





Safety Data Sheet

Section 1. Identification of the substance/mixture and of the company/undertaking			
Product Identity / Trade Name	Chlorendic Anhydride PE1+	REACH registration number	01-2119513697-32-0000
EINECS #	204-077-3	CAS#	115-27-5
Chemical Name	1,4,5,6,7,7-Hexachloro-8,9,10-trinorborn-5-ene-2,3-dicarboxylic anhydride	Chemical Formula	C ₉ H ₂ Cl ₆ O ₃
Synonym	4,5,6,7,8,8-Hexachloro-3a, 4,7,7a-tetrahydro-4, 7-methanoiso benzofuran-1, 3-dione	Chemical Family	Chlorinated bicyclic Anhydride
Supplier	Only Representative of the Manufacture LSR Associates Ltd, Woolley Road PE28 4HS, Alconbury United Kingdom Phone: +44 (0) 1954 212132 info@lsr-associates.com	Manufacture	Velsicol Chemical LLC 10400 W. Higgins Road Rosemont, IL 60018 U.S.A. Phone: 847-813-7888 Fax: 847-298-9018 Email: msds@velsicol.com
In Case of Emergency	In the continental U.S.A. call CHEMTREC 800-424-9300 (24 hours) Outside the continental U.S.A. call CHEMTREC 703-527-3887 (24 hours)		
Relevant identified uses	Industrial applications: Hardener for epoxy resins, paints, and coatings. Other non-specified industry: Flame Retardant in unsaturated polyester resins In compliance with the conditions described in the Annex to extended safety data sheet.	Uses advised against	No recommendations at this stage. See section 16 for a general overview.
Section 2. Hazards identification			
Potential Acute Health Effects	Inhalation and skin contact are expected to be the primary routes of occupational exposure to chlorendic anhydride. This material is irritating to the eyes, skin and respiratory tract. Allergic skin reaction may occur in susceptible individuals. Chlorendic anhydride is considered, on the basis of single exposure (acute) animal tests, to be slightly toxic after ingestion (swallowing), practically non-toxic after inhalation and skin contact, severely irritating to eyes and practically non-irritating to skin.		
Regulation (EC) No 1272/2008	Classification: Skin Mild Irritation 3 Skin Sensitization 1 Eye Irritation 2A Carcinogen 2 STOT Repeated Exposure 2 Aquatic Acute 3	Labeling: H316, H317, H319, H351, H373, H413 P260, P262, P273, P280, P332, P305+P351+P338 Signal Word: Warning	Pictograms:   GHS08 GHS07
Directive 67/548/EEC	Classification: Xi; Xn; T R/20/21/22 R36/37/38, R42/43, R45, R48, R52/53	Labeling: Xn; T Symbol R20/21/22-36/37/38/ - 42/43 - 45-48 - 52/53 S22 -24/25 - 26 - 36/37/39 - 45 -61	Symbol:   Xn T
Potential Chronic Health Effects	Chlorendic anhydride will slowly degrade to chlorendic acid in the presence of water and/or sunlight. The National Toxicology Program (NTP) has concluded that there is clear evidence of carcinogenicity (cancer) in a feeding study of rats and mice using chlorendic acid. International Agency for Research on Cancer (IARC) has given chlorendic acid an overall evaluation of 2B (possibly carcinogenic).		

Safety Data Sheet

Section 3. Composition/information on ingredients

Name	CAS#	EC Number	% by Weight	R Phrases	Symbol
1) Chlorendic Anhydride	115-27-5	204-077-3	> 95.0	R20/21/22, R/36/37/38, R48	Xn
2) Chlorendic Acid	115-28-6	204-078-9	< 3.0	R45	T
3) Maleic anhydride	108-31-6	203-571-6	< 1.0	R42/43	
4) Chlorobenzene	108-90-7	203-628-5	< 5.0	R10, R52/53	

Section 4. First aid measures

Eye Contact	Immediately flush with plenty of water for at least 15 minutes. Get medical attention immediately.
Skin Contact	Immediately wash skin with soap and plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Destroy contaminated shoes.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion	If swallowed, induce vomiting as directed by medical personnel. Get medical attention. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

