CADMIUM (-106, -108, -110, -111, -112, -113, -114, -116)

Chemwatch: **21921**
Version No: **7.1.1.1**
Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Issue Date: **01/01/2013**
Print Date: **12/08/2015**
Initial Date: **Not Available**
S.GHS.USA.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	CADMIUM
Chemical Name	Cadmium
Synonyms	Cadmium
Proper shipping name	Flammable solid, toxic, inorganic, n.o.s.
Chemical formula	Cd
Other means of identification	Not Available
CAS number	7440-43-9

Relevant identified uses of the substance

	Medical and research applications

Details of the manufacturer

Registered company name	Oak Ridge National Laboratory
Address	P.O. Box 2008 37831, Oak Ridge, Tennessee 37831-6158
Telephone	(865) 574-6984
Fax	(865) 574-6986
Website	http://isotopes.gov/
Email	isotopes@ornl.gov

Emergency telephone number

Association / Organization	Oak Ridge National Laboratory
Emergency telephone numbers	(865)574-6606
Other emergency telephone numbers	CHEMTREC: 1-800-424-9300

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability	3		
Toxicity	4		
Body Contact	0		
Reactivity	2		
Chronic	3		

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

	Flammable Solid Category 1, Acute Toxicity (Inhalation) Category 2, Germ Cell Mutagen Category 2, Carcinogen Category 1B, Reproductive Toxicity Category 2, STOT - RE Category 1, Acute Aquatic Hazard Category 1, Chronic Aquatic Hazard Category 1

Label elements

Continued...

Hazard statement(s)

H228	Flammable solid
H330	Fatal if inhaled
H341	Suspected of causing genetic defects
H350	May cause cancer
H361	Suspected of damaging fertility or the unborn child
H372	Causes damage to organs through prolonged or repeated exposure
H400	Very toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects

Precautionary statement(s): Prevention

P201	Obtain special instructions before use.
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260	Do not breathe dust/fume/gas/mist/vapors/spray.
P271	Use only outdoors or in a well-ventilated area.

Precautionary statement(s): Response

P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P310	Immediately call a POISON CENTER/doctor/physician/first aider
P370+P378	In case of fire: Use… to extinguish.

Precautionary statement(s): Storage

P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Precautionary statement(s): Disposal

	Dispose of contents/container to authorized chemical landfill or if organic to high temperature incineration

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

CAS No	%[weight]	Name
7440-43-9	100	cadmium

Mixtures

See section above for composition of Substances

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	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 Centre 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. ▪ **DO NOT** attempt to remove particles attached to or embedded in eye. ▪ Lay victim down, on stretcher if available and pad both eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye. ▪ Seek urgent medical assistance, or transport to hospital.
Skin Contact	If skin contact occurs: ▪ Immediately remove all contaminated clothing, including footwear. ▪ Flush skin and hair with running water (and soap if available). ▪ Seek medical attention in event of irritation. In case of burns: ▪ Immediately apply cold water to burn either by immersion or wrapping with saturated clean cloth. ▪ **DO NOT** remove or cut away clothing over burnt areas. Do not pull away clothing which has adhered to the skin as this can cause further injury. ▪ **DO NOT** break blister or remove solidified material. ▪ Quickly cover wound with dressing or clean cloth to help prevent infection and to ease pain. ▪ For large burns, sheets, towels or pillow slips are ideal; leave holes for eyes, nose and mouth. ▪ **DO NOT** apply ointments, oils, butter, etc. to a burn under any circumstances. ▪ Water may be given in small quantities if the person is conscious. ▪ Alcohol is not to be given under any circumstances. ▪ Reassure. ▪ Treat for shock by keeping the person warm and in a lying position. ▪ Seek medical aid and advise medical personnel in advance of the cause and extent of the injury and the estimated time of arrival of the patient.

Continued...

