
SECTION 1: Identification

1.1 GHS Product identifier

Product name (1Î±,2Î±,3Î±,4Î²,5Î²,6Î²)-1,2,3,4,5,6-hexachlorocyclohexane

1.2 Other means of identification

Product number -
Other names Lysactone;GDL;gluconodeltalactone

1.3 Recommended use of the chemical and restrictions on use

Identified uses Lindane is used as an insecticide on fruit and vegetable crops, for seed treatment, in forestry, and for livestock and pet treatment. Lindane is no longer produced in the United States (however, it is still formulated in this country), and aerial application of the chemical is prohibited. Lindane is also used topically for the treatment of head and body lice and scabies; it is available in 1 percent preparations as a lotion, cream, or shampoo.

Uses advised against no data available

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

no data available

2.2 GHS label elements, including precautionary statements

Pictogram(s) no data available
Signal word no data available
Hazard statement(s) no data available
Precautionary statement(s)
Prevention no data available
Response no data available
Storage no data available
Disposal no data available

2.3 Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
(1Î±,2Î±,3Î±,4Î²,5Î²,6Î²)-1,2,3,4,5,6-hexachlorocyclohexane	(1Î±,2Î±,3Î±,4Î²,5Î²,6Î²)-1,2,3,4,5,6-hexachlorocyclohexane	6108-10-7	228-068-9	100%

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled

Fresh air, rest. Seek medical attention if you feel unwell.

Following skin contact

Wear protective gloves when administering first aid. Remove contaminated clothes. Rinse and then wash skin with water and soap. Seek medical attention if you feel unwell.

Following eye contact

Rinse with plenty of water (remove contact lenses if easily possible).

Following ingestion

Rinse mouth. Give a slurry of activated charcoal in water to drink, but NOT if convulsions occur. Refer immediately for medical attention.

4.2 Most important symptoms/effects, acute and delayed

ACUTE/CHRONIC HAZARDS: Highly toxic. May cause irritation on contact. Hazardous decomposition products. (NTP, 1992)
Excerpt from ERG Guide 151 [Substances - Toxic (Non-combustible)]: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. (ERG, 2016)
ACUTE/CHRONIC HAZARDS: Highly toxic carcinogen. May cause irritation on contact. Hazardous decomposition products. (NTP, 1992)
Lindane is a stimulant of the nervous system, causing violent convulsions that are rapid in onset and generally followed by death or

recovery within 24 hours. The probable human oral lethal dose is 50-500 mg/kg, or between 1 teaspoon and 1 ounce for a 150-lb (70 kg) person. (EPA, 1998)

ACUTE/CHRONIC HAZARDS: Carcinogen. Toxic. Irritant. Hazardous decomposition product. (NTP, 1992)

4.3 Indication of immediate medical attention and special treatment needed, if necessary

Basic treatment: Establish a patent airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary. Anticipate seizures and treat if necessary. For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport. Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated charcoal. Lindane and Related Compounds

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

This compound is not very flammable but any fire involving this compound may produce dangerous vapors. You should evacuate the area. All firefighters should wear full-body protective clothing and use self-contained breathing apparatuses. You should extinguish any fires involving this chemical with a dry chemical, carbon dioxide, foam, or halon extinguisher. (NTP, 1992)

5.2 Specific hazards arising from the chemical

Excerpt from ERG Guide 151 [Substances - Toxic (Non-combustible)]: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. (ERG, 2016)

Excerpt from ERG Guide 151 [Substances - Toxic (Non-combustible)]: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. (ERG, 2016)

Excerpt from ERG Guide 151 [Substances - Toxic (Non-combustible)]: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. (ERG, 2016)

When heated to decomposition, this compound emits toxic fumes of chlorine, hydrochloric acid, and phosgene. (EPA, 1998)

Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.). Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. For electric vehicles or equipment, ERG Guide 147 (lithium ion batteries) or ERG Guide 138 (sodium batteries) should also be consulted. (ERG, 2016)

5.3 Special protective actions for fire-fighters

Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing mist, gas or vapours. Avoid contacting with skin and eye. Use personal protective equipment. Wear chemical impermeable gloves. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

