(S)-(-)-Nicotine

sc-212834

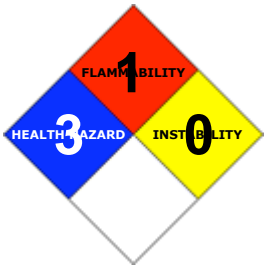
Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
(S)-(-)-Nicotine

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA


SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800
EMERGENCY:
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C10-H14-N2, 1-methyl-2-(3-pyridyl)pyrrolidine, 3-(N-methylpyrrolidino)pyridine, (S)-3-(1-methyl)-2-pyrrolidinyl)pyridine, L-3-(1-methyl-2-pyrrolidyl)pyridine, (-)-3-(1-methyl-2-pyrrolidyl)pyridine, beta-pyridyl-alpha-N-methylpyrrolidine, niocide, (-)-nicotine, L-nicotine, (S)-nicotine, "nicotine alkaloid", "pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-", "pyridine, 3-(tetrahydro-1-methylpyrrol-2-yl)", "pyrrolidine, 1-methyl-2-(3-pyridal)-", "RCRA Waste No.: P-075", "tetrahydronicotyrine, DL-", "Black Leaf 40", "Destruxol Orchid Spary", Emo-Nix, "Ent-3, 424", "Flux Maag", Fumetobac, Mach-Nic, "Niagara P.A. Dust", Nico-dust, Nico-fume, "Ortho N-4 Dust", "Ortho N-5 Dust", Tendust, "XL All Insecticide"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	1		
Toxicity:	4		
Body Contact:	4		
Reactivity:	1		
Chronic:	3		

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Toxic if swallowed.
Very toxic by inhalation and in contact with skin.
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
■ Nicotine is amongst the most toxic of poisons, acting quickly. The probable lethal dose by ingestion, in man, is about 0.5-1.0 mg/kg. Nicotine is absorbed by the oral mucosa, respiratory tract, gastrointestinal tract (except stomach) and skin.
Symptoms of poisoning may develop within 15 minutes. Gastrointestinal signs and symptoms occur first and may include burning of the mouth and throat. Less severe poisonings are characterised by profuse salivation, nausea, vomiting, and occasionally diarrhoea, abdominal pain, dizziness, mental confusion, faintness, convulsions and prostration. Other systemic effects include agitation, headache, auditory and visual disturbances, weakness and incoordination. Serious overdose may produce central nervous system (CNS) symptoms headache, confusion, dizziness, agitation and incoordination. Convulsions and coma may follow. Other cholinergic effects include sweating, lachrymation, increased bronchial secretions, miosis and mydriasis. Respiratory system effects may include tachypnea, but later, dyspnea, decreased respiratory rate and cyanosis. Respiratory arrest may occur within minutes, and death may result within one hour. Cardiovascular effects include a transient increase in blood pressure followed by hypotension, bradycardia, paroxysmal atrial fibrillation, or cardiac standstill.
Exposure may produce transient stimulation and subsequent depression or paralysis of the central nervous system, all peripheral autonomic ganglia and motor end plates in skeletal muscles. Smooth muscle cells are also excited; this action which may explain observed vasoconstriction and intestinal movements. Marked tolerance of the alkaloid is acquired by confirmed smokers. In lethal poisonings, postmortem examination often reveals congestion and bloody engorgement (hyperaemia) of the brain, meninges and visceral organs, especially the kidneys. Haemorrhage of the gastrointestinal tract and lungs has also been described. Death is usually rapid (always within one hour and sometimes within five minutes) with the traditional view suggesting paralysis of respiratory muscles.
Stimulation of nicotinic receptors primarily affects the autonomic ganglia, adrenal medulla, and the motor end-plate of striated muscle; nicotinic agonists primarily produce actions affecting the neurosmuscular junctions (producing, for example, fasciculations, weakness and paralysis) and muscarinic effects (producing postganglionic stimulation and, as a result, cardiac inhibition, vasodilation, salivation, lachrymation, bronchoconstriction and gastrointestinal stimulation).

