Acetonitrile

sc-207252

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Acetonitrile

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
C2-H3-N, CH3-CN, cyanomethane, ethanenitrile, "ethyl nitrile", "methane carbonitrile", "methyl cyanide", "Hewlett-Packard PTH Analysis Solvent C", "Hewlett-Packard Protein Sequencing Reagent L1", "RCRA Waste No. U003"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	3		
Toxicity:	2		
Body Contact:	2		
Reactivity:	1		
Chronic:	3		

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

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Contact with acids liberates very toxic gas.
Irritating to eyes.
Harmful by inhalation, in contact with skin and if swallowed.
Highly flammable.
May cause long-term adverse effects in the environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.
■ Cyanide poisoning can cause increased saliva output, nausea without vomiting, anxiety, confusion, vertigo, dizziness, stiffness of the lower jaw, convulsions, spasm, paralysis, coma and irregular heartbeat, and stimulation of breathing followed by failure. Often the skin becomes cyanosed (blue-gray), and this is often delayed.
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■ Nitrile poisoning exhibits similar symptoms to poisoning due to hydrogen cyanide. The substances irritate the eyes and skin, and are absorbed quickly and completely through the skin.
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EYE

■ There is evidence that material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Severe inflammation may be expected with pain.
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SKIN

■ Skin contact with the material may be harmful; systemic effects may resultfollowing absorption.
■ The material is not thought to be a skin irritant (as classified using animal models). Temporary discomfort, however, may result from prolonged dermal exposures.
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■ 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.

INHALED

■ Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful.
■ 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.
■ The odour of acetonitrile is considered to give insufficient warning properties of exposure. The vapour is highly toxic, and inhalation may cause loss of consciousness. Effects of inhalation exposure are headache, general weakness, with nausea, and reduced pulse rate and blood pressure. Other symptoms include subnormal temperature, shallow respiration, and cyanosis (a blue discolouration of the skin due to lack of oxygen). The peak effects may be delayed for several hours. Convulsions and collapse may follow. Exposure to concentrations of 160 ppm acetonitrile, in air, for 4 hours, has caused flushing of the face (2 hour delay following exposure) and bronchial tightness (5 hour delay). Heavier exposures produced systemic effects with symptoms ranging from headache, nausea, lassitude to vomiting, chest or abdominal pain, respiratory depression, extreme weakness, stupor, convulsions and, for severe exposures, depending on time and concentration, death.
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CHRONIC HEALTH EFFECTS

■ 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.
Chronic exposure to cyanides and certain nitriles may result in interference to iodine uptake by thyroid gland and its consequent enlargement. This occurs following metabolic conversion of the cyanide moiety to thiocyanate.
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Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
acetonitrile	75-05-8	> 99

Section 4 - FIRST AID MEASURES

SWALLOWED

■ IMPORTANT: ESTABLISH A FIRST AID PLAN BEFORE WORKING WITH CYANIDES. ANTIDOTES SHOULD BE AVAILABLE ON SITE. · Prompt response in an emergency is vital. · All workers are to be trained and refresher trained in procedures. · Rescuers might need the protection of breathing apparatus where there is the potential of exposure to airborne cyanide. · Use the buddy system and avoid becoming a casualty. In all cases of cyanide exposure get medical help urgently after administering first aid. For cyanide poisonings by any route: · Contact Poisons Advisory Center or a doctor. · Seek immediate medical attention.

EYE

■ If this product comes in contact with the eyes: · Wash out immediately with fresh 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.

SKIN

■ If skin contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN

· Signs symptoms of acute cyanide poisoning reflect cellular hypoxia and are often non-specific.
· Cyanosis may be a late finding.

Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	99.758 @ 27 deg.C
Upper Explosive Limit (%):	16.0
Specific Gravity (water=1):	0.8
Lower Explosive Limit (%):	4.4

EXTINGUISHING MEDIA

· Water spray or fog.
· Foam.