Section 5. Firefighting measures

Fire Fighting Media and Instructions	Non-Flammable. Not considered to present risks of explosion. However, contains up to 5% occluded volatiles, which can present a fire hazard if sufficient oxygen and a source of ignition is present. Ground containers and equipment to avoid static charge accumulation and/or use an inert atmosphere to prevent combustion.
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Section 6. Accidental release measures

Small Spill	Use appropriate tools to put the spilled solid in a convenient waste disposal container.
Large Spill	Stop the leak if possible. Ventilate the area involved. Sweep up the material and place in container for later disposal.

Section 7. Handling and storage

Handling	Do not handle until all safety precautions have been read and understood Do not breathe dust/fumes/gas/mist/vapours/spray Do not get in eyes, on skin, or on clothing Wear suitable protective clothing, gloves and eye/face protection. Avoid release to the environment. Dispose of contents/container in accordance with local/regional/national/international regulation
Storage	Store in well ventilated area away from sources of ignition. Keep container tightly closed.

Section 8. Exposure controls/personal protection

Exposure Controls	Investigate engineering techniques to reduce exposures. Provide ventilation if necessary to minimize exposure. If practical use local mechanical exhaust ventilation at sources of air contamination such as open process equipment. In compliance with the conditions described in the Annex to extended safety data sheet.																		
Personal Protection	Chemical resistant coveralls, gloves and boot covers. Shoes/boots. A full-face piece respirator with dual organic vapor and particulate matter cartridge is recommended.																		
Personal Protection in Case of a Large Spill	Chemical resistant coveralls, gloves and boot covers. Shoes/boots. A full-face piece respirator with dual organic vapor and particulate matter cartridge is recommended. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.																		
DNEL-values	<p>Chlorendic Anhydride: DNEL (Derived No Effect Level) for Worker</p> <table border="1"> <thead> <tr> <th>DNEL type</th> <th>DNEL value</th> </tr> </thead> <tbody> <tr> <td>DNEL acute dermal, short-term (local)</td> <td>1 mg/cm³</td> </tr> <tr> <td>DNEL acute dermal, short-term (systemic)</td> <td>43 mg/kg bw/day</td> </tr> <tr> <td>DNEL long-term dermal (systemic)</td> <td>3.7 mg/kg bw/day</td> </tr> <tr> <td>DNEL long-term dermal (local)</td> <td>0.56 mg/cm³</td> </tr> <tr> <td>DNEL acute inhalation (local)</td> <td>299 mg/m³</td> </tr> <tr> <td>DNEL acute inhalation (systemic)</td> <td>299 mg/m³</td> </tr> <tr> <td>DNEL long-term inhalation (local)</td> <td>33.23 mg/m³</td> </tr> <tr> <td>DNEL long-term inhalation (systemic)</td> <td>15 mg/m³</td> </tr> </tbody> </table>	DNEL type	DNEL value	DNEL acute dermal, short-term (local)	1 mg/cm ³	DNEL acute dermal, short-term (systemic)	43 mg/kg bw/day	DNEL long-term dermal (systemic)	3.7 mg/kg bw/day	DNEL long-term dermal (local)	0.56 mg/cm ³	DNEL acute inhalation (local)	299 mg/m ³	DNEL acute inhalation (systemic)	299 mg/m ³	DNEL long-term inhalation (local)	33.23 mg/m ³	DNEL long-term inhalation (systemic)	15 mg/m ³
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Safety Data Sheet