EYE

■ There is some evidence to suggest that this material can causeeye irritation and damage in some persons.
■ The vapor may produce pronounced discomfort of the eyes when present at higher concentrations and this generally gives warning of excessive exposure and the need for control measures to ensure safe working conditions.

SKIN

■ Skin contact with the material may produce severely toxic effects; systemic effects may result following absorption and these may be fatal.
■ The material is not thought to be a skin irritant (as classified using animal models). Temporary discomfort, however, may result from prolonged dermal exposures. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
■ Open cuts, abraded or irritated skin should not be exposed to this material.
■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
■ Extreme care must be taken when handling nicotine compounds or congeners. A self-limiting illness, known as "green tobacco sickness" has been described amongst workers handling uncured tobacco leaves in the field; the disease consists of pallor, vomiting and prostration and is probably due to the percutaneous absorption of nicotine from wet leaves.

INHALED

■ Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may produce severely toxic effects. Relatively small amounts absorbed from the lungs may prove fatal.
■ The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of vapors, fumes or aerosols, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

CHRONIC HEALTH EFFECTS

■ There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
There is some evidence that human exposure to the material may result in developmental toxicity. This evidence is based on animal studies where effects have been observed in the absence of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not secondary non-specific consequences of the other toxic effects.
Exposure to the material for prolonged periods may cause physical defects in the developing embryo (teratogenesis).
Chronic nicotine poisoning may produce digestive and nutritional disturbances, peripheral vasoconstriction and a rise in blood pressure and rarely, amblyopia (a small area of visual loss at the centre of the visual field that slowly enlarges and can lead to complete blindness). Nicotine dependence remains controversial only in a diminishing number of schools. Tolerance may occur. Chronic exposure to nicotine may produce adverse effects on the developing foetus. Along with decreased birth weights, attention deficit disorders are more common in children whose mothers smoke cigarettes during pregnancy; nicotine has been shown to lead to analagous neurobehavioural abnormalities

in animals exposed prenatally to nicotine. Nicotinic receptors are expressed early in the development of the nervous system beginning in the developing brainstem and later expressed in the diencephalon. It is quite possible that the interaction of nicotine with its receptors, during the prenatal period, is the basis of subsequent attention disorders. The formation of tobacco-specific nitrosamines results during processing and fermentation as a result of reaction between nicotine and exogenous nitrates and nitrites. Nicotine may behave as a secondary amine due to its pyridyl moiety. Secondary amines may react in the acid conditions of the stomach with endogenous nitrites or nitrites found in various food-stuffs (as anti-oxidants or preservatives) to form potentially carcinogenic N-nitrosamines.
Data from experimental studies indicate that pyridines represent a potential cause of cancer in man. They have also been shown to cross the placental barrier in rats and cause premature delivery, miscarriages and stillbirths. PAs are passed through breast milk. Pyridine has been implicated in the formation of liver cancers.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
nicotine	54-11-5	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

· IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. · Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise: · For advice, contact a Poisons Information Center or a doctor. · Urgent hospital treatment is likely to be needed. · If conscious, give water to drink. · INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear a protective glove when inducing vomiting by mechanical means. · In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition. · If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist. · If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

EYE

■ If this product comes in contact with the eyes: · Immediately hold eyelids apart and flush the eye continuously with running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. · Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes. · Transport to hospital or doctor without delay. · Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

■ If skin or hair contact occurs: · Immediately flush body and clothes with large amounts of water, using safety shower if available. · Quickly remove all contaminated clothing, including footwear. · Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center. · Transport to hospital, or doctor.