FIRE FIGHTING

· Alert Emergency Responders and tell them location and nature of hazard.
· May be violently or explosively reactive.
When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 500 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

· Liquid and vapor are highly flammable.
· Severe fire hazard when exposed to heat, flame and/or oxidizers.
Combustion products include: carbon dioxide (CO2), nitrogen oxides (NOx), other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:
Chemical goggles.
Gloves:
1.BUTYL 2.PE/EVAL/PE 3.PVA
Respirator:
Type A Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
■ Environmental hazard - contain spillage.
· Remove all ignition sources.
· Clean up all spills immediately.
Wipe up and absorb small quantities with a cloth or paper towel.
Allow to evaporate in a fume hood and burn the paper.
Flush area with large quantities of water.
MAJOR SPILLS
■ Environmental hazard - contain spillage.
· DO NOT touch the spill material.
· Clear area of personnel and move upwind.
· Alert Emergency Responders and tell them location and nature of hazard.
For alkyl nitriles:
For residue:
· Add alkaline hypochlorite solution to spill to produce cyanate.

· Neutralise liquid, and absorb with sawdust.
· Collect solid residues and seal in drums for disposal.
· Wash spill area with large quantities of water.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

· Containers, even those that have been emptied, may contain explosive vapours.
· Do NOT cut, drill, grind, weld or perform similar operations on or near containers.
· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.

RECOMMENDED STORAGE METHODS

■ Glass container.
Packing as supplied by manufacturer. Plastic containers may only be used if approved for flammable liquid.
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· For low viscosity materials (i): Drums and jerricans must be of the non-removable head type. (ii): 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).

STORAGE REQUIREMENTS

· Outside or detached storage is preferred.
· Store in original containers in approved flame-proof area.
· No smoking, naked lights, heat or ignition sources.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
Canada - Alberta Occupational Exposure Limits	acetonitrile (Acetonitrile)	20	34						
Canada - British Columbia Occupational Exposure Limits	acetonitrile (Acetonitrile)	20							Skin
US NIOSH Recommended Exposure Limits (RELs)	acetonitrile (Acetonitrile)	20	34						
US OSHA Permissible Exposure Levels (PELs) - Table Z1	acetonitrile (Acetonitrile)	40	70						
US ACGIH Threshold Limit Values (TLV)	acetonitrile (Acetonitrile)	20							TLV Basis: Lower respiratory tract irritation
US - Minnesota Permissible Exposure Limits (PELs)	acetonitrile (Acetonitrile)	40	70	60	105				
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	acetonitrile (Acetonitrile)	40	70						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	acetonitrile (Acetonitrile)	40	70	60	105				

US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	acetonitrile (Acetonitrile)	40	70	60	105		
US - California Permissible Exposure Limits for Chemical Contaminants	acetonitrile (Acetonitrile)	40	70	60	105		
US - Idaho - Limits for Air Contaminants	acetonitrile (Acetonitrile)	40	70				
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	acetonitrile (Acetonitrile)	40	67	60	101		
US - Hawaii Air Contaminant Limits	acetonitrile (Acetonitrile)	40	70	60	105		
US - Alaska Limits for Air Contaminants	acetonitrile (Acetonitrile)	40	70	60	105		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	acetonitrile (Acetonitrile)	20		30			Skin
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	acetonitrile (Acetonitrile)	40	70	60	105		
US - Washington Permissible exposure limits of air contaminants	acetonitrile (Acetonitrile)	40		60			
US - Michigan Exposure Limits for Air Contaminants	acetonitrile (Acetonitrile)	40	70	60	105		
Canada - Prince Edward Island Occupational Exposure Limits	acetonitrile (Acetonitrile)	20					TLV Basis: Lower respiratory tract irritation
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	acetonitrile (Acetonitrile)	40	70				
Canada - Nova Scotia Occupational Exposure Limits	acetonitrile (Acetonitrile)	20					TLV Basis: Lower respiratory tract irritation
US - Oregon Permissible Exposure Limits (Z-1)	acetonitrile (Acetonitrile)	40	70				

Canada - Northwest Territories Occupational Exposure Limits (English)	acetonitrile (Acetonitrile - Skin)	40	67	60	100

ENDOELTABLE

PERSONAL PROTECTION




RESPIRATOR

Type A Filter of sufficient capacity
Consult your EHS staff for recommendations

EYE

· Safety glasses with side shields.
· Chemical goggles.

HANDS/FEET

■ 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.
for acetonitrile:
Butyl rubber, PVAL, Teflon, Saranex, Silvershield, Viton/ chlorobutyl are all highly resistant to permeation.
· Butyl rubber gloves.
· Viton gloves.