	Chlorendic Anhydride: DNEL (Derived No Effect Level) for the general population
	DNEL type
	DNEL value
	DNEL acute dermal, short-term (local)
	0.5 mg/cm ³
	DNEL acute dermal, short-term (systemic)
	21 mg/kg bw/day
	DNEL long-term dermal (systemic)
	3 mg/kg bw/day
	DNEL long-term dermal (local)
	0.28 mg/cm ³
	DNEL acute inhalation (local)
	0.042 mg/m ³
	DNEL acute inhalation (systemic)
	149 mg/m ³
	DNEL long-term inhalation (local)
	16.62 mg/m ³
	DNEL long-term inhalation (systemic)
	12 mg/m ³
Exposure Limits	<i>108 -31-6, Maleic anhydride:</i> United Kingdom, WEL - TWA: 1 mg/m ³ TWA, WEL - STEL: 3 mg/m ³ STEL United States: TWA: 0.25 ppm from OSHA/NIOSH; TWA: 0.25 ppm from ACGIH. Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties			
Appearance	Fine, crystalline solid.	Odor	No distinctive odor.
Molecular Weight	371	Color	White to yellowish.
pH (1% soln/water)	Not Available.	Boiling Point	Not available.
Melting Point	235°C (455°F)	Critical Temperature	Not available.
Relative Density	1.73 (Water = 1)	Vapor Pressure	2 mm of Hg (@ 20°C)
Vapor Density	13 (Air = 1)	Volatility	Not available
Evaporation Rate	Not available.	Viscosity	Not available.
Ionicity (In Water)	Not available.	Dispersion Properties	Not available.
Flash Point	Not available.	Auto Ignition Temp.	Not available.
Partition Coefficient Log n-Octanol/Water	Octanol/water = 1.39; 1,2-dichlorobenzene/water = 0.49		
Solubility	Easily soluble in acetone. Soluble in methanol, diethyl ether, n-octanol. Insoluble in cold water, hot water		
Flammability	Non-flammable. However, contains up to 5% occluded chlorobenzene, which can present a fire hazard if sufficient oxygen and a source of ignition is present. Ground containers and equipment to avoid static charge accumulation and/or use an inert atmosphere to prevent combustion.		
Explosive Properties	Not considered to present risks of explosion.		
Oxidising Properties	Not available.		

Section 10. Stability and reactivity	
Stability	The product is stable.
Instability Temperature	Not available.
Conditions to Avoid	No additional remark.
Incompatibility with Various Substances	Highly reactive with oxidizing agents, organic materials. Slightly reactive to reactive with reducing agents, acids, alkalis. Very slightly to slightly reactive with metals.
Corrosivity	Non-corrosive in presence of glass.
Hazardous Polymerization	Not available.
Hazardous Decomposition Products	Not available.

Section 11. Toxicological information	
Routes of Entry	Inhalation. Skin contact.
Toxicity to Animals	<i>115-27-5, Chlorendic Anhydride:</i> Acute oral toxicity (LD50): 1138-3130 mg/kg, Slightly toxic (Rat) Acute dermal toxicity (LD50): > 10000 < 20000 mg/kg (Rabbit), practically non-toxic. Acute inhalation toxicity (LC50): > 203 mg/l 1-hour exposure, > 65 mg/l 4-hour exposure (Rat), practically non-toxic. Eye Irritation: Severely irritating (Rabbit) Skin Irritation: Practically non-irritating 0.8/8.0 (Rabbit)

Safety Data Sheet

Section 11. Toxicological information	
	<p>Allergic skin reaction was reported in guinea pigs after repeated skin application. Repeated skin contact produced skin irritation, stomach lesions, diarrhea, nasal and eye discharge, decreased activity, anorexia and dehydration in rats. Decreased body weights, decreased food consumption and changes in heart, liver, kidney and spleen weights were reported after repeated dietary administration to rats. Repeated inhalation of dust produced nasal and eye irritation, salivation, hair loss, decreased body weight gain, liver and thyroid changes, lesions in the lung and stomach and cellular changes in the respiratory tract and stomach. No birth defects were reported in the offspring of rats given Chlorendic anhydride orally during fetal development. No genetic changes were reported in standard tests using animals and animal and bacterial cells. Genetic changes were reported in a standard test using human cells.</p> <p><i>108-31-6, Maleic anhydride in RTECS (#ON3675000):</i> Dermal, guinea pig: LD50 = >20 gm/kg; Draize test, rabbit, eye: 1% Severe; Oral, mouse: LD50 = 465 mg/kg; Oral, rabbit: LD50 = 875 mg/kg; Oral, rat: LD50 = 400 mg/kg; Skin, rabbit: LD50 = 2620 mg/kg.</p> <p><i>115-28-6, Chlorendic Acid in RTECS (#RB9000000):</i> Draize test, rabbit, eye: 250 ug/24H Severe; Draize test, rabbit, skin: 500 mg/24H Mild.</p> <p>The National Toxicology Program (NTP) has concluded that there is clear evidence of carcinogenicity (cancer) in a feeding study of rats and mice using Chlorendic acid. International Agency for Research on Cancer (IARC) has given Chlorendic acid an overall evaluation of 2B (possibly carcinogenic).</p> <p><i>108-90-7, Chlorobenzene:</i> Oral, LD50, Rat: 1110 mg/kg; Oral, LD50, Mouse: 2300 mg/kg.</p>

