



# Chlorendic Anhydride PE1+

## Safety Data Sheet

Product No: 2330020

Version: 2.0 / EN

Revision date: August 31, 2016

### SECTION 1: Identification

#### 1.1 Product identifier Chlorendic Anhydride PE1+

##### Chemical Name and Synonym:

1,4,5,6,7,7-hexachloro-8,9,10-trinorborn-5-ene-2,3-dicarboxylic anhydride;  
4,5,6,7,8,8-Hexachloro-3a,4,7,7a-tetrahydro-4,7-methanoiso benzofuran-1,3-dione

#### 1.2 Relevant identified uses of the substance or mixture and uses advised against

##### 1.2.1 Relevant identified uses:

Industrial applications: Hardener for epoxy resins, paints, and coatings.  
Other non-specified industry: Flame retardant in unsaturated polyester resins.

##### 1.2.2 Uses advised against:

No specific uses advised against have been identified.

#### 1.3 Details of the supplier of the safety data sheet

##### Velsicol Chemical LLC

10400 W. Higgins Road, Suite 303

Rosemont, Illinois 60018 USA

Phone: (847) 813-7888

Fax: (847) 768-3227

Email: [customerservice@velsicol.com](mailto:customerservice@velsicol.com)

#### 1.4 Emergency telephone number

Outside the continental U.S.A. call CHEMTREC 1-800-424-9300 (24 hours)

In the continental U.S.A. call CHEMTREC 703-527-3887 (24 hours)

### SECTION 2: Hazards Identification

#### 2.1 Hazard classification and Hazard statement(s)

Hazard classification	Hazard statement(s)
Skin Irritation 2	Causes skin irritation
Skin Sensitization 1	May cause an allergic skin reaction
Eye Irritation 2A	Causes serious eye irritation
Carcinogen 2 *	Suspected of causing cancer through oral exposure
Specific Target Organ Toxicity (STOT) Repeated Exposure 2	May cause damage to lungs, stomach, heart and liver through prolonged or repeated exposure to oral, dermal and inhalation
Aquatic Chronic 3	May cause long lasting harmful effects to aquatic life.

\* **Chlorendic Anhydride PE1+** will rapidly hydrolyse to chlorendic acid in the presence of water. 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).

#### 2.2 Precautionary statements

- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Avoid breathing dust/fume/gas/mist/ vapors/spray.
- Wash any possible exposed area on body thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.

- Dispose of contents/container in accordance with local/regional/national/international regulation
- Wash contaminated clothing before reuse.
- Take off contaminated clothing and wash it before reuse.
- Contaminated work clothing must not be allowed out of the workplace.
- Store in a well-ventilated place. Keep container tightly closed and locked up.
- Avoid release to the environment.
- If exposed or concerned: Get medical advice/attention.
- If on skin: Wash with soap and plenty of water. Remove contaminated clothing and shoes.
- If skin irritation or rash occurs: Get medical advice/attention.
- If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If eye irritation persists: Get medical advice/attention.
- Get medical advice/attention if you feel unwell.

### 2.3 Signal Word

Warning

### 2.4 Pictograms



GHS08



GHS07

### 2.5 Other hazards

Not known.

## SECTION 3: Composition/information on ingredients:

### 3.1 Substances:

Chemical Name	Common name and synonyms	CAS number	% by Weight
4,7-Methanoisobenzofuran-1,3-dione, 4,5,6,7,8,8-hexachloro-3a,4,7,7a-tetrahydro-	<b>Chlorendic Anhydride</b> 1,4,5,6,7,7-hexachloro-8,9,10-trinorborn-5-ene-2,3-dicarboxylic anhydride	115-27-5	>95

### 3.2 Impurities and stabilizing additives:

Chemical Name	Common name and synonyms	CAS number	% by Weight
Bicyclo[2.2.1]hept-5-ene-2,3-dicarboxylic acid, 1,4,5,6,7,7-hexachloro-	Chlorendic Acid 1,4,5,6,7,7-Hexachloro-8,9,10-trinorborn-5-ene-2,3-dicarboxylic acid	115-28-6	<3.0
2,5-Furandione	Maleic anhydride	108-31-6	<1.0
Benzene, chloro-	Chlorobenzene	108-90-7	<5.0

## SECTION 4: First-Aid Measures

### 4.1 Description of first aid measures

#### 4.1.1 General information:

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.