OTHER

· Overalls.
· PVC Apron.
· Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
· For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.
* Keep an antidote kit available where acetonitrile is used.

ENGINEERING CONTROLS

■ For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.
Mixes with water.
Contact with acids liberates very toxic gas.

State	Liquid	Molecular Weight	41.05 Pure
Melting Range (°F)	-49	Viscosity	Not Available
Boiling Range (°F)	177.98	Solubility in water (g/L)	Miscible
Flash Point (°F)	41.9 (OC)	pH (1% solution)	Not available.
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	975.2	Vapor Pressure (mmHg)	99.758 @ 27 deg.C

Upper Explosive Limit (%)	16.0	Specific Gravity (water=1)	0.8
Lower Explosive Limit (%)	4.4	Relative Vapor Density (air=1)	1.4
Volatile Component (%vol)	100	Evaporation Rate	5.79 BuAc=1
Gas group	IIA		

ACETONITRILE		
log Kow (Prager 1995):		-0.34
log Kow (Sangster 1997):		-0.34

APPEARANCE
Clear, highly flammable liquid with an ether-like odour. Mixes with water, alcohols, esters, acetone, ether, acetamide solutions, chloroform, ethylene dichloride and many unsaturated hydrocarbons. Immiscible with many saturated hydrocarbons (petroleum fractions).

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY
· Presence of elevated temperatures.
· Presence of incompatible materials.
· Product is considered stable.

STORAGE INCOMPATIBILITY
■ Acetonitrile
· forms cyanide gas on contact with steam
· reacts violently with oxidisers such as chlorine, bromine, fluorine; with chlorosulfonic acid, oleum or sulfuric acid
· is incompatible with water (especially if acid or alkaline), acids, caustics, nitrating agents, indium, nitrogen tetroxide , sulfur trioxide, iron(III) salts of perchlorate, nitrogen fluoride compounds
· attacks most rubber and plastics
· may accumulate electrical charges, causing ignition of vapours.
· Contact with acids produces toxic fumes.
WARNING:
May decompose violently or explosively on contact with other substances.
· This substance is one of the relatively few compounds which are described as "endothermic" i.e. heat is absorbed into the compound, rather than released from it, during its formation.
· The majority of endothermic compounds are thermodynamically unstable and may decompose explosively under various circumstances of initiation.
· Many but not all endothermic compounds have been involved in decompositions, reactions and explosions and, in general, compounds with significantly positive values of standard heats of formation, may be considered suspect on stability grounds.
BRETHERICK L.: Handbook of Reactive Chemical Hazards.
· Nitriles may polymerize in the presence of metals and some metal compounds.
· They are incompatible with acids; mixing nitriles with strong oxidizing acids can lead to extremely violent reactions.
· The covalent cyano group is endothermic and many organic nitriles are reactive under certain conditions; N-cyano derivatives are reactive or unstable.
· The majority of endothermic compounds are thermodynamically unstable and may decompose explosively under various circumstances of initiation.
· Many but not all endothermic compounds have been involved in decompositions, reactions and explosions and, in general, compounds with significantly positive values of standard heats of formation, may be considered suspect on stability grounds.
BRETHERICK L.: Handbook of Reactive Chemical Hazards.
Avoid reaction with oxidizing agents.

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

Section 11 - TOXICOLOGICAL INFORMATION

ACETONITRILE

TOXICITY AND IRRITATION
ACETONITRILE:
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (human) TDLo: 570 mg/kg	Skin (rabbit):500 mg (open)-Mild
Oral (rat) LD50: 2730 mg/kg	Eye (rabbit):20 mg (open)-SEVERE
Inhalation (human) TCLo: 160 ppm/4h	
Inhalation (rat) LC50: 7551 mg/kg	
Inhalation (rabbit) LC50: 2828 ppm/4h	
Dermal (rabbit) LD50: 1250 mg	