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested. · Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. · Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. · Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

■ For nicotine intoxication:
· Administer 6 to 8 heaped teaspoons of activated charcoal, as a slurry, in water.
· Because nicotine induces vomiting by stimulating the chemoreceptor trigger zones of the brainstem, it seems inadvisable to administer syrup of Ipecac, which acts by the same mechanism.
· Unless spontaneous emesis is vigorous and productive, gastric lavage with a 0.5% solution of tannic acid, or a 1:5000 solution of potassium permanganate. Use water if these solutions are not immediately available.
· If nicotine is spilled on skin, wash thoroughly and IMMEDIATELY with diluted vinegar and / or cold running water. (Nicotine salts are less readily absorbed).
· Administer artificial ventilation and oxygen therapy until spontaneous breathing is adequate or until the heart ceases to beat. Central respiratory stimulants are rarely if ever indicated. Keep airway clear. Profuse salivation may require continuous oral suction.
· If severe or persistent, convulsions may be controlled with small intravenous doses of barbiturates or diazepam.
· Most of the visceral manifestations can be controlled by various combinations of autonomic blocking drugs, such as atropine and phenoxybenzamine (Dibenzyline). Caramiphen (Parpanit) hydrochloride and diethazine (Diparcol) hydrochloride have been recommended in the experimental poisoning but may not be readily available.
GOSSELIN, SMITH & HODGE: Clinical Toxicology of Commercial Products, 5th Ed.
Nicotine undergoes a large first-pass effect during which the liver metabolises 80-89%. Smaller amounts are metabolised in the lung and kidney. Nicotine and its metabolites (cotinine and nicotine-1'-N-oxide) are excreted in the urine. At a pH of 5.5 or less, 23% is excreted unchanged. At a pH of 8, only 2% is excreted in the urine. The effect of urinary pH on total clearance is entirely due to changes in renal clearance. Blood cotinine levels, and possibly, saliva cotinine levels, are good measures of passive smoking. Tobacco is less toxic than expected from its nicotine content, among tobacco chewers. Apparently intestinal absorption of nicotine from tobacco is so slow that metabolic inactivation keeps pace with absorption.
for ingested poison
.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible
Upper Explosive Limit (%):	4.0 vol
Specific Gravity (water=1):	1.01
Lower Explosive Limit (%):	0.7 vol

EXTINGUISHING MEDIA
· Water spray or fog.
· Foam.
· Dry chemical powder.
· BCF (where regulations permit).
· Carbon dioxide.

FIRE FIGHTING
· Alert Emergency Responders and tell them location and nature of hazard.
· Wear full body protective clothing with breathing apparatus.
· Prevent, by any means available, spillage from entering drains or water course.
· Use fire fighting procedures suitable for surrounding area.
· DO NOT approach containers suspected to be hot.
· Cool fire exposed containers with water spray from a protected location.
· If safe to do so, remove containers from path of fire.
· Equipment should be thoroughly decontaminated after use.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
· Combustible.
· Slight fire hazard when exposed to heat or flame.
· Heating may cause expansion or decomposition leading to violent rupture of containers.
· On combustion, may emit toxic fumes of carbon monoxide (CO).
· May emit acrid smoke.
· Mists containing combustible materials may be explosive.
Combustion products include: carbon dioxide (CO2), nitrogen oxides (NOx), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.

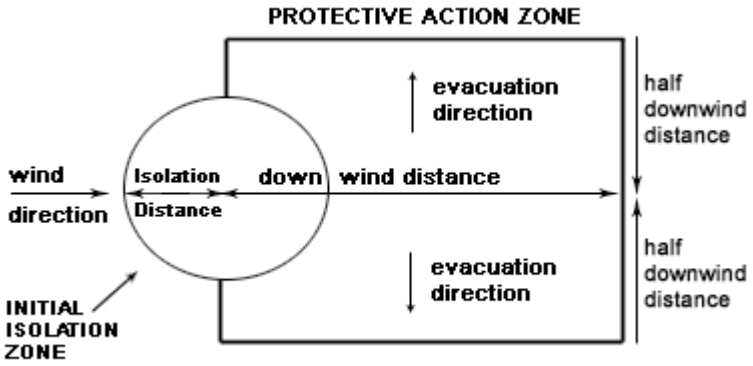
FIRE INCOMPATIBILITY
■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION
Glasses:
Full face- shield.
Gloves:
1.PE/EVAL/PE
Respirator:
Type A-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
· Remove all ignition sources.
· Clean up all spills immediately.
· Avoid breathing vapors and contact with skin and eyes.
· Control personal contact by using protective equipment.
· Contain and absorb spill with sand, earth, inert material or vermiculite.
· Wipe up.
· Place in a suitable labeled container for waste disposal.
MAJOR SPILLS
· Clear area of personnel and move upwind.
· Alert Emergency Responders and tell them location and nature of hazard.
· Wear full body protective clothing with breathing apparatus.
· Prevent, by any means available, spillage from entering drains or water course.
· Stop leak if safe to do so.
· Contain spill with sand, earth or vermiculite.
· Collect recoverable product into labeled containers for recycling.
· Neutralize/decontaminate residue.
· Collect solid residues and seal in labeled drums for disposal.
· Wash area and prevent runoff into drains.
· After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
· If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)	
Isolation Distance	25 meters
Downwind Protection Distance	250 meters