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### 4.1.2 Following inhalation:

Remove to under fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

### 4.1.3 Following 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.

### 4.1.4 Following eye contact:

Immediately flush with plenty of water for at least 15 minutes. Get medical attention immediately.

### 4.1.5 Following ingestion:

Get medical attention. Inducing vomiting as directed by medical personnel. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

### 4.1.6 Self-protection of the first aider:

Wear protective gloves/protective clothing/eye protection/face protection. Do not get in eyes, on skin, or on clothing. Contaminated work clothing should not be allowed out of the workplace. Get medical attention immediately.

### 4.1.7 Notes for the doctor:

Not available.

### 4.2 Most important symptoms and effects, both acute and delayed

Severely irritate to eyes. May cause damage to lungs, stomach, heart and liver through prolonged or repeated exposure to oral, dermal and inhalation. Suspected of causing cancer through oral exposure.

### 4.3 Indication of any immediate medical attention and special treatments needed:

Not available.

## SECTION 5: Fire-Fighting Measures

### 5.1 Extinguishing media

- Flammability Properties: Non-flammable. However, this product contains up to 5% occluded Chlorobenzene, which can present a fire hazard if sufficient oxygen and a source of ignition is present.
- Suitable extinguishing media: Not applicable.
- Unsuitable extinguishing media: Not applicable.

### 5.2 Special hazards arising from the substance or mixture

May give off dust.

### 5.3 Advice for fire fighters

Fire-fighters should wear protective clothing and Self-Contained Breathing Apparatus (SCBA) with chemical resistant gloves. Firefighting equipment should be thoroughly decontaminated after use.

## SECTION 6: Accidental Release Measures

### 6.1 Personal precautions, protective equipment and emergency procedures

Wearing of suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing; Removal of ignition sources, provision of sufficient ventilation, control of dust; Evacuate the danger area or to consult an expert.

### 6.2 Environmental precautions



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Do not allow to enter sewers / surface or ground water.  
In case of spillage to water course or public sewers inform responsible authorities.

### 6.3 Methods and materials for containment and clearing up

Stop the leak if possible. Collect spilled material into a suitable container. Avoid raising dust. Label containers and arrange for recovery or disposal. Dispose of contaminated material as hazardous waste. Wash spill area thoroughly with water and detergent.

### 6.4 References to other sections

See sections 8 and 13 for further advice.

## SECTION 7: Handling and Storage

### 7.1 Precautions for safe handling

- Do not handle until all safety precautions have been read and understood; Wear suitable protective clothing, gloves and eye/face protection.
- Provide ventilation if necessary to minimize exposure. Do not breathe dust/fumes;
- Avoid release to the environment.
- Handle in accordance with good industrial hygiene and safety practices. These practices include avoiding unnecessary exposure and removal of material from eyes, skin, and clothing. Keep away from sources of ignition and sunlight.

### 7.2 Conditions for safe storage, including any incompatibilities

Store in well-ventilated area away from sources of ignition and direct sunlight; Keep container tightly closed and locked up. Store away from food and feeding stuff.

This product 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.

#### Specific incompatibilities

Keep away from moisture/water.

### 7.3 Specific end uses(s):

End use name	Substance supplied to that use
Receipt and storage of raw materials	as such (substance itself)
Blending / dissolving of dispersion	as such (substance itself)
Filtering and filling	in a mixture
Waste management	in a mixture
Use in closed batch process	as such (substance itself)
Mixing or blending batches	as such (substance itself)
Transfer of substance	in a mixture
Research and development.	as such (substance itself)

## SECTION 8. Exposure Controls/Personal Protection

### 8.1 Control parameters

No OSHA Permissible Exposure Limits (PELs), or American Conference of Governmental Industrial Hygienists (ACGIH), or Threshold Limit Values (TLVs) available.