Oral (Human) TDLo: 500 mg/kg
Oral (Human) TDLo: 800 mg/kg
Oral (Human) TDLo: 64 mg/kg
Oral (Rat) LD50: 2460 mg/kg
Intraperitoneal (Rat) LD50: 850 mg/kg
Subcutaneous (Rat) LD50: 3500 mg/kg
Intravenous (Rat) LD50: 1680 mg/kg
Oral (Mouse) LD50: 269 mg/kg
Intraperitoneal (Mouse) LD50: 175 mg/kg
Subcutaneous (Mouse) LD50: 4480 mg/kg
Intravenous (Mouse) LD50: 612 mg/kg
Inhalation (Dog) LC: 16000 ppm/4h
Oral (Cat) LD50: 200 mg/kg
Oral (Rabbit) LD50: 50 mg/kg
Subcutaneous (Rabbit) LD: 105 mg/kg
Oral (Guinea pig) LD50: 177 mg/kg
Inhalation (Guinea pig) LC50: 5655 ppm/4h

■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

for acetonitrile:

Pharmacokinetics
Absorption - Absorption of acetonitrile occurs after oral, dermal, or inhalation exposure. Although no quantitative absorption data were found for oral exposure, signs of acute toxicity, observed after oral exposure, indicate that absorption occurs In humans, 74% of acetonitrile was absorbed from cigarette smoke held in the mouth for 2 seconds; when inhaled into the lungs, absorption increased to 91% Dogs exposed by inhalation to 16,000 ppm for 4 hours appeared to reach steady-state blood concentrations within 3-4 hours.
Distribution - Acetonitrile and its metabolites are transported throughout the body in the blood . After oral or inhalation exposures to experimental animals, parent compound or metabolites were found in the brain, heart, liver, kidney, spleen, blood, stomach, and muscle After a fatal human inhalation exposure, metabolites were also found in those organs as well as skin, lungs, intestine, testes, and urine . Metabolism - Acetonitrile is metabolised to hydrogen cyanide and thiocyanate which are responsible for the toxic effects of the chemical Metabolism is mediated by the cytochrome P-450 system
Excretion - Acetonitrile is excreted as the parent chemical in expired air and as parent or metabolite in urine Urinary excretion of thiocyanate following oral exposure in rats ranged from 11.8% (U.S. EPA 1985) to 37% of administered dose. Concentrations of acetonitrile of 2.2-20 microgram/100 mL of urine have been found for heavy smokers
Acute Toxicity
Acetonitrile liquid or vapor is irritating to the skin, eyes, and respiratory tract. At high enough doses, death can occur quickly from respiratory failure. Lower doses cause typical symptoms of cyanide poisoning such as salivation, nausea, vomiting, anxiety, confusion, hyperpnea, dyspnea, rapid pulse, unconsciousness, and convulsions.
Humans - Liquid or vapor acetonitrile is irritating to eyes, skin, nose, and throat . Concentrations of acetonitrile vapor up to 500 ppm cause irritation of mucous membranes . Volunteers were exposed to 40, 80, or 160 ppm for 4 hours; several hours after exposure one person had tightness of the chest after exposure to 40 ppm and another experienced flushing of the face and bronchial tightness after exposure to 160 ppm The concentration of 160 ppm is roughly equivalent to a total of 19.5 mg/kg over the 4 hour period . One photographic laboratory worker died after "massive" exposure to acetonitrile vapor; gastric distress and nausea began about 4 hours after exposure followed by hypersalivation, conjunctivitis, low urine output, low blood pressure, albumin in urine and cerebrospinal fluid, coma, and death due to cardiac and respiratory failure . Similar signs and symptoms, including death, occurred in a worker painting the interior of a tank with a resin containing 30-40% acetonitrile
Animals - Oral LD50 values for acetonitrile in the rat range from 2.46 to 6.5 g/kg. The 4-hour inhalation LC50 varies with species from 2828 ppm in the rabbit to 16,000 ppm in the rat; dermal LD50 values of 3.9 and 1.25 g/kg have been reported for the rabbit Deaths occurred in dogs exposed by inhalation to 16,000 or 32,000 ppm; necropsy indicated pulmonary hemorrhage and vascular congestion
Subchronic/Chronic Toxicity
Limited information was found on the adverse effects of long term human exposure to acetonitrile. Animals exposed chronically by inhalation have liver vacuolisation, cerebral hemorrhage, lung lesions including focal emphysema and proliferation of alveolar septa, and decreases in hematological parameters. EPA has derived an oral reference dose (RfD) of 0.006 mg/kg/day for acetonitrile, based on adverse blood effects observed in animal inhalation studies. Confidence in this RfD is low
Humans - No information was found on the adverse effects of long term human exposure to acetonitrile. Chronic exposure to acetonitrile may cause headache, anorexia, dizziness, weakness, and macular, papular, or vesicular dermatitis.
Animals - Female mice exposed to 100, 200, or 400 ppm, 6 hours/day, 5 days/week for 90 days had thymic atrophy at the middle and high doses and hepatic vacuolisation at the high dose; dose-related decreases were observed in hematocrit, blood hemoglobin concentration, and erythrocyte and leucocyte counts A no-observed-adverse effect level (NOAEL) for this study was 100 ppm (equivalent to 19.3 mg/kg/day). Based on these inhalation data the U.S. EPA calculated an oral reference dose for acetonitrile of 0.006 mg/kg/day. Similar hepatic and blood profile changes were observed in mice exposed to 200 or 400 ppm 6.5 hours/day, 5 days/week for 13 weeks Rats exposed by inhalation to 166, 330, or 655 ppm acetonitrile 7 hours/day, 5 days/week for 90 days had a dose-responsive increase in the severity of lung lesions. Animals in the low and middle dose groups had "histiocytic clumps in alveoli, atelectasis, bronchitis or pneumonia"; high dose animals had alveolar congestion and focal edema, bronchial inflammation, desquamation, and excess mucus as well as swelling of the liver and kidneys and cerebral hemorrhage. Dogs and monkeys exposed to 350 ppm, 7 hours/day, 5 days/week for 91 days had pulmonary lesions including