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
5 Guide 151 is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.
· Use in a well-ventilated area.
· Prevent concentration in hollows and sumps.
· DO NOT enter confined spaces until atmosphere has been checked.
· DO NOT allow material to contact humans, exposed food or food utensils.
· Avoid contact with incompatible materials.
· When handling, DO NOT eat, drink or smoke.
· Keep containers securely sealed when not in use.
· Avoid physical damage to containers.
· Always wash hands with soap and water after handling.
· Work clothes should be laundered separately.
· Launder contaminated clothing before re-use.
· Use good occupational work practice.
· Observe manufacturer's storing and handling recommendations.
· Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

RECOMMENDED STORAGE METHODS

· Lined metal can, Lined metal pail/drum
· Plastic pail
· Polyliner drum
· Packing as recommended by manufacturer.
· Check all containers are clearly labeled and free from leaks.
For low viscosity materials
· Drums and jerricans must be of the non-removable head type.
· Where a can is to be used as an inner package, the can must have a screwed enclosure.
For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):
· Removable head packaging;
· Cans with friction closures and
· low pressure tubes and cartridges may be used.- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages * . - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage *. - * unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.
All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.

STORAGE REQUIREMENTS

· Store in original containers.
· Keep containers securely sealed.

· Store in a cool, dry, well-ventilated area.
· Store away from incompatible materials and foodstuff containers.
· Protect containers against physical damage and check regularly for leaks.
· Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

X X + X X +

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Notes
Canada - Alberta Occupational Exposure Limits	nicotine (Nicotine)		0.5			
Canada - British Columbia Occupational Exposure Limits	nicotine (Nicotine)		0.5			Skin
Canada - Ontario Occupational Exposure Limits	nicotine (Nicotine)		0.5			Skin
US OSHA Permissible Exposure Levels (PELs) - Table Z1	nicotine (Nicotine)		0.5			
US ACGIH Threshold Limit Values (TLV)	nicotine (Nicotine)		0.5			TLV Basis: gastrointestinal damage; central nervous system impairment; cardiac impairment
US NIOSH Recommended Exposure Limits (RELs)	nicotine (Nicotine)		0.5			[skin]
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	nicotine (Nicotine)		0.5			
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	nicotine (Nicotine)		0.5			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	nicotine (Nicotine)		0.5			
US - Minnesota Permissible Exposure Limits (PELs)	nicotine (Nicotine)		0.5			

US - California Permissible Exposure Limits for Chemical Contaminants	nicotine (Nicotine; 1-methyl-2-(3-pyridyl)-pyrrolidine)	0.075	0.5			
US - Idaho - Limits for Air Contaminants	nicotine (Nicotine)		0.5			
US - Hawaii Air Contaminant Limits	nicotine (Nicotine)		0.5		1.5	
US - Alaska Limits for Air Contaminants	nicotine (Nicotine)		0.5			
US - Michigan Exposure Limits for Air Contaminants	nicotine (Nicotine)		0.5			
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	nicotine (Nicotine - Skin)	-	0.5	-	1.5	
US - Washington Permissible exposure limits of air contaminants	nicotine (Nicotine)		0.5		1.5	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	nicotine (Nicotine)		0.5		1.5	Skin
Canada - Prince Edward Island Occupational Exposure Limits	nicotine (Nicotine)		0.5			TLV Basis: gastrointestinal damage; central nervous system impairment; cardiac impairment
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	nicotine (Nicotine)		0.5			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	nicotine (Nicotine)		0.5			
US - Oregon Permissible Exposure Limits (Z-1)	nicotine (Nicotine)	0.075	0.5			*
Canada - Northwest Territories Occupational Exposure Limits (English)	nicotine (Nicotine - Skin)		0.5		1.5	
Canada - Nova Scotia Occupational Exposure Limits	nicotine (Nicotine)		0.5			TLV Basis: gastrointestinal damage; central nervous system impairment; cardiac impairment

