

SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

- 1.1. Product identifier** **N-Octenyl Succinic Anhydride (J-8)**
Synonyms: Dihydro-3-(2-octenyl)-2,5-furandione, J-8
Chemical Abstracts Registry No: 42482-06-4; 26680-54-6
REACH Registration Number: 01-2119979082-33-0001
Ladd Catalog Number: 21360
- 1.2. Relevant identified uses of the substance or mixture and uses advised against**

Chemical Intermediate

1.3. Details of the supplier of the safety data sheet

Ladd Research
83 Holly Court
Williston, VT 05495 USA
1-802-658-4961

1.4. Emergency telephone number

CHEMTREC (USA): 1-800-424-9300 (collect calls accepted)
CHEMTREC (International): 1-703-527-3887 (collect calls accepted)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

(According to Regulation (EC) No 1272/2008)

Skin Irritation Category 2
Serious Eye Irritation Category 2
Skin Sensitization Category 1A
Acute Toxicity Dermal Category 4
Acute Toxicity Oral Category 4

(According to Directive 67/548/EEC)

Symbol: Xi, Xn
Risk Phrases: R36/38: Irritating to eyes and skin.
R43: May cause sensitisation by skin contact.
R21/22: Harmful in contact with skin and if swallowed.
Safety Phrases: S24/25: Avoid contact with skin and eyes.
S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S36/37/39: Wear suitable protective clothing, gloves and eye/face protection.

2.2. Label elements

**Hazard Symbols
(Pictogram):**



Signal Word:

Warning

SAFETY DATA SHEET

Hazard Precautions:	H315 - Causes skin irritation. H319 - Causes serious eye irritation. H302 - Harmful if swallowed. H312 - Harmful in contact with skin. H317 - May cause an allergic skin reaction.
Prevention Precautionary Statements:	P270 - Do not eat, drink or smoke when using this product. P280 - Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Precautionary Statements:	P302+P352 - IF ON SKIN: Wash with plenty of soap and water. P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P333+P313 - If skin irritation or rash occurs: Get medical advice/attention. P337+P313 - If eye irritation persists: Get medical advice/attention. P362 - Take off contaminated clothing and wash before reuse. P312 - Call a POISON CENTER or doctor/physician if you feel unwell.

SECTION 3: Composition/information on ingredients

3.1. Substances or 3.2. Mixtures

Ingredient	CAS Number	Concentration (weight %)	EC Number	CLP Inventory/ Annex VI	EU DSD Classification (67/548/EEC)	EU CLP Classification (1272/2008)
2-Octenyl succinic anhydride	42482-06-4; 26680-54-6	~ 100	247-899-8	Not listed.	Xi, Xn R36/38, R21/22, R43	Eye Irrit. 2; H319 Skin Irrit. 2; H315 Acute Tox. 4; H302 Skin Sens. 1; H317 Acute Tox. 4; H312

NOTE: See Section 8 for exposure limit data for these ingredients. See Section 15 for trade secret information (where applicable). See Section 16 for the full text of the R-phrases above.

SECTION 4: First aid measures

4.1. Description of first aid measures

Skin Contact:	May cause skin irritation. Remove contaminated clothing and continue flushing with water. Get medical attention if irritation develops or persists.
Eye Contact:	Quickly and gently blot or brush chemical off the face. Rinse eyes immediately with large amounts of water for at least 15 minutes, occasionally lifting the eyelids. Obtain medical attention immediately.
Inhalation:	If symptoms of respiratory irritation are experienced, remove source of contamination or move victim to fresh air and obtain medical advice. Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment, use the buddy system. If breathing is difficult, oxygen may be beneficial if administered by trained personnel, preferably on a doctor's advice. Immediately transport victim to an emergency care facility
Ingestion:	Have victim rinse mouth thorough with water if alert and capable. Do NOT induce vomiting.

SAFETY DATA SHEET

4.2 Most important symptoms and effects, both acute and delayed

Acute:	Direct contact causes eye irritation. Direct contact causes skin irritation. Vapor can irritate the eyes, nose, and respiratory tract. May cause gastrointestinal tract irritation with nausea and vomiting. May cause sensitization by skin contact.
Delayed Effects:	None known.