focal emphysema, atelectasis and proliferation of alveolar septa; transient depression in haematocrit and hemoglobin values also occurred in dogs, and brain hemorrhages were observed in monkeys . Male and female mice (groups of 10/sex) were exposed to 25, 50, 100, 200, or 400 ppm, 6 hours/day for 65 days. Decreased BUN, red blood cell counts, and hematocrit occurred in females exposed to the two highest doses, and increased liver weights were observed in males at 400 ppm and females at 100 and 200 ppm
Genotoxicity
Acetonitrile was negative for mutations in Chinese hamster ovary cells and Salmonella strains TA98, TA100, TA1535, and TA1537 when assayed with or without metabolic activation . Developmental/Reproductive Toxicity Acetonitrile causes a dose-related increase in early resorptions and fetal death in hamsters, rats, and rabbits. Neural tube defects also occur in hamsters after a single oral or inhalation exposure during early gestation.
Humans - No information was found in the secondary sources searched regarding the developmental or reproductive toxicity of acetonitrile to humans.
Animals - Hamsters (6 to 12/group) were administered a single oral dose of acetonitrile of 100, 200, 300, or 400 mg/kg on day 8 of gestation. At the 2 highest doses, increases in exencephaly, encephalocele, and rib malformations were observed; decreased fetal body weight occurred at all doses and an increase in resorptions occurred at 200 and 400 mg/kg . The same malformations occurred when hamsters were exposed by inhalation to 5000 or 8000 ppm for 1 hour on day 8 of gestation An increase in early resorptions also occurred in rats receiving 375 mg/kg/day by gavage on gestation days 6-19; no adverse effects were observed at 200 mg/kg/day . Rabbits given 2, 15, or 30 mg/kg/day acetonitrile by gavage on gestation days 6-18 had an increase in fetal death at the highest dose . No effects in sperm motility and morphology or in vaginal cytology was observed in rats or mice exposed to 400 ppm, 6 hours/day, 5 days/week for 13 weeks .
Neurotoxicity
Exposure to high concentrations of acetonitrile causes death by respiratory failure and has been shown to cause brain lesions in animals.
Humans - The nervous system is a major target for acetonitrile acute toxicity. Acute exposure may cause salivation, nausea, vomiting, anxiety, confusion, hyperpnea, dyspnea, rapid pulse, unconsciousness, and convulsions followed by death from respiratory failure. Chronic exposure may cause headache, anorexia, dizziness, and weakness
Animals - Acetonitrile inhalation caused cerebral hemorrhages in rats exposed to 655 ppm 7 hours/day, 5 days/week, for 90 days and monkeys exposed to 350 ppm 7 hours/day, 5 days/week, for 91 days.