ENDOELTABLE

EMERGENCY EXPOSURE LIMITS
Material Revised IDLH Value (mg/m3) Revised IDLH Value (ppm)
nicotine 5

MATERIAL DATA

NICOTINE:

■ For nicotine:

At the TLV-TWA an 8-hour intake of nicotine received by inhalation is calculated to be 0.07 mg/kg/day based on the metabolism and

controlled dosing of human volunteers. Chronic studies using rodents have found a no-observed-adverse-effect level (NOAEL) of 1.14 mg/kg/day.
Absorption through intact human skin has produced serious (and even life threatening) intoxication.

PERSONAL PROTECTION




Consult your EHS staff for recommendations

EYE

· Chemical goggles.
· Full face shield.
· Contact lenses pose a special hazard; soft contact lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET

■ Elbow length PVC gloves.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
· Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

OTHER

· Overalls.
· Eyewash unit.
· Barrier cream.
· Skin cleansing cream.

GLOVE SELECTION INDEX

■ Glove selection is based on a modified presentation of the:
" Forsberg Clothing Performance Index" .
The effect(s) of the following substance(s) are taken into account in the computer- generated selection: nicotine
■ Protective Material CPI *.

PE/EVAL/PE	A

■ * CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory; may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion
NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -
* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

RESPIRATOR

■ Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	A-1 P	-
1000	50	-	A-1 P
5000	50	Airline*	-
5000	100	-	A-2 P
10000	100	-	A-3 P
	100+		Airline* *

* - Continuous Flow ** - Continuous-flow or positive pressure demand.
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be

made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection an approved self contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area.
Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.
Mixes with water.
Toxic or noxious vapors/ gas.

State	Liquid	Molecular Weight	162.26
Melting Range (°F)	-112	Viscosity	Not Available
Boiling Range (°F)	476.6 (745 mm)	Solubility in water (g/L)	Miscible
Flash Point (°F)	215.006	pH (1% solution)	10.2 (0.05 M)
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not available
Autoignition Temp (°F)	464	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	4.0 vol	Specific Gravity (water=1)	1.01
Lower Explosive Limit (%)	0.7 vol	Relative Vapor Density (air=1)	5.61
Volatile Component (%vol)	Negligible	Evaporation Rate	Not available
VOC(regulatory)	lb/gall	VOC(actual)	lb/gall

■ log Kow (Prager 1995): 1.17 ■ log Kow (Sangster 1997): 1.17

NICOTINE

APPEARANCE

Colourless to pale yellow, very hygroscopic, oily liquid; mixes with water below 60 deg C. Slight fish-like odour when warm. On mixing with water the volume contracts. Turns brown on exposure to air. Develops odour of pyridine. Acrid burning taste. Volatile in steam. Forms salts with almost any acid and double salts with many metals and acids. Very soluble in alcohol, chloroform, ether, petroleum ether, kerosene, oils. pK1: 6.16 ; pK2: 10.96 (15 deg C).

