (1)

**CARCINOGENICITY:**

**Toluene:** The International Agency for Research on Cancer (IARC) has concluded there is inadequate evidence for the carcinogeneicity 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)

**Benzoyl Chloride:** Small numbers of skin tumours have been observed following the skin application of benzoyl chloride to mice. Inhalation exposure has produced no significant increase in tumour incidence in mice. The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for the carcinogenicity of benzoyl chloride to experimental animals. (1)

**Carbon Black:** The International Agency for Research on Cancer (IARC) has determined that there is sufficient evidence that carbon black is carcinogenic to experimental animals. An increased incidence of lung tumours has been observed in 3 studies using female rats, but not in male rats or in mice. No increase in skin tumours was observed following skin application of either oil suspension or water suspensions containing 10% or 20% carbon black (various types). When benzene extracts of carbon black were used, however, increases in skin tumours were observed. (1)

## SECTION XI. TOXICOLOGICAL INFORMATION

**CARCINOGENICITY:**

**Xylene:** Oral studies of mixed xylenes in rats (up to 500 mg/kg for 103 weeks) and mice (up to 1000 mg/kg for 103 weeks) found no treatment-related increase in the incidence of tumours. In another carcinogenicity study, xylene (unspecified composition) was administered to rats (up to 500 mg/kg for 104 weeks). The reporting of this study was so poor that it is not possible to evaluate the results. A number of studies have investigated whether exposure to xylenes causes skin cancer. The conduct and reporting of these studies do not allow any conclusions to be drawn. The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for carcinogenicity of xylene in animals. (1)

**N-(trichloromethylthio)phthalimide:** A two-year feeding study of Folpan indicated duodenal tumours in mice after repeated administration of high dose levels. The NOAEL (No Observed Adverse Effect Level) was 450 ppm. No evidence of carcinogenicity was observed in long-term studies with rats. Information on the mechanism of tumour formation establishes a threshold for the duodenal tumours, and indicates that this tumour type is not relevant for human risk assessment at likely exposure levels. (2)

**TDI:** The International Agency for Research on Cancer (IARC) has determined there is sufficient evidence for the carcinogenicity of toluene diisocyanate to experimental animals. (1)

**PGMEA, Calcium Oxide:** No information available.

**TERATOGENICITY, EMBRYOTOXICITY, FETOTOXICITY:**

**Light aromatic solvent naphtha:** Harmful effects have been observed in the offspring of rats and mice exposed by inhalation, but only in the presence of maternal toxicity. Mice were exposed by inhalation to 0, 100, 500 or 1500 ppm on days 6-15 of pregnancy. Exposure to 100 ppm produced a significant decrease in the number of live foetuses/litter. However, this effect was not dose-related, as it did not occur at the 500 ppm exposure. No significant maternal toxicity was noted at 100 ppm. At 500 ppm, a significant reduction in foetal body weight was observed in the presence of maternal toxicity (reduced weight gain). At 1500 ppm, teratogenicity, embryotoxicity and fetotoxicity were observed in the presence of severe maternal toxicity (44% mortality and clinical observations). Rats were continuously exposed to approximately 120, 200 or 400 ppm (cited as 600, 1000 or 2000 mg/m$^3$) Aromatol on days 7-15 of pregnancy. A significant increase in foetal skeletal retardation was observed at all exposures. Foetal weight was retarded at 200 or 400 ppm and overall malformations were increased at 400 ppm. Toxic effects in the mothers were described as slight and dose-dependant. The authors of this paper and authors of a subsequent review indicate that no significant effects were observed in rat offspring at the low dose. Rats were exposed to 0, 120, 200 or 400 ppm (cited as 600, 1000 or 2000 mg/m$^3$) Aromatol during days 7-15 of pregnancy with subsequent behavioural evaluation of the pups. No effects were observed in the behavioural parameters evaluated, birth weight, postnatal weight gain or survival or nervous system development. Mice exposed continuously to approximately 100 ppm (500 mg/m$^3$) on days 6-15 of pregnancy showed embryotoxicity (post-implantation loss) and an increase in overall malformations. There was no evaluation of maternal toxicity. (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 1200 or 1800 ppm toluene. These effects were observed in the absence of maternal toxicity. Rats (16/group) were exposed to 1800 ppm of 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)

**Xylene:** In three studies, fetotoxic effects (delayed ossification and behavioural effects) were observed in the offspring of rats exposed by inhalation to 500 ppm mixed xylenes with up to 20% ethylbenzene. In another study, fetotoxicity (decreased weight) was observed in the female offspring of rats exposed to up to 500 ppm of mixed xylenes (12.8% ethylbenzene). No signs of material toxicity were observed in these studies. In other studies where rats and mice were exposed by inhalation or ingestion, harmful effects in the offspring (teratogenicity, embryotoxicity and/or fetotoxicity) were either not observed or were observed in the presence of significant harmful effects in the mothers. Some other studies have not been evaluated because of significant study design limitations for example, poor reporting of exposure details and/or effects, and inadequate evaluation of material toxicity. (1)