Inhalation	▪ 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.
Ingestion	▪ Give a slurry of activated charcoal in water to drink. **NEVER** GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK. ▪ At least 3 tablespoons in a glass of water should be given. ▪ Although induction of vomiting may be recommended (**IN CONSCIOUS PERSONS ONLY**), such a first aid measure is dissuaded due to the risk of aspiration of stomach contents. It is better to take the patient to a doctor who can decide on the necessity and method of emptying the stomach. (ii) Special circumstances may however exist; these include non-availability of charcoal and the ready availability of the doctor. **NOTE:** If vomiting is induced, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. **NOTE:** Wear protective gloves when inducing vomiting. ▪ REFER FOR MEDICAL ATTENTION WITHOUT DELAY. ▪ In the meantime, 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 SDS 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. (ICSC20305/20307)

Indication of any immediate medical attention and special treatment needed

- High acute exposure, to cadmium, produces delayed pulmonary edema progressing to interstitial fibrosis.
- For acute inhalations, initial presentation simulates metal fume fever (fever, headache, dyspnea, pleuritic chest pain, conjunctivitis, rhinitis, sore throat, cough) developing 4-12 hours post-exposure. Respiratory failure may ensue in 3-10 days.
- For acute oral exposures, gastroenteritis results with sudden onset of vomiting, diarrhea and abdominal pain. If
- vomiting is not prominent, use Ipecac/lavage/catharsis in usual manner.
- CaNa2EDTA is the chelator of choice for acute cadmium exposure. British Anti-Lewisite increases nephrotoxicity and therefore is not indicated

[*Ellenhorn and Barceloux: Medical Toxicology*]

COMMENTS on HUMAN TOXICITY:

- Between 10 and 50% of inhaled cadmium is adsorbed, the adsorption being greater for smaller particles and fumes; absorption through skin is negligible.

- The half-life of cadmium in the human body is thought to be about around 30 years and it has no known biological function.

Blood and urine cadmium concentrations may be determined.

Normal concentrations	Hazardous concentrations
Blood <27 nml/l (<3ug/l), non-smokers <54 nmol/l (<6 ug/l), smokers	>180 nmol/l (>20 ug/l)
Urine <18 nmol/l (<2 ug/l), non-smokers 0.4-1.3 nmol/mmol creatinine <45 nmol/l (<5 ug/l), smokers 10-35 nmol/mmol creatinine	>180 nmol/l (>20 ug/l) >4-13 nmol/mmol creatinine

BIOLOGICAL EXPOSURE INDEX (BEI)

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

Determinant	Sampling time	Index	Comments
Cadmium in urine	Not critical	5 ug/g creatinine	B
Cadmium in blood	Not critical	5 ug/L	B

B: Background levels occur in specimens collected from subjects NOT exposed

Copper, magnesium, aluminum, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, brazing, galvanizing or smelting operations all give rise to thermally produced particulates of smaller dimension than may be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce "metal fume fever" in workers from an acute or long term exposure.

- Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)
- Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.
- Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.
- The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.
- Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.

[Ellenhorn and Barceloux: Medical Toxicology]
* In addition to preplacement and periodic medical examinations, recommended medical surveillance procedures include urinary cadmium and protein determinations and pulmonary function testing.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

	Metal dust fires need to be smothered with sand, inert dry powders. **DO NOT** USE WATER, CO2 or FOAM. ▪ Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire. ▪ Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.

Special hazards arising from the substrate or mixture

	None known.

Advice for firefighters

	▪ Alert Fire Brigade and tell them location and nature of hazard.

Continued...

	▪ Wear full body protective clothing with breathing apparatus. ▪ Prevent, by any means available, spillage from entering drains or water course. ▪ Fight fire from a safe distance, with adequate cover.
Fire/Explosion Hazard	▪ **DO NOT** disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal. ▪ **DO NOT** use water or foam as generation of explosive hydrogen may result. With the exception of the metals that burn in contact with air or water (for example, sodium), masses of combustible metals do not represent unusual fire risks because they have the ability to conduct heat away from hot spots so efficiently that the heat of combustion cannot be maintained - this means that it will require a lot of heat to ignite a mass of combustible metal. Decomposes on heating and produces toxic fumes of cadmium oxide.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	▪ Remove all ignition sources. ▪ **DO NOT** touch or walk through spilled material. ▪ Clean up all spills immediately. ▪ Avoid contact with skin and eyes.
Major Spills	▪ Clear area of personnel and move upwind. ▪ Alert Fire Brigade and tell them location and nature of hazard. ▪ **DO NOT** touch or walk through spilled material. ▪ Wear full protective clothing and breathing apparatus.

	Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▪ Avoid all personal contact, including inhalation. ▪ Wear protective clothing when risk of overexposure occurs. ▪ Use in a well-ventilated area. ▪ Prevent concentration in hollows and sumps.
Other information	**FOR MINOR QUANTITIES:** ▪ Store in an indoor fireproof cabinet or in a room of noncombustible construction. ▪ Provide adequate portable fire-extinguishers in or near the storage area. **FOR PACKAGE STORAGE:** ▪ Store in original containers in approved flame-proof area. ▪ No smoking, naked lights, heat or ignition sources.

Conditions for safe storage, including any incompatibilities

Suitable container	▪ **CARE**: Packing of high density product in light weight metal or plastic packages may result in container collapse with product release ▪ Glass container is suitable for laboratory quantities ▪ Heavy gauge metal packages / Heavy gauge metal drums For low viscosity materials and solids: 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): ▪ Removable head packaging and ▪ cans with friction closures may be used.
Storage incompatibility	The material is described as an electropositive metal. The activity or electromotive series of metals is a listing of the metals in decreasing order of their reactivity with hydrogen-ion sources such as water and acids. In the reaction with a hydrogen-ion source, the metal is oxidized to a metal ion, and the hydrogen ion is reduced to H2. The ordering of the activity series can be related to the standard reduction potential of a metal cation. |Segregate from strong oxidizers, sulfur, selenium, tellurium, hydrazoic acid.|Reacts with hydrochloric and sulfuric acids to produce hydrogen. (Reaction is slow.)|May react violently with fused ammonium nitrate.|Reacts with nitric acid to produce oxides of nitrogen.|Cadmium slowly oxidizes in moist air at room temperature

PACKAGE MATERIAL INCOMPATIBILITIES

Not Available

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US OSHA Permissible Exposure Levels (PELs) - Table Z1	cadmium	Cadmium	0.005 mg/m3	Not Available	Not Available	see 1910.1027;(as Cd)
US OSHA Permissible Exposure Levels (PELs) - Table Z2	cadmium	Cadmium fume / Cadmium dust	0.1 mg/m3 / 0.2 mg/m3	Not Available	0.3 mg/m3 / 0.6 mg/m3	(Z37.5–1970);This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect
US ACGIH Threshold Limit Values (TLV)	cadmium	Cadmium and compounds, as Cd	0.01 mg/m3 / 0.002 mg/m3	Not Available	Not Available	TLV® Basis: Kidney dam; BEI
US NIOSH Recommended Exposure Limits (RELs)	cadmium	Cadmium metal: Cadmium	Not Available	Not Available	Not Available	Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]

EMERGENCY LIMITS

Ingredient	TEEL-0	TEEL-1	TEEL-2	TEEL-3
CADMIUM	Not Available	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
cadmium	50 mg/m3 / 9 mg/m3	9 mg/m3 / 9 [Unch] mg/m3

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.
Personal protection	
Eye and face protection	▪ Safety glasses with side shields. ▪ Chemical goggles. ▪ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.
Skin protection	See Hand protection below
Hands/feet protection	The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice. Suitability and durability of glove type is dependent on usage.
Body protection	See Other protection below
Other protection	▪ Employees working with confirmed human carcinogens should be provided with, and be required to wear, clean, full body protective clothing (smocks, coveralls, or long-sleeved shirt and pants), shoe covers and gloves prior to entering the regulated area. [AS/NZS ISO 6529:2006 or national equivalent] ▪ Employees engaged in handling operations involving carcinogens should be provided with, and required to wear and use half-face filter-type respirators with filters for dusts, mists and fumes, or air purifying canisters or cartridges. A respirator affording higher levels of protection may be substituted. [AS/NZS 1715 or national equivalent] ▪ Emergency deluge showers and eyewash fountains, supplied with potable water, should be located near, within sight of, and on the same level with locations where direct exposure is likely.
Thermal hazards	Not Available

Recommended material(s)

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:
CADMIUM Not Available

Material	CPI

* 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.