6.2 Environmental precautions

Personal protection: filter respirator for organic gases and particulates adapted to the airborne concentration of the substance, chemical protection suit including self-contained breathing apparatus and protective gloves. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

6.3 Methods and materials for containment and cleaning up

Liquids containing lindane should be absorbed in vermiculite, dry sand, earth, or a similar material. Lindane

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

7.2 Conditions for safe storage, including any incompatibilities

Well closed. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing. Separated from bases, metals and food and feedstuffs. Store in dry place. ... avoid exposure ... to extreme heat, strong alkalis, and powdered metals.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

Component	(1 $\hat{1}$ \pm , 2 $\hat{1}$ \pm , 3 $\hat{1}$ \pm , 4 $\hat{1}$ $\hat{2}$, 5 $\hat{1}$ $\hat{2}$, 6 $\hat{1}$ $\hat{2}$)-1,2,3,4,5,6-hexachlorocyclohexane	
CAS No.	6108-10-7	
	Limit value - Eight hours	Limit value - Short term

Component	(1Î±,2Î±,3Î±,4Î²,5Î²,6Î²)-1,2,3,4,5,6-hexachlorocyclohexane			
CAS No.	6108-10-7			
	ppm	mg/m³	ppm	mg/m³
Denmark		0,5		1
	Remarks			

Biological limit values

no data available

8.2 Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

8.3 Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear tightly fitting safety goggles with side-shields conforming to EN 166(EU) or NIOSH (US).

Skin protection

Wear fire/flammable resistant and impervious clothing. Handle with gloves. Gloves must be inspected prior to use. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Respiratory protection

If the exposure limits are exceeded, irritation or other symptoms are experienced, use a full-face respirator.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	PHYSICAL DESCRIPTION: Slightly musty odor. (NTP, 1992)
Colour	Crystals from benzene, alcohol, or xylene
Odour	Slight musty odor
Melting point/freezing point	141.5Å°C
Boiling point or initial boiling point and boiling range	60Å°C AT 0.36 mm Hg
Flammability	Noncombustible Solid, but may be dissolved in flammable liquids.
Lower and upper explosion limit/flammability limit	no data available
Flash point	157.5Å°C
Auto-ignition temperature	Not flammable (USCG, 1999)
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available
Solubility	less than 1 mg/mL at 75Å° F (NTP, 1992)
Partition coefficient n-octanol/water	no data available
Vapour pressure	0.14 mm Hg at 104Å° F (NTP, 1992)
Density and/or relative density	1.59g/cm ³
Relative vapour density	(air = 1): 10
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive fumes including chlorine (see ICSC 0126), hydrogen chloride (see ICSC 0163) and phosgene (see ICSC 0007). Reacts with bases and powdered metals.
 Decomposes on heating and on burning. This produces toxic and corrosive fumes including chlorine (see ICSC 0126), hydrogen chloride (see ICSC 0163) and phosgene (see ICSC 0007). Reacts with bases. This produces toxic and corrosive fumes including hydrogen chloride and trichlorobenzenes (see ICSCs 0344, 1049 and 1222).
 Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive fumes including chlorine (see ICSC 0126), hydrogen chloride (see ICSC 0163) and phosgene (see ICSC 0007). Reacts with bases and powdered metals.
 Decomposes on contact with hot surfaces or flames. This produces toxic and corrosive fumes including chlorine (see ICSC 0126), hydrogen chloride (see ICSC 0163) and phosgene (see ICSC 0007). Reacts with bases and powdered metals.

10.2 Chemical stability

Considerable stability in acids, unstable in alkaline condition. from table

10.3 Possibility of hazardous reactions

Not flammable. DELTA-BHC may be incompatible with strong oxidizing and reducing agents. Incompatible with some amines, nitrides, azo/diazo compounds, with alkali metals, and with epoxides.

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Incompatible with alkaline materials.

10.6 Hazardous decomposition products

When heated to decomposition it emits toxic fumes of /hydrogen chloride, HCl, and phosgene/.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 Rat oral 6 g/kg
- Inhalation: LC50 Rat inhalation 1.56 mg/L
- Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

CLASSIFICATION: C; possible human carcinogen. BASIS FOR CLASSIFICATION: Increases in benign liver tumors in CF1 mice fed beta-HCH