4.3. Indication of any immediate medical attention and special treatment needed

Note to Physician:	No specific indications. Treatment should be based on the judgment of the physician in response to the reactions of the patient.
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SECTION 5: Firefighting measures

5.1. Extinguishing media

Appropriate Extinguishing Media:	Carbon dioxide, Alcohol foam, Water spray, Foam
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5.2. Special hazards arising from the substance or mixture

Hazardous Products of Combustion:	Carbon dioxide, Carbon monoxide Irritating and/or toxic fumes may be released if this material is burned.
Potential for Dust Explosion:	Not applicable.
Special Flammability Hazards:	Can burn in fire releasing toxic vapors.

5.3. Advice for firefighters

Basic Fire Fighting Guidance:	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
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SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuation Procedures:	Isolate the hazard area and deny entry to unnecessary and unprotected personnel.
Special Instructions:	See Section 8 for personal protective equipment recommendations. Remove all contaminated clothing to prevent further absorption. Decontaminate affected personnel using the first aid procedures in Section 4. Leather shoes that have been saturated must be discarded.

6.2. Environmental precautions

Prevent releases to soils, drains, sewers and waterways.

6.3. Methods and material for containment and cleaning up

LARGE SPILLS: Shut off leak if safe to do so. Clean up spills immediately. Wear protective equipment during clean-up. Prevent skin/eye contact. Stop the flow of material, if this is without risk. For small spills, use suitable absorbent material and collect for later disposal. For large spills, the area may require diking to contain the spill. Carefully scoop up and place into appropriate disposal container. Scrub area with detergent and water. Prevent runoff from entering drains, sewers, and streams

6.4. Reference to other sections

SAFETY DATA SHEET

Refer to section 8 for information on selecting personal protective equipment. Refer to section 13 for information on spilled product, absorbent and clean up material disposal instructions.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for Unique Hazards: Not applicable.

Practices to Minimize Risk: Wear appropriate protective equipment when performing maintenance on contaminated equipment. Wash hands thoroughly before eating or smoking after handling this material. Do not eat, drink or smoke in work areas. Prevent contact with incompatible materials. Avoid spills and keep away from drains. Handle in a manner to prevent generation of aerosols, vapors or dust clouds.

Special Handling Equipment: Use with adequate ventilation.
Wash thoroughly after handling.

7.2. Conditions for safe storage, including any incompatibilities

Storage Precautions & Recommendations: Store in a cool dry place Keep container closed when not in use.

Dangerous Incompatibility Reactions: Strong oxidizing agents

Incompatibilities with Materials of Construction: None known

7.3. Specific end use(s)

If a chemical safety assessment has been completed an exposure scenario is attached as an annex to this Safety Data Sheet. Refer to this annex for the specific exposure scenario control parameters for uses identified in subsection 1.2.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Country

Occupational Exposure Limit

Air Monitoring Method: Not applicable.

Derived No Effect Levels (DNELs) – Workers:

Route	DNEL
Acute - systemic effects (dermal)	1.0 mg/kg bw/d
Long-term - systemic effects (dermal)	0.33 mg/kg bw/day
Long-term - systemic effects (inhalation)	Not established. Exposure unlikely
Long term - local effects (dermal)	10 mg/kg bw/day
Long term - systemic (oral) reproductive	0.5 mg/kg bw/day
Long term - systemic (oral) developmental	5 mg/kg bw/day

SAFETY DATA SHEET

Derived No Effect Levels (DNELs) – General Population:

Route	DNEL
Acute - systemic effects (dermal) Acute - systemic effects (inhalation) Long-term - systemic effects (dermal) Long-term - systemic effects (inhalation) Long-term - systemic effects (oral) Acute and long-term - local effects (dermal, inhalation)	Qualitative assessment - skin/eye/respiratory irritant. No applications involving general population

Predicted No Effect Concentrations (PNECs):

Route	PNEC
PNEC aqua (freshwater)	0.02 mg/L
PNEC aqua (marine water)	0.002 mg/L
PNEC aqua (intermittent releases)	0.2 mg/L
PNEC aqua (STP)	10 mg/L
PNEC sediment (freshwater)	1.7 mg/kg sediment dw
PNEC sediment (marine water)	0.17 mg/kg sediment dw
PNEC soil	0.2 mg/kg soil dw
PNEC oral (wildlife exposures)	Derivation waived - (log Kow >3)

8.2. Exposure controls

Also see the annex to this SDS (if applicable) for specific exposure scenario controls.

Other Engineering Controls: All operations should be conducted in well-ventilated conditions. Local exhaust ventilation should be provided. Use process enclosures to control the level of dust in the air.