**N-(trichloromethylthio)phthalimide:** Non-teratogenic in animal studies. (2)

**PGMEA, TDI, Calcium Oxide, Carbon Black:** No information available.

**REPRODUCTIVE TOXICITY:**

**Light aromatic solvent naphtha:** A three-generation study showed no consistent effects on reproductive parameters in rats despite significant toxicity. Rats were exposed to 0, 100, 500 or 1500 ppm in a three-generation study. The first generation (F0) was exposed for 10 weeks with exposure continuing during a 2-week mating period. Females were then exposed on days 0-20 of pregnancy and allowed to deliver their litters with exposure beginning again on post-natal day 5 until weaning. One week after weaning, rats in the second generation (F1) were exposed for 10 weeks and then were mated. Immediately after weaning the third generation (F2) began exposure. The majority of F2 pups in the high dose group died during the first week of exposure. Most fertility indices were not affected for any generation despite significant parental toxicity at 500 ppm and above. Those indices that were affected (e.g. reduced male fertility and reduced litter size in F1 at 1500 ppm) occurred at toxic doses, did not show a dose-response relationship and did not appear in other generations. (1)

**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)

## SECTION XI. TOXICOLOGICAL INFORMATION

**REPRODUCTIVE TOXICITY:**

**Xylene:** No harmful reproductive effects were noted in males or females when rats were exposed to up to 500 ppm mixed xylenes in a single generation study. No firm negative conclusions can be drawn from this study because the maximum tolerated dose may not have been achieved. Ingestion of mixed xylenes for up to 2 years caused no observable adverse effects in the reproductive organs of male and female rats (up to 500 mg/kg/day) or mice (up to 1000 mg/kg/day). (1)

**PGMEA,** Calcium Oxide, Carbon Black: No information available.

**MUTAGENICITY:**

**Light aromatic solvent naphtha:** Negative results were observed in the bone marrow cytogenicity test following inhalation exposure of rats to 150, 500 or 1500 ppm for 5 days, despite evidence of toxicity (reduced body weight gain) in the animals. Negative results were obtained in cultured mammalian cells (the CHO/HGPRT forward mutation assay, and sister chromatid exchanges and chromosomal aberration in CHO cells), with or without metabolic activation. Negative results were obtained in a gene mutation assay, both with and without metabolic activation, at exposure levels that were toxic to some of the bacteria strains tested. (1)

**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)

**Tris(nonylphenyl)phosphite:** This material was not mutagenic in an Ames bacterial assay. (2)

**Carbon Black:** Both positive and negative results have been obtained in rats in vivo studies. Positive results have been obtained in somatic cells following inhalation exposure of rats. Generally, negative results have been obtained in short-term assays using bacteria and cultured mammalian cells and in insects. (1)

**Xylene:** Negative results have been consistently obtained in a variety of studies using live animals and cultured cells. Mixed xylenes (undefined compositions) gave negative results in a number of bacterial assays, with and without metabolic activation. Negative results were obtained in a variety of tests live animals exposed by a number of exposure routes. Tests for chromosome damage in rats and mice (both bone-marrow cytogenetics and micronucleus) (by oral, injection and inhalation routes) were negative. Negative results were also obtained in dominant lethal assays in rats and mice following administration by injection of adequate maximum doses. (1)

**N-(trichloromethylthio)phthalimide:** Non-mutagenic (in vivo tests). (2)

**TDI:** Production-grade TDI (80:20 mixture) gave negative results in the in vivo mouse and rat white blood cell micronucleus test (exposure to 0.05 or 0.15 ppm TDI for 4 weeks. Negative results were obtained for the 80:20 mixture in cultured mammalian cells. There are conflicting reports in bacterial tests. (1)

**PGMEA, Calcium Oxide:** 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 regulations 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. TRANSPORTATION INFORMATION

| | |
|---|---|
| **NAME OF PRODUCT:** Alsan 500 F | **IDENTIFICATION NUMBER:** UN 1263 |
| **CLASSIFICATION (TDG - DOT):** Class 3 | **SHIPPING NAME:** Paint |
| **CONTAINERS FOLOW THE STANDARDS OF:**<br>Canada: CAN / CGSB-43.150-97<br>USA: CFR 49 parts 100 to 199 | **PACKING GROUP:** III |

## SECTION XV. REGULATORY INFORMATION

Canada -WHMIS: Class B2: Flammable liquid (flash point lower than 37.8°C).
Class D2A: Very toxic material causing other effects. (Toluene: teratogenicity and embryotoxicity.)
Class D2B: Toxic material causing other effects. (Toluene: skin irritation.)

Canada - DSL: All constituents of this product are included on the Domestic Substances List (DSL – Canada)
USA - TSCA: All constituents of this product are included on the Toxic Substances Control Act Inventory (TSCA – United States).

USA – California proposition 65: TDI: cancer
Toluene: reproductive toxicity
Carbon black: cancer
N-(trichloromethylthio)phthalimide: cancer

## 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 dead of 50% mortality of a defined animal population
LD50: (Lethal dose50) Single dose of a substance that, when administrated by a define 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)

**Reference:**
Supplier MSDS
This MSDS has been prepared by: SOPREMA, INC.
For information: 800-543-3085
The Material Safety Data Sheets of SOPREMA are available on Internet at the following site: HTTP://WWW.SOPREMA.US

**Justification of the update:**
New MSDS.

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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