Section 12. Ecological information																	
Ecotoxicology	<p><i>115-27-5, Chlorendic Anhydride:</i> 48-hour LC50: 110.7 ppm Daphnia magna, practically non-toxic 96-hour LC50: 422.7 ppm Bluegill sunfish, practically non-toxic 96-hour LC50: 422.7 ppm Rainbow trout, practically non-toxic 72-hour EC50/LC50: >97.2 mg/L freshwater Algae</p>																
PNEC-values	<p>Chlorendic Anhydride: Predicted No Effect Concentration (PNEC)</p> <table border="1"> <thead> <tr> <th>Fresh water</th> <th>Marine water</th> <th>Intermittent release</th> <th>Sediment (fresh water)</th> <th>Sediment (marine water)</th> <th>Soil (Terrestrial)</th> <th>STP (sewage treatment plant)</th> <th>Oral (mammals)</th> </tr> </thead> <tbody> <tr> <td>0.097 mg/L</td> <td>0.0097 mg/L</td> <td>0.97 mg/L</td> <td>0.097 mg/kg dw</td> <td>0.0097 mg/kg dw</td> <td>0.106 mg/kg dw</td> <td>16.23 mg/L</td> <td>2.51 mg/kg food</td> </tr> </tbody> </table>	Fresh water	Marine water	Intermittent release	Sediment (fresh water)	Sediment (marine water)	Soil (Terrestrial)	STP (sewage treatment plant)	Oral (mammals)	0.097 mg/L	0.0097 mg/L	0.97 mg/L	0.097 mg/kg dw	0.0097 mg/kg dw	0.106 mg/kg dw	16.23 mg/L	2.51 mg/kg food
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Chemical Fate	While Chlorendic anhydride is regarded as toxic, due to its Chlorendic acid content it may be considered to be persistent. However it is clearly not bioaccumulative. Therefore it is not regarded as PBT / vPvB.																

Section 13. Disposal considerations	
Waste Disposal	Recycle to process, if possible. Consult your local or regional authorities for disposal options.

Section 14. Transport information			
ADR	IMDG	IATA	Special Provisions for Transport
Not controlled.			
Customs Classification	International HTS# 2917.20.0000		

Safety Data Sheet

Section 15. Regulatory information		
Global Inventories	Europe (EINECS, ELINCS, NLP)	In Compliance with the EINECS
	Australia (AICS)	In Compliance with the AICS
	Canada (DSL, NDSL)	In Compliance with the DSL
	China (IECSC)	In Compliance with the IECSC
	Japan (ENCS)	In Compliance with the ENCS
	Korea (KECI)	In Compliance with the KECI
	New Zealand (NZIoC)	In Compliance with the NZIoC
	Philippines (PICCS)	In Compliance with the PICCS
	United States (TSCA)	In Compliance with the TSCA
Other Regulations	<p>Germany: Ordinance on the Classification of Water-Endangering Substances. This substance has been assigned WGK Class: 2 (water endangering); WGK Identification Number: None; assigned by Velsicol Chemical LLC, pending further evaluation.</p> <p>REACH: chemical safety assessment has been carried out for Chlorendic anhydride by the supplier.</p>	