Personal Protective Equipment: Neoprene, nitrile or polyvinyl chloride gloves conforming to at least EN374. Use safety glasses with side shields under normal exposure conditions; use chemical goggles where there is potential for splashing, spraying or generation of mists or vapors. Respiratory protection is not normally required, but where overexposure is a concern, use NIOSH-approved chemical cartridge respirator with organic vapor cartridges.

Respirator Caution: Observe OSHA regulations for respirator use (29 CFR 1910.134). Air-purifying respirators must not be used in oxygen-deficient atmospheres.

Thermal Hazards: Not applicable.

Environmental Exposure Controls: The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

SAFETY DATA SHEET

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance, State & Odor (ambient temperature):	Clear, pale yellow to pink liquid with a slight odor.		
Molecular Formula:	C ₁₂ H ₁₈ O ₃	Molecular Weight:	210.2695
Vapor Pressure:	43.5 Pa	Evaporation Rate:	No data available.
Specific Gravity or Density:	0.9633 @ 20°C	Vapor Density (air = 1):	7.3
Boiling Point:	235 °C	Freezing / Melting Point:	11 - 14 °C
Solubility in Water:	20 mg/L @ 20°C	Octanol / Water Coefficient:	Log Kow 4.68 @ 22°C
pH:	No data available.	Odor Threshold:	Not applicable
Viscosity:	44 cps @ 20°C (68°F)	Autoignition Temperature:	No data available.
Flash Point and Method:	146-206C @ 101.3 kPa; Closed Cup	Flammable Limits:	No data available.
Flammability (solid, gas):	Not applicable	Decomposition Temperature:	235 °C
Explosive Properties:	Not explosive	Oxidizing Properties:	Not oxidizing

SECTION 10: Stability and reactivity

10.1. Reactivity	Not classified as dangerously reactive.
10.2. Chemical stability	Stable under normal conditions.
10.3. Possibility of hazardous reactions	Not expected to occur.
10.4. Conditions to avoid	No data.
10.5. Incompatible materials	Strong oxidizing agents
10.6. Hazardous decomposition products	Products from combustion may include dense smoke, irritating and toxic fumes and vapors.; Carbon dioxide; carbon monoxide

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute Oral LD₅₀:	1098 mg/kg (rat)	Lowe, C (2012)
Acute Dermal LD₅₀:	> 1000 mg/ kg (rat)	Lowe, C (2012)
Acute Inhalation LC₅₀:	> 5.3 mg/L (rat) (Dust or mist)	Welch, J. (1982)
Skin Irritation:	Irritating to the skin.	

SAFETY DATA SHEET

Eye Irritation:	Moderately irritating to eyes.
Skin Sensitization:	A similar substance causes skin sensitization in animal tests.
Mutagenicity:	This product has been shown not to be mutagenic based on a battery of assays.
Reproductive / Developmental Toxicity:	No evidence of reproductive effects
Carcinogenicity:	No data available.
Target Organs:	Not applicable
Primary Route(s) of Exposure:	Inhalation. Ingestion. Eye contact. Skin contact.
Most important symptoms and effects, both acute and delayed	Direct contact causes eye irritation. Direct contact causes skin irritation. Vapor can irritate the eyes, nose, and respiratory tract. May cause gastrointestinal tract irritation with nausea and vomiting. May cause sensitization by skin contact. Delayed Effects: None known.
Additive or Synergistic effects:	None known.

SECTION 12: Ecological information

12.1. Toxicity	LC50(96h) <i>Oncorhynchus mykiss</i> > 100 mg/L 24-hrLC50 <i>Daphnia magna</i> > 100 mg/L Aquatic EC50 (96h) <i>Selenastrum capricornutum</i> (algae) = 110 mg/L	Dinehart, Simon (2014) Novak (2013) Ward (1997)
12.2. Persistence and degradability	The substance was shown to be readily biodegradable in a closed bottle test conducted in accordance with OECD Guideline 301D. Biodegradation of 71.66% was reported on day 19 of the 28 day study.	
12.3. Bioaccumulative potential	Not expected to bioconcentrate in aquatic species.	
12.4. Mobility in soil	This material is expected to have essentially no mobility in soil. It absorbs strongly to most soil types.	
12.5. Results of PBT and vPvB assessment	This substance is not a PBT or vPvB.	
12.6. Other adverse effects	None known	

SECTION 13: Disposal considerations

13.1. Waste treatment methods	
US EPA Waste Number:	Non-Hazardous
Waste Disposal:	NOTE: Generator is responsible for proper waste characterization. State hazardous waste regulations may differ substantially from federal regulations. Dispose of this material responsibly, and in accordance with standard practice for disposal of potentially hazardous materials as required by applicable international, national, regional, state or local laws, and environmental protection duty of care principles. Do NOT dump into any sewers, on the ground, or into any body of water. For disposal within the EC, the appropriate classification code according to the European Community List of Wastes should be used. Note that disposal regulations may also apply to empty containers and equipment rinsates.