#### DN(M)ELs for workers

Exposure pattern	Route	DNEL / DMEL	(Corrected) Dose descriptor
Acute - systemic effects	Dermal	43 mg/kg bw/day	NOAEL: 1,290 mg/kg bw/day (based on AF of 30)



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Acute - systemic effects	Inhalation	299 mg/m <sup>3</sup>	NOAEC: 8,970 mg/m <sup>3</sup> (based on AF of 30)
Acute - local effects	Dermal	1 mg/cm <sup>2</sup>	LOAEL: 50 mg/cm <sup>2</sup> (based on AF of 50)
Acute - local effects	Inhalation	299 mg/m <sup>3</sup>	NOAEC: 8,970 mg/m <sup>3</sup> (based on AF of 30)
Long-term - systemic effects	Dermal	3.7 mg/kg bw/day	NOAEL: 1,110.0 mg/kg bw/day (based on AF of 300)
Long-term - systemic effects	Inhalation	15 mg/m <sup>3</sup>	NOAEC: 4,500 mg/m <sup>3</sup> (based on AF of 300)
Long-term - local effects	Dermal	0.56 mg/cm <sup>2</sup>	NOAEL: 100.80 mg/cm <sup>2</sup> (based on AF of 180)
Long-term - local effects	Inhalation	33.23 mg/m <sup>3</sup>	NOAEC: 9,969.00 mg/m <sup>3</sup> (based on AF of 300)

### DN(M)ELs for the general population

Exposure pattern	Route	DNEL / DMEL	(Corrected) Dose descriptor
Acute - systemic effects	Dermal	21 mg/kg bw/day	NOAEL: 1,260 mg/kg bw/day (based on AF of 60)
Acute - systemic effects	Inhalation	149 mg/m <sup>3</sup>	NOAEC: 8,940 mg/m <sup>3</sup> (based on AF of 60)
Acute - systemic effects	Oral	21 mg/kg bw/day	NOAEL: 1,260 mg/kg bw/day (based on AF of 60)
Acute - local effects	Dermal	0.5 mg/cm <sup>2</sup>	LOAEL: 50.0 mg/cm <sup>2</sup> (based on AF of 100)
Acute - local effects	Inhalation	0.042 mg/m <sup>3</sup>	NOAEC: 50.400 mg/m <sup>3</sup> (based on AF of 1200)
Long-term - systemic effects	Dermal	3 mg/kg bw/day	NOAEL: 1,080 mg/kg bw/day (based on AF of 360)
Long-term - systemic effects	Inhalation	12 mg/m <sup>3</sup>	NOAEC: 4,320 mg/m <sup>3</sup> (based on AF of 360)
Long-term - systemic effects	Oral	1.1 mg/kg bw/day	NOAEL: 396.0 mg/kg bw/day (based on AF of 360)
Long-term - local effects	Dermal	0.28 mg/cm <sup>2</sup>	NOAEL: 100.80 mg/cm <sup>2</sup> (based on AF of 360)
Long-term - local effects	Inhalation	16.62 mg/m <sup>3</sup>	NOAEL: 9,972.00 mg/m <sup>3</sup> (based on AF of 600)

### PNECs

Environmental protection target	PNEC	Remark
Fresh water	0.097 mg/L	Extrapolation method: assessment factor  The LC50 from Acute toxicity to Algae, 97.2 mg/l, was used. This is the worst-case scenario for aquatic toxicity.
Marine water	0.0097 mg/L	
Intermittent release	0.97 mg/L	
Sediment (fresh water)	0.097 mg/kg dw	
Sediment (marine water)	0.0097 mg/kg dw	
Soil (Terrestrial)	0.106 mg/kg dw	Extrapolation method: partition coefficient
Food chain (Oral, mammals)	2.51 mg/kg food	The endpoint used was 90 day sub-acute oral toxicity to rats which gave a result of 226 mg/kg bw/day and has an assessment factor of 90.
Sewage treatment	16.23 mg/L	Extrapolation method: assessment factor

DN(M)EL: Derived No(Minimal) Effect Level; NOAEL(C): No-observed-adverse-effect level (concentration), PNEC: Predicted No-Effect Concentration; AF: Assessment Factor

## 8.2 Exposure controls

Ventilation must be adequate to maintain the ambient workplace atmosphere.

### 8.2.1 Appropriate engineering controls:

Provide ventilation if necessary to minimize exposure. If practical use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

### 8.2.2 Personal protective measures:

Do not eat, drink, or smoke whilst working. Keep away from foodstuffs, beverages and feed. Remove all contaminated clothing. Wash hands before breaks and at the end of work.

### Respiratory protection

A full-face piece respirator with dual organic vapour and particulate matter cartridge is recommended.



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### Hand Protection

Chemical resistant coveralls, gloves and boot covers. If gloves are damaged during use, remove immediately and wash hands before replacing with new gloves.

### Eye and face protection

Safety glasses should be worn when handling this substance.