Section 16. Other information		
Regulation (EU) No	Classification	Hazard Statement
1272/2008	Skin Mild Irritation 3	H316: Causes mild skin irritation
	Skin Sensitization 1	H317: May cause an allergic skin reaction
	Eye Irritation 2A	H319: Causes serious eye irritation
	Carcinogen 2	H351: Suspected of causing cancer through oral exposure
	STOT Repeated Exposure 2	H373: May cause damage to lungs, stomach, heart and liver through prolonged or repeated exposure to oral, dermal and inhalation.
	Aquatic Acute 3	H413: May cause long lasting harmful effects to aquatic life.
GHS Pictograms		
GHS08: health hazard; GHS07: exclamation mark		
Precautionary statements		
<p>P202: Do not handle until all safety precautions have been read and understood. P260: Do not breathe dust/fume/gas/mist/vapors/spray. P262: Do not get in eyes, on skin, or on clothing. P264: Wash ... thoroughly after handling. P272: Contaminated work clothing should not be allowed out of the workplace. P273: Avoid release to the environment. P280: Wear protective gloves/protective clothing/eye protection/face protection. P332: If skin irritation occurs: wash affected area with soap and water and seek medical advice. P308 + P313: IF exposed or concerned: Get medical advice/attention. P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P314: Get medical advice/attention if you feel unwell. P363: Wash contaminated clothing before reuse. P403+P233: Store in a well-ventilated place. Keep container tightly closed. P405: Store locked up. P501: Dispose of contents/container in accordance with local/regional/national/international regulation EUH401: To avoid risks to human health and the environment, comply with the instructions for use.</p>		

Safety Data Sheet

Section 16. Other information			
Directive 67/548/EEC	<p>Risk Phases: R10 – Flammable. R20/21/22 – Harmful by inhalation, in contact with skin and if swallowed R36/37/38 – Irritating to eyes, respiratory system and skin. R42/43 – May cause sensitization by inhalation and skin contact. R45 – May cause cancer R48 – Danger of serious damage to health by prolonged exposure R52/53 – Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.</p> <p>Safety Statements: S22 – Do not breathe dust. 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. S45 – In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S61 – Avoid release to the environment. Refer to special instructions/Safety data sheets.</p>		
References	<ul style="list-style-type: none"> -REGISTRY Database, Chemical Abstract Service -CHEMLIST Database, Chemical Abstract Service -Registry of Toxic Effects of Chemical Substances (RTECS) -Hazardous Substance Data Bank (HSDB), National library of Medicine, #2920 -LOLI Database -ICRMS North American Database, Ariel Research Corporation -ICRMS European Database, Ariel Research Corporation -ICRMS Inventories Database, Ariel Research Corporation -Product Information Bulletin, Velsicol Chemical LLC -Material Safety Data Sheet, Velsicol Chemical LLC -Velsicol Chemical LLC, unpublished studies 		
Contact Information	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> SDS or Regulatory information, contact: Dawei Li Velsicol Chemical LLC 1199 Warford Street Memphis, TN 38108 Phone: 901-323-6226, ext. 124 Fax: 901-324-5897 dli@velsicol.com </td> <td style="width: 50%; vertical-align: top;"> Technical or Product Support Information, contact: Sherman Friedman Velsicol Chemical LLC 10400 W. Higgins Road Rosemont, IL 60018 U.S.A. Phone: 847-635-3486 Fax: 847-298-9018 Email: sfriedman @velsicol.com </td> </tr> </table>	SDS or Regulatory information, contact: Dawei Li Velsicol Chemical LLC 1199 Warford Street Memphis, TN 38108 Phone: 901-323-6226, ext. 124 Fax: 901-324-5897 dli@velsicol.com	Technical or Product Support Information, contact: Sherman Friedman Velsicol Chemical LLC 10400 W. Higgins Road Rosemont, IL 60018 U.S.A. Phone: 847-635-3486 Fax: 847-298-9018 Email: sfriedman @velsicol.com
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Amendments	Update to Section 2		
Prepared By	Dawei Li, 08/23/2011		
Notice to Reader	<i>To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.</i>		