SAFETY DATA SHEET

SECTION 14: Transport information

The following information applies to all shipping modes (DOT/IATA/ICAO/IMDG/ADR/RID/ADN), unless otherwise indicated:

14.1. UN number	Not applicable	14.2. UN proper shipping name	Chemicals, n.o.s. (N-Octenylsuccinic Anhydride)
14.3. Transport hazard class(es)	Not applicable	14.4. Packing group	Not applicable
14.5. Environmental hazards	Not applicable		
14.6. Special precautions for user	Not applicable		
NA Emergency Guidebook Numbers:	Not applicable	IMDG EMS:	Not applicable;
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code			Not applicable.

SECTION 15: Regulatory information

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

Chemical Inventory Lists:	Status:		
USA TSCA:	Listed	EINECS:	247-899-8
Canada(DSL/NDSL):	DSL (for CAS No. 26680-54-6)	Japan:	(2)-852X (Listed as CAS No. 26680-54-6)
Korea:	KE-10725 (Listed as CAS No. 26680-54-6)	Australia:	Listed as CAS No. 26680-54-6
China:	Listed as CAS No. 26680-54-6	Philippines:	Listed as CAS No. 26680-54-6
Taiwan:	Listed	New Zealand:	Listed as CAS No. 26680-54-6
WHMIS Classification:	Class D, Division 2, Subdivision B: Irritant.		
German Water Hazard Classification:	Not listed		
SARA 313:	Not listed.		
Other Regulatory Listings:	Material is also listed as CAS # 26680-54-6 (Dihydro-3-(octenyl)furan-2,5-dione).		

HMIS:	HEALTH	2
	FLAMMABILITY	1
	REACTIVITY	0

NFPA:



15.2. Chemical safety assessment

Not applicable.

SAFETY DATA SHEET

SECTION 16: Other information

Full text of R phrases in Section 3:
 R36/38: Irritating to eyes and skin.
 R21/22: Harmful in contact with skin and if swallowed.
 R43: May cause sensitisation by skin contact.

Key Data Sources:

Literature Reference:

- Water Soluble Fraction (WSF) to the Rainbow Trout, *Onchorhynchus mykiss*, Determined Under Static-Renewal Conditions. Testing laboratory: ABC Laboratories, Inc., Study No. 80483.
- Hershman (1983) Summary of results of primary eye irritation study, The Lubrizol Corp
- Lowe (2012) Acute Oral toxicity up and down in rats, DDSA-OSA Consortium
- Lowe (2012) Primary Skin irritation Study in Rabbits, DDSA-OSA Consortium
- Nakamura (1999) A quantitative comparison of induction challenge concentrations inducing a 50% positive response in three skin sensitization tests, published J Toxicological Sciences
- Novak (2013) Triponenyl succinic acid Acute immobilization Test to *Daphnia magna*, static 48 hour limit test, Clariant Productt
- Dinehart, Simon, (2014) Tetrapropenyl Succinic Anhydride: Acute Toxicity of the Water Soluble Fraction (WSF) to the Rainbow Trout, *Onchorhynchus mykiss*, ABC Study No. 80483.
- Schreib (2012) Reverse Mutation Assay Using Bacteria with n-Dodecenyl succinic anhydride, DDSA-OSA Consortium
- Takawale, Pradeep (2013) Reproduction/Developmental Toxicity Screening Test including Sperm Analysis in Wistar Rats with Novoperm, Clariant Productt
- Ward, Magazu, Boeri (1997) Acute Toxicity of the Water Accommodated Fraction of OS# 1823OU to the Freshwater Algae, The Lubrizol Corporation
- Welch (1982) Inhalation Toxicity Study in Rats with EPA Response, Buffalo Color Corp

Training Advice: Not applicable.

Legend of Abbreviations:

ACGIH = American Conference on Governmental Industrial Hygienists.

CAS = Chemical Abstracts Service.

CFR = Code of Federal Regulations.