### Skin protection

Aprons or coveralls are recommended. These should be changed after use or if contaminated. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### 8.2.3 Environmental exposure controls:

Avoid release to the environment.

## SECTION 9: Physical and Chemical Properties

### 9.1 Information on basic physical and chemical properties

**Appearance:** White solid

**Odor:** No distinctive odor.

**Odor threshold:** Not known

**pH:** Not available

**Melting point:** 235 - 239°C

**Boiling point:** 266.5 - 322°C

**Flashpoint:** Not applicable

**Evaporation rate:** Not applicable

**Flammability:** Not flammable

**Vapor pressure:** 2.68 E-03 Pa at 25°C

**Vapor density:** Not available

**Relative density:** 1.76

**Particle size distribution:** 0.1% w/w < 10 µm

**Solubility in water:** 0.499 g/l for Chlorendic acid, < 2.5 E-03 g/l for Chlorendic anhydride

**Solubility in other solvents:** Easily soluble in acetone. Soluble in methanol, diethyl ether, n-octanol

**Surface tension:** 72.0 mN/m (90% saturated solution) due to rapid hydrolysis result for Chlorendic acid.

**Partition coefficient:** Log Pow = 1.39 (for Chlorendic acid)

**Auto ignition temperature:** Explosivity study not undertaken as Chlorendic Anhydride is used as a flame retardant.

**Decomposition temperature:** Not available

**Viscosity:** Not applicable

**Explosive properties:** Not considered to be explosive

**Oxidizing properties:** Not considered to be oxidizing

**Dissociation Constant:** Study not undertaken as Chlorendic Anhydride readily hydrolyses

**Molecular Weight:** 371

### 9.2 Other information:

Chlorendic anhydride rapidly hydrolyses to chlorendic acid in contact with water.

## SECTION 10: Stability and Reactivity

### 10.1 Reactivity

Not a reactive substance and no reactive hazards are expected.

No hazardous reaction when handled and stored according to provisions.

### 10.2 Chemical stability

This substance is stable under normal ambient temperature and conditions.

The substance rapidly (instantaneously) hydrolyses to chlorendic acid in contact with water.



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### 10.3 Others

#### Possibility of hazardous reactions:

No hazardous reactions expected under normal conditions of use.

#### Conditions to avoid:

Avoid excessive exposure to heat, direct sunlight and humidity.

#### Incompatible materials:

Highly reactive with oxidizing agents, organic materials. Slightly reactive to reactive with reducing agents, acids, alkalis. Very slightly to slightly reactive with metals.

#### Hazardous decomposition products:

No decomposition if used as directed.

## SECTION 11: Toxicological Information

### 11.1 Information on toxicological effects

#### (a) Acute toxicity

This substance is not classified as acute toxic for all exposure route listed below:

Acute Toxicity	Effect Dos /Concentration
Acute Oral Toxicity	LD50: 2562 mg/kg bw (male) LD50: 2130 mg/kg bw (female)
Acute dermal toxicity	LD50: 10000 - 20000 mg/kg bw
Acute inhalative toxicity (dust/mist)	LC50: > 203 mg/l

#### (b) Skin corrosion/irritation

Causes skin irritation

#### (c) Serious eye damage/irritation

Causes serious eye irritation

Irritation parameter	Basis	Time point	Score	Max. score	Reversibility	Remarks
overall irritation score	mean	14 days	16.4	17.3	no data	Rabbit

#### (d) Respiratory/skin sensitisation

May cause an allergic skin reaction

#### (e) Germ cell mutagenicity

Chlorendic Anhydride is not classified as genetically toxic as all study results are negative.

#### (f) Carcinogenicity

Suspected of causing cancer though oral exposure

Chlorendic anhydride will rapidly hydrolyse to **chlorendic acid** in the presence of water. 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).

#### (g) Reproductive toxicity

Chlorendic anhydride is not classified as toxic to reproduction as negative results were obtained in the reproductive and spermatogenetic studies in animals.



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### Adverse effects on sexual function and fertility:

Species	Result /Evaluation
Mouse	NOEL (Fetal mortality): > 223 mg/kg bw/day (actual dose received)

### Adverse effects on developmental toxicity:

Species	Result / Evaluation
Rats	NOEL: 400 mg/kg bw/day (actual dose received); NOEL (maternal toxicity): 100 mg/kg bw/day (nominal)

(h) **STOT-single exposure**

No information available.