Respiratory protection

Not Applicable

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

	A silver-white, lustrous, soft, malleable and ductile metal. It is insoluble in water, but is soluble in acids.

Physical state	Divided Solid	**Relative density (Water = 1)**	8.6
Odor	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odor threshold	Not Available	**Auto-ignition temperature (°C)**	250 (layer); 57
pH (as supplied)	Not Applicable	**Decomposition temperature**	Not Applicable
Melting point / freezing point (°C)	320.9	**Viscosity (cSt)**	Not Applicable
Initial boiling point and boiling range (°C)	767	**Molecular weight (g/mol)**	112.4

Continued...

Flash point (°C)	Not Applicable	**Taste**	Not Available
Evaporation rate	Not Applicable	**Explosive properties**	Not Available
Flammability	Not Applicable	**Oxidizing properties**	Not Available
Upper Explosive Limit (%)	Not Applicable	**Surface Tension (dyn/cm or mN/m)**	Not Applicable
Lower Explosive Limit (%)	Not Applicable	**Volatile Component (%vol)**	Not Applicable
Vapor pressure (kPa)	0.13 @ 394 deg.	**Gas group**	Not Available
Solubility in water (g/L)	Immiscible	**pH as a solution(1%)**	Not Applicable
Vapor density (Air = 1)	3.88	**VOC g/L**	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	▪ Presence of heat source and ignition source ▪ Unstable in the presence of incompatible materials. ▪ Product is considered stable. ▪ Hazardous polymerization will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	Inhalation of dusts, generated by the material, during the course of normal handling, may produce severely toxic effects; these may be fatal. Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralizing the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs.
Ingestion	Accidental ingestion of the material may be seriously damaging to the health of the individual; animal experiments indicate that ingestion of less than 40 gram may be fatal. Pyrophoric compounds may produce gastrointestinal damage resulting from local generation of heat. Ingestion of cadmium salts produces prompt vomiting and are not retained. For this reason exposure by this route tends to be less harmful than exposure by inhalation.
Skin Contact	Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterized by skin redness (erythema) and swelling (edema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level, there may be intercellular edema of the spongy layer of the skin (spongiosis) and intracellular edema of the epidermis.
Eye	It has either been demonstrated or it is expected that when the material is applied to the eye(s) of animals, it produces severe ocular lesions which are present twenty-four hours or more after instillation. Contact with the eye, by metal dusts, may produce mechanical abrasion or foreign body penetration of the eyeball. Pyrophoric compounds may produce thermal burns on contact with the eye.
Chronic	Strong evidence exists that the substance may cause irreversible but non-lethal mutagenic effects following a single exposure. On the basis, primarily, of animal experiments, the material may be regarded as carcinogenic to humans. There is sufficient evidence to provide a strong presumption that human exposure to the material may result in cancer on the basis of: - appropriate long-term animal studies - other relevant information Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed. Serious damage (clear functional disturbance or morphological change which may have toxicological significance) is likely to be caused by repeated or prolonged exposure.

Inhalation (rat) LC50: 25 mg/m3/30m	Nil reported
Oral (rat) LD50: 225 mg/kg	
Not Available	Not Available

** Value obtained from manufacturer's msds*
unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances

Acute Toxicity	✔	**Carcinogenicity**	✔
Skin Irritation/Corrosion	⊘	**Reproductivity**	✔
Serious Eye Damage/Irritation	⊘	**STOT - Single Exposure**	⊘

Continued...