■ log Kow (Prager 1995) 1.17 ■ log Kow (Sangster 1997) 1.17

Material	Value

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

· Presence of incompatible materials.
· Product is considered stable.
· Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

■ Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

NICOTINE

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 50 mg/kg	Nil Reported
Dermal (rat) LD50: 140 mg/kg	
Intraperitoneal (rat) LD50: 14.56 mg/kg	
Oral (mouse) LD50: 33.4 mg/kg	
Dermal (rabbit) LD50: 14 mg/kg	

■ For nicotine:

Nicotine is acutely toxic by all routes of exposure (oral, dermal, and inhalation). The LD50 of nicotine is 50 mg/kg for rats and 3 mg/kg for mice. A dose of 40-60 mg can be a lethal dosage for adult human beings and doses as low as 1-4 mg can be associated with toxic effects in some individuals. Nicotine is an agonist at nicotinic receptors in the peripheral and central nervous system
In a subchronic oral rat toxicity study conducted with nicotine hydrogen tartrate, the substance was administered to pregnant and non-pregnant female rats in the drinking water for 10 days at doses equivalent to 1.25 and 2.5 mg/kg/day. The animals exhibited mild fatty change, mild focal necrosis and mild dark cell change, with effects on the mitochondria, in a dose proportional manner.
Effects at the lower dose were not statistically significant, so the NOAEL was identified as 1.25 mg/kg/day; the LOAEL was identified as 2.5 mg/kg/day. .
According to various authorities, nicotine is neither an initiator nor a promoter of tumors in rodents.
Exposure to the material for prolonged periods may cause physical defects in the developing embryo (teratogenesis).

SKIN

nicotine	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
nicotine	US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants - Skin	Skin Designation	X
nicotine	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
nicotine	US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
nicotine	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X
nicotine	US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
nicotine	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
nicotine	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:
NICOTINE:
Marine Pollutant: Yes

■ BCF<100: 5
■ log Kow (Prager 1995): 1.17
■ log Kow (Sangster 1997): 1.17
■ Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
■ Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
■ For nicotine:
Environmental fate:
Terrestrial fate:: If released to soil, nicotine may biodegrade to a variety of different products including oxynicotine, 3-pyridylmethyl ketone, 2,3'-dipyridyl, N-methylmyosmine and a purple crystalline pigment. In moist soil chemical hydrolysis and volatilisation are not expected to be important fate processes. Under alkaline condition, nicotine should be highly mobile.
Aquatic fate: If released to water, nicotine may biodegrade. This compound is not expected to undergo chemical hydrolysis, bioaccumulate significantly in aquatic organisms or volatilise. Under alkaline conditions adsorption to suspended solids and sediments is not expected to be significant. Slight potential exists for photolysis.
Atmospheric fate: If released to air nicotine is expected to degrade rather quickly in the presence of light and air. A resinous product may form. In the ambient atmosphere, nicotine may react with photochemically generated hydroxyl radicals (vapor phase t 1/2 1 day) or be removed by wet deposition. Slight potential exists for direct photolysis, since it adsorbs UV light only weakly above 290 nm.
■ Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health.The potential for surfaces in an enclosed space to facilitate reactions should be considered.