(i) **STOT-repeated exposure**

May cause damage to lungs, stomach, heart and liver through prolonged or repeated exposure to oral, dermal and inhalation.

Oral NOAEL = 1242 mg/kg bw/day;

Dermal NOAEL = 2500 mg/kg bw/day;

Inhalation NOAEC = 9970 mg/m<sup>3</sup>

### Repeated dose toxicity: oral

Species	Specific effects	Organs affected
Rats	decrease in bodyweight	Heart, liver

### Repeated dose toxicity: dermal

Species	Specific effects	Organs affected
Rabbits	adverse clinical signs and decrease in bodyweight at higher dose	Stomach

### Repeated dose toxicity: inhalation

Species	Specific effects	Organs affected
Rats	pathological inflammatory changes in the lungs, trachea, nasal turbinate and stomach mucosa in all treated groups	Lungs, stomach, liver

(j) **Aspiration hazard**

This substance is a solid.

## SECTION 12: Ecological Information

### 12.1. Toxicity

May cause long lasting harmful effects to aquatic life.

#### Acute (short-term) toxicity:

**Fish:** LC50 (96h) for freshwater fish: 422.7 mg/L

**Crustacean:** EC50/LC50 (48h) for freshwater invertebrates: 110.7 mg/L

#### Algae/aquatic plants:

EC50/LC50 (72h) for freshwater algae: 97.2 mg/L

EC10/LC10 (72h) or NOEC for freshwater algae: 48.4 mg/L

**Other organisms:** Not available

#### Chronic (long-term) toxicity:

The Algal Inhibition Test with a result of EC50 > 97.2 mg/l.

### 12.2 Persistence and degradability

Chlorendic Anhydride is not inherently biodegradable. However chlorendic anhydride readily hydrolyses to chlorendic acid and is moderately soluble, 0.499 mg/l.





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### 12.3 Bioaccumulative potential

Chlorendic anhydride readily hydrolyses to chlorendic acid (log Kow = 1.39). According to the screening criteria this indicates that chlorendic acid is non-bioaccumulative.

### 12.4 Mobility in soil

Chlorendic anhydride readily hydrolyses to chlorendic acid. Chlorendic acid shows a low adsorptive (log Koc = 0.92) potential. The fugacity study shows that chlorendic acid undergoes significant degradation. Hence, Chlorendic anhydride is not expected to be a relevant distribution into soil and a considerable exposure to the soil compartment.

### 12.5 Results of PBT and vPvB assessment

Chlorendic anhydride is not bioaccumulative and is not regarded as a PBT / vPvB.

### 12.6 Other adverse effects

No information available.

## SECTION 13: Disposal Considerations

Recycle to process, if possible. Consult your local or regional authorities for disposal options.

## SECTION 14: Transport Information

This substance is not under control of ADR, IMDG, IATA and DOT.

Customs Classification: International HTS# 2917.20.0000

## SECTION 15: Regulatory Information

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

This substance included on or exempted from listing on the following inventories:

United States (TSCA), Canada (DSL), Australia (AICS), China (IECSC), European Union (EINECS), Japan (ENCS), Korea (ECI), New Zealand (NZIoC), Philippines (PICCS)

This product contains Chlorendic Acid known to the State of California to cause cancer.

### 15.2 Chemical Safety Assessment

#### HMIS Rating

Health: 1      Flammability: 1      Reactivity (Stability): 1      Personal Protection:

Key: 0=Insignificant; 1=Slight; 2=Moderate; 3=High; 4=Extreme.

## SECTION 16: Other Information

### 16.1 Indication of changes

October 22, 2013      This is the first SDS under OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200(g))

August 31, 2016,      Update address in Section 1

### 16.2 Key literature references and sources for data

Hazard Communication Standard (HCS)(29 CFR 1910.1200(g)) and Appendix D Hazardous Substance Data Bank (HSDB), National library of Medicine, #2920 Dossier and Chemical Safety Report (CSR) submitted to ECHA under REACH Product Data Sheet and SDS information from manufacturer.



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**16.3 Classification for mixtures and used evaluation method according to Hazard Communication Standard (HCS)(29 CFR 1910.1200(g)), Not a mixture.**

**16.4 Training advice:** accordance with Hazard Communication Standard (HCS)(29 CFR 1910.1200(g))

**16.5 Further information:** Notice to Reader

*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.*