SKIN

acetonitrile	US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
acetonitrile	US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
acetonitrile	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X

Section 12 - ECOLOGICAL INFORMATION

May cause long-term adverse effects in the environment.
This material and its container must be disposed of as hazardous waste.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
acetonitrile	LOW	HIGH	LOW	HIGH

GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

Name / EHS TRN A1a A1b A1 A2 B1 B2 C1 C2 C3 D1 D2 D3 E1 E2 E3 Cas No / RTECS No _____ Acetonitr 16 69 0 0 0 R 1 NI 1 1 2 1 2 D 2 ile / CAS:75- 05- 8 / AL7700000

Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships) NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation, B1=Acuteaquatic toxicity LC/ECIC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg), C2=Acutemammalian dermal toxicity LD50 (mg/kg), C3=Acute mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion, D2=Eye irritation& corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference with coastal amenities, For column A2: R=Readily biodegradable, NR=Not readily biodegradable. For column D3: C=Carcinogen, M=Mutagenic, R=Reprotoxic, S=Sensitising, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lunginjury, N=Neurotoxic, I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Floater, S=Sinking substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships)

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information
Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)
Reactivity characteristic: use EPA hazardous waste number D003 (waste code R).
B. Component Waste Numbers
When acetonitrile 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 U003 (waste code T,I).

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.
· Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
· Care must be taken when using hypochlorite solution to destroy cyanidewastes by oxidation to cyanates.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 3
Identification Numbers: UN1648 PG: II
Label Codes: 3 Special provisions: IB2, T7,
TP2
Packaging: Exceptions: 150 Packaging: Non- bulk: 202
Packaging: Exceptions: 150 Quantity limitations: 5 L
Passenger aircraft/rail:
Quantity Limitations: Cargo 60 L Vessel stowage: Location: B
aircraft only:
Vessel stowage: Other: 40 S.M.P.: YES
Hazardous materials descriptions and proper shipping names:
Acetonitrile

Air Transport IATA:

ICAO/IATA Class: 3 ICAO/IATA Subrisk: None
UN/ID Number: 1648 Packing Group: II
Special provisions: None
Cargo Only
Packing Instructions: 307 Maximum Qty/Pack: 60 L
Passenger and Cargo Passenger and Cargo
Packing Instructions: 305 Maximum Qty/Pack: 5 L
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: Y305 Maximum Qty/Pack: 1 L
Shipping Name: ACETONITRILE

Maritime Transport IMDG:

IMDG Class: 3 IMDG Subrisk: None
UN Number: 1648 Packing Group: II
EMS Number: F-E , S-D Special provisions: None
Limited Quantities: 1 L
Shipping Name: ACETONITRILE

Section 15 - REGULATORY INFORMATION

acetonitrile (CAS: 75-05-8) 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 - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada National Pollutant Release Inventory (NPRI)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances","OECD Representative List of High Production Volume (HPV) Chemicals","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Toxic Air Contaminant List Category IV","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","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 Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either","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 Dangerous waste constituents list","US - Washington Discarded Chemical Products List - ""U"" Chemical Products","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 ACGIH Threshold Limit Values (TLV) - Carcinogens","US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)","US Clean Air Act - Hazardous Air Pollutants","US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA Acute Exposure Guideline Levels (AEGLs) - Interim","US EPA Carcinogens Listing","US EPA High Production Volume Program Chemical List","US EPA Master Testing List - Index I Chemicals Listed","US EPCRA Section 313 Chemical List","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) - Appendix IX to Part 264 Ground-Water Monitoring List 1","US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261","US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Inorganic and Organic Constituents 1","US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes","US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards","US Toxic Substances Control Act (TSCA) - Inventory","US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements","US TSCA Section 4/12 (b) - Sunset Date/Status","US TSCA Section 8 (a) - Preliminary Assessment Information Rules (PAIR) - Reporting List","US TSCA Section 8 (d) - Health and Safety Data Reporting"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Cumulative effects may result following exposure*.
■ May be harmful to the foetus/ embryo*.
* (limited evidence).

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 preparation 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.

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