Source of unsaturated substances	Unsaturated substances (Reactive Emissions)	Major Stable Products produced following reaction with ozone.
Occupants (exhaled breath, ski oils, personal care products)	Isoprene, nitric oxide, squalene, unsaturated sterols, oleic acid and other unsaturated fatty acids, unsaturated oxidation products	Methacrolein, methyl vinyl ketone, nitrogen dioxide, acetone, 6MHQ, geranyl acetone, 4OPA, formaldehyde, nonanol, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid.
Soft woods, wood flooring, including cypress, cedar and silver fir boards, houseplants	Isoprene, limonene, alpha-pinene, other terpenes and sesquiterpenes	Formaldehyde, 4-AMC, pinoaldehyde, pinic acid, pinonic acid, formic acid, methacrolein, methyl vinyl ketone, SOAs including ultrafine particles
Carpets and carpet backing	4-Phenylcyclohexene, 4-vinylcyclohexene, styrene, 2-ethylhexyl acrylate, unsaturated fatty acids and esters	Formaldehyde, acetaldehyde, benzaldehyde, hexanal, nonanal, 2-nonenal
Linoleum and paints/polishes containing linseed oil	Linoleic acid, linolenic acid	Propanal, hexanal, nonanal, 2-heptenal, 2-nonenal, 2-decenal, 1-pentene-3-one, propionic acid, n-butyric acid
Latex paint	Residual monomers	Formaldehyde
Certain cleaning products, polishes, waxes, air fresheners	Limonene, alpha-pinene, terpinolene, alpha-terpineol, linalool, linalyl acetate and other terpenoids, longifolene and other sesquiterpenes	Formaldehyde, acetaldehyde, glycoaldehyde, formic acid, acetic acid, hydrogen and organic peroxides, acetone, benzaldehyde, 4-hydroxy-4-methyl-5-hexen-1-al, 5-ethenyl-dihydro-5-methyl-2(3H)-furanone, 4-AMC, SOAs including ultrafine particles
Natural rubber adhesive	Isoprene, terpenes	Formaldehyde, methacrolein, methyl vinyl ketone
Photocopier toner, printed paper, styrene polymers	Styrene	Formaldehyde, benzaldehyde
Environmental tobacco smoke	Styrene, acrolein, nicotine	Formaldehyde, benzaldehyde, hexanal, glyoxal, N-methylformamide, nicotinaldehyde, cotinine
Soiled clothing, fabrics, bedding	Squalene, unsaturated sterols, oleic acid and other saturated fatty acids	Acetone, geranyl acetone, 6MHO, 40PA, formaldehyde, nonanal, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid
Soiled particle filters	Unsaturated fatty acids from plant waxes, leaf litter, and other vegetative debris; soot; diesel particles	Formaldehyde, nonanal, and other aldehydes; azelaic acid; nonanoic acid; 9-oxo-nonanoic acid and other oxo-acids; compounds with mixed functional groups (=O, -OH, and -COOH)
Ventilation ducts and duct liners	Unsaturated fatty acids and esters, unsaturated oils, neoprene	C5 to C10 aldehydes
"Urban grime"	Polycyclic aromatic hydrocarbons	Oxidized polycyclic aromatic hydrocarbons
Perfumes, colognes, essential oils (e.g. lavender, eucalyptus, tea tree)	Limonene, alpha-pinene, linalool, linalyl acetate, terpinene-4-ol, gamma-terpinene	Formaldehyde, 4-AMC, acetone, 4-hydroxy-4-methyl-5-hexen-1-al, 5-ethenyl-dihydro-5-methyl-2(3H) furanone, SOAs including ultrafine particles
Overall home emissions	Limonene, alpha-pinene, styrene	Formaldehyde, 4-AMC, pinonaldehyde, acetone, pinic acid, pinonic acid, formic acid, benzaldehyde, SOAs including ultrafine particles

Abbreviations: 4-AMC, 4-acetyl-1-methylcyclohexene; 6MHQ, 6-methyl-5-heptene-2-one, 4OPA, 4-oxopentanal, SOA, Secondary Organic

Aerosols
Reference: Charles J Weschler; Environmental Helath Perspectives, Vol 114, October 2006.
■ Pyridine and its derivatives:
Environmental fate:
The atmospheric photodegradation estimates for the Pyridine and Pyridine Derivatives Category chemicals indicate that piperidine which is the lower molecular weight, non-aromatic and unsubstituted chemical in the category, would be expected to degrade rapidly (t1/2 < 1 day) when exposed to UV light in the atmosphere. Pyridine and the three methyl derivatives of pyridine (picolines) which are the higher molecular weight, aromatic and substituted chemicals in the category, would be expected to photodegrade more slowly (t1/2 . 30 or 10 days, respectively). , Lutidines, and collidines are expected to photodegrade even more slowly. The nitriles derivatives of pyridine are also predicted to photodegrade more slowly (t1/2 . 164 days). However, the nitrile derivatives of pyridine were predicted to partition to air much less favorably than to soil and water. As molecular weight and substitution increase in the category, greater distribution to water and soil and less to air is predicted. This trend is consistent with the vapor pressure data.
Pyridines are not expected to hydrolysis in the environment because they lack a potentially hydrolysable functional group.
There are adequate measured data across the pyridine group to allow the conclusion that these chemicals are biodegradable in the presence of adequate oxygen and bacteria; however, they are relatively stable under anaerobic and/or sterile environments.
Depending upon the environmental conditions, different types of bacteria, fungi, and enzymes are involved in the degradation process of these compounds . Different organisms are using different pathways to biotransform a substrate The transformation rate of the pyridine derivatives is dependent on the substituents . For example, pyridine carboxylic acids have the highest transformation rate followed by mono-hydroxypyridines, methylpyridines, aminopyridines, and halogenated pyridines
Ecotoxicity:
Measured values for acute aquatic toxicity indicate that the Pyridine and Pyridine Derivatives Category chemicals are slightly to moderately toxic to fish, invertebrates and algae. Modeled data for acute aquatic toxicity were generally consistent with the reliable measured values in cases for which both existed.
■ DO NOT discharge into sewer or waterways.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
nicotine	HIGH		LOW	MED

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

B. Component Waste Numbers
When nicotine is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number P075 (waste code T).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
¦ Puncture containers to prevent re-use and bury at an authorized landfill.
Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:
· Reduction
· Reuse
· Recycling
· Disposal (if all else fails)
This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
· Recycle wherever possible or consult manufacturer for recycling options.
· Consult Waste Management Authority for disposal.
· Bury or incinerate residue at an approved site.
· Recycle containers if possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 6.1
Identification Numbers: UN1654 PG: II
Label Codes: 6.1 Special provisions: IB2
Packaging: Exceptions: 153 Packaging: Non- bulk: 202
Packaging: Exceptions: 153 Quantity limitations: 5 L

Passenger aircraft/rail:
Quantity Limitations: Cargo 60 L Vessel stowage: Location: A
aircraft only:
Vessel stowage: Other: None
Hazardous materials descriptions and proper shipping names:
Nicotine

Air Transport IATA:

ICAO/IATA Class: 6.1 ICAO/IATA Subrisk: None
UN/ID Number: 1654 Packing Group: II
Special provisions: None
Cargo Only
Packing Instructions: 611 Maximum Qty/Pack: 60 L
Passenger and Cargo Passenger and Cargo
Packing Instructions: 609 Maximum Qty/Pack: 5 L
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: Y609 Maximum Qty/Pack: 1 L
Shipping Name: NICOTINE

Maritime Transport IMDG:

IMDG Class: 6.1 IMDG Subrisk: None
UN Number: 1654 Packing Group: II
EMS Number: F-A , S-A Special provisions: None
Limited Quantities: 100 ml Marine Pollutant: Yes
Shipping Name: NICOTINE

Section 15 - REGULATORY INFORMATION

REGULATIONS

nicotine (CAS: 54-11-5) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which production, use or other presence must be reported","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity","US - California Proposition 65 - Reproductive Toxicity","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Maine Chemicals of High Concern List","US - Massachusetts Oil & Hazardous Material List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Oregon Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Hazardous Constituents","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US DOE Temporary Emergency Exposure Limits (TEELs)","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261","US SARA Section 302 Extremely Hazardous Substances","US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Cumulative effects may result following exposure*.
■ May produce discomfort of the eyes*.
■ Limited evidence of a carcinogenic effect*.
■ May be harmful to the fetus/ embryo*.
* (limited evidence).

REPRODUCTIVE HEALTH GUIDELINES

■ Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have

been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated. Ingredient ORG UF Endpoint CR Adeq TLV nicotine 0.00001 mg/m3 100 D NA - ■ These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise. CR = Cancer Risk/10000; UF = Uncertainty factor: TLV believed to be adequate to protect reproductive health: LOD: Limit of detection Toxic endpoints have also been identified as: D = Developmental; R = Reproductive; TC = Transplacental carcinogen Jankovic J., Drake F.: A Screening Method for Occupational Reproductive Health Risk: American Industrial Hygiene Association Journal 57: 641-649 (1996).

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Issue Date: Nov-19-2008

Print Date:Oct-1-2010