DSL/NDSL = Domestic Substances List/Non-Domestic Substances List.

EC = European Community.

EINECS = European Inventory of Existing Commercial Chemical Substances.

ELINCS = European List of Notified Chemical Substances.

EU = European Union.

GHS = Globally Harmonized System.

LC = Lethal Concentration.

LD = Lethal Dose.

NFPA = National Fire Protection Association.

NIOSH = National Institute of Occupational Safety and Health.

NTP = National Toxicology Program.

OSHA = Occupational Safety and Health Administration

PEL = Permissible Exposure Limit.

RQ = Reportable Quantity.

SARA = Superfund Amendments and Reauthorization Act of 1986.

TLV = Threshold Limit Value.

WHMIS = Workplace Hazardous Materials Information System.

Important Note: Please note that the information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. The information contained herein may change without prior notice. THIS SAFETY DATA SHEET SUPERSEDES ALL PREVIOUS EDITIONS.

Revision Date: 05/19/2015

SAFETY DATA SHEET

Annex N-Octenyl Succinic Anhydride - Summary of Uses

ES Number	Name	SU	ERC	PROC	PC
2	Use as an intermediate	3/8	6a	3,4,8a,8b,15	

N-Octenyl Succinic Anhydride Exposure Scenarios

Note: Guidance below is in addition to that indicated in sections 1-16 of the SDS

ES 2

Title: Use as an Intermediate

Exposure scenario covering the following

Main Sector of Use Group

- **SU3: Industrial uses: Uses of substances as such or in preparations-at industrial sites**
 - SU8: Manufacture of bulk, large scale chemicals

Process Categories

PROC 3: Use in closed batch process (synthesis or formulation)

PROC 4: Use in batch processes-opportunities for exposure

PROC 8a: Transfer of substance-Non-Dedicated facilities

PROC 8b: Transfer of substance or preparation (charging/discharging) from / to vessels / large containers at dedicated facilities

PROC 15: Laboratory Use -Sampling

Environmental Release Categories

ERC 6a: Use as an Intermediate

1. Control of Worker Exposure

Product Characteristic

- The material exists only in the liquid form

Amounts used

- Not relevant for human risk assessment

Frequency and duration of use/exposure

Worker exposure per shift

PROC	Hours / shift
3	< 8 hours
4	< 8 hours
8a	< 4 hours
8b	< 4 hours
15	< 1 hour

Other given operational conditions affecting workers exposure

- The work is performed indoors

Technical conditions and measures at process level (source) to prevent release:

- See Section 7 of SDS

SAFETY DATA SHEET

Technical conditions and measures to control dispersion from source towards the worker:

- See Section 7 and 8 of SDS
- Ventilation

PROC	General Ventilation	Local Ventilation
3	General (1-3 air changes per hour)	Yes 90% Efficiency
4	General (1-3 air changes per hour)	Yes 90% Efficiency
8a	General (1-3 air changes per hour)	Yes 90% Efficiency
8b	General (1-3 air changes per hour)	Yes 90% Efficiency
15	General (1-3 air changes per hour)	

Organisational measures to prevent /limit releases, dispersion and exposure: See SDS

Conditions and measures related to personal protection, hygiene and health evaluation:

- See sections 7, 8 and 10 of SDS
- Respirators: not defined
- Gloves with specific activity training, 95% efficiency assumed for all

2. Control of Environmental Exposure

Product characteristics

- The substance is a liquid.

Frequency and duration of use

- Continuous and Intermittent release possible

Environment factors not influenced by risk management

- Default values of 18,000 m³/d for receiving waters are assumed

Other given operational conditions affecting environmental exposure

- Operations are assumed to be indoors
- Production is in closed systems

Technical conditions and measures at process level (source) to prevent release

- See sections 7 and 8 of the SDS

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Water

- Discharge to STP: Treatment efficiency assumed 90.19%
- STP Discharge rate: 2000 m³ / day
- Compliance with local water discharge regulations

Use	Release Rate %	Basis
2:Use as Intermediate	0.01	Closed system; upper worst case release limit

SAFETY DATA SHEET

Air

Use	Release Rate %	Basis
2:Use as intermediate	0	Use in closed systems

Soil

Use	Release Rate %	Basis
2: Use as Intermediate	0	Used in closed systems

Organizational measures to prevent/limit release from site

- See Sections 6 and 7 of the SDS

Conditions and measures related to municipal sewage treatment plant disposal

- The default STP value of 2000 m³/d was used.