Respiratory or Skin sensitization	⊘	**STOT - Repeated Exposure**	✔
Mutagenicity	✔	**Aspiration Hazard**	⊘

Legend: ✔ *– Data required to make classification available*
✖ *– Data available but does not fill the criteria for classification*
⊘ *– Data Not Available to make classification*

CMR STATUS

REPROTOXIN	cadmium	ILO Chemicals in the electronics industry that have toxic effects on reproduction	H A si
CARCINOGEN	cadmium	US NIOSH Recommended Exposure Limits (RELs) - Carcinogens|US Environmental Defense Scorecard Suspected Carcinogens|US Air Toxics Hot Spots TSD for Describing Available Cancer Potency Factors	Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]|P65|P65-MC|1
RESPIRATORY	cadmium	US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs) - Respiratory	X

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Very 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.
|BCF : 2.18-250000|Fish LC50 (96 h); 4.2-6.9 mg/L|Invertebrate LC50 (96 h): 11 mg/L|Degradation Biological: sig|processes Abiotic: photodeg

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container cannot be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorized landfill.
- Where possible retain label warnings and SDS and observe all notices pertaining to the product.

SECTION 14 TRANSPORT INFORMATION

Labels Required

Marine Pollutant

Land transport (DOT)

UN number	3179
Packing group	II
UN proper shipping name	Flammable solid, toxic, inorganic, n.o.s.
Environmental hazard	No relevant data
Transport hazard class(es)	Class | 4.1

Continued...

Hazard Label	4.1, 6.1
Special provisions	A1, IB6, IP2, T3, TP33

Air transport (ICAO-IATA / DGR)

UN number	3179
Packing group	II
UN proper shipping name	Flammable solid, toxic, inorganic, n.o.s.
Environmental hazard	No relevant data
Transport hazard class(es)	ICAO/IATA Class: 4.1 ICAO / IATA Subrisk: 6.1 ERG Code: 3P
Special precautions for user	Special provisions: A3 Cargo Only Packing Instructions: 448 Cargo Only Maximum Qty / Pack: 50 kg Passenger and Cargo Packing Instructions: 445 Passenger and Cargo Maximum Qty / Pack: 15 kg Passenger and Cargo Limited Quantity Packing Instructions: Y440 Passenger and Cargo Limited Maximum Qty / Pack: 1 kg

Sea transport (IMDG-Code / GGVSee)

UN number	3179
Packing group	II
UN proper shipping name	FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S.
Environmental hazard	No relevant data
Transport hazard class(es)	IMDG Class: 4.1 IMDG Subrisk: 6.1
Special precautions for user	EMS Number: F-A , S-G Special provisions: 274 915 Limited Quantities: 1 kg

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

"US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - California Proposition 65 - Maximum Allowable Dose Levels (MADLs) for Chemicals Causing Reproductive Toxicity","US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)","US - Idaho - Limits for Air Contaminants","US - Hawaii Air Contaminant Limits","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Proposition 65 - No Significant Risk Levels (NSRLs) for Carcinogens","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US - California Proposition 65 - Reproductive Toxicity","US - Michigan Exposure Limits for Air Contaminants","US EPA Carcinogens Listing","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - California - Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity","International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs","US - Oregon Permissible Exposure Limits (Z-1)","US - Oregon Permissible Exposure Limits (Z-2)","US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values","US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift","US OSHA Carcinogens Listing","US NIOSH Recommended Exposure Limits (RELs)","US - Alaska Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - California Proposition 65 - Carcinogens","US National Toxicology Program (NTP) 12th Report Part A Known to be Human Carcinogens","US OSHA Permissible Exposure Levels (PELs) - Table Z2","US - Minnesota Permissible Exposure Limits (PELs)","US ACGIH Threshold Limit Values (TLV)","US - Idaho - Acceptable Maximum Peak Concentrations","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Carcinogens","US OSHA Permissible Exposure Levels (PELs) - Table Z1"

SECTION 16 OTHER INFORMATION

Other information

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 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.