Conditions and measures related to external treatment of waste for disposal

- See section 13 of the SDS
- Empty raw material packaging containers (EU waste code: 15 01 10)
- Residual in shipping containers assumed to be <0.1%
- Observe all regional, state and local environmental regulations

Conditions and measures related to external recovery of waste

- There is no recovery at an external waste treatment site

3. Exposure estimation and reference to its source

The human health risk assessment and the environmental risk assessment were performed using Chesar with ECETOC TRA 3.0.. Tables below summarize the calculated exposures and resulting Risk Characterization Ratios (RCR) at < 1.0. Note the worker exposures in ECETOC TRA are calculated by multiplying the full shift calculations by the following factors:

- >4 hours: 1
- 1-4 hours: 0.6
- 15minutes to 1 hour: 0.2
- < 15minutes: 0.1

4. Guidance to DU - Operational conditions and Risk Management Measures

The activities discussed above result in an acceptable exposure if individually performed by an industrial/professional worker, and considering the operational conditions and the risk management measures (RMM) as defined.

The downstream user may re-calculate the RCR values based on variations in the local operational conditions and application of RMM to confirm that operations are within the control limits.

SAFETY DATA SHEET

Predicted Exposure Concentrations / Risk Characterization – Environmental

Compartment	-	RCR*	Local PEC; Use 2	RCR*	-			
Water: Fresh; mg/L	-	-	6.576E-4	0.033				
Water: Fresh Sediment; mg/kg	-	-	0.057	0.033				
Water: Marine; mg/L	-	-	6.576E-5	0.033				
Water; Marine Sediment; mg/kg	-	-	0.006	0.033				
Water: STP mg/L	-	-	0.007	<0.01				
Soil: mg/kg	-	-	8.542E-7	<0.01	3.598E-4	<0.01	1.799E-4	<0.01

*Risk Characterization Ratio

Predicted Exposure Concentrations – Worker

Route of exposure: ES 1	PROC 3	PROC 4	PROC 8a	PROC 8b	PROC 15
Inhalation: Acute Systemic: mg/m3	Qual	Qual	Qual	Qual	Qual
Inhalation: Long Term Local; mg/m3	Qual	Qual	Qual	Qual	Qual
Inhalation: Long Term Systemic: mg/m3	Qual	Qual	Qual	Qual	Qual
Dermal: Acute Systemic: mg/kg bw/day	Qual	Qual	Qual	Qual	Qual
Dermal: Long Term Local: mg/cm2	Qual	Qual	Qual	Qual	Qual
Dermal: Long Term Systemic: mg/kg/bw/day	0.034	0.034	0.069	0.034	0.034

Qual: Qualitative assessment completed to demonstrate control considering alternate modes and the use of defined Operational Conditions and Risk Management Measures

Risk Characterization Ratio – Worker

Route of exposure: ES 1	PROC 3	PROC 4	PROC 8a	PROC 8b	PROC 15
Inhalation: Acute Systemic:	Qual	Qual	Qual	Qual	Qual
Inhalation: Long Term Local;	Qual	Qual	Qual	Qual	Qual
Inhalation: Long Term Systemic:	Qual	Qual	Qual	Qual	Qual
Dermal: Acute Systemic:	Qual	Qual	Qual	Qual	Qual
Dermal: Long Term Local:	Qual	Qual	Qual	Qual	Qual
Dermal: Long Term System:	0.105	0.105	0.208	0.105	0.105
Combined: Long Term Systemic	0.105	0.105	0.208	0.105	0.105
Combined: acute systemic	Qual	Qual	Qual	Qual	Qual

Qual: Qualitative assessment completed to demonstrate control considering alternate modes and the use of

SAFETY DATA SHEET

defined Operational Conditions and Risk Management Measures

The primary hazard is sensitisation by skin contact.
Substance is classified as an eye irritant. Skin irritant.

Avoid skin contact. Wear gloves conforming to at least EN374.
Wear suitable working clothes, taking all precautions against exposure. Wash contaminated clothing before reuse.

Contact with aerosols or vapours will cause severe eye irritation. Use suitable eye protection: goggles during normal operations, with faceshield where there is a risk of splashing.

Avoid direct eye contact with product, also via contamination on hands.

The vapour pressure of the substance is relatively low and the substance is not expected to readily volatilize. If used at elevated temperatures, vapours may cause respiratory irritation. Where there is a risk of vapour formation, respiratory protection (APF10 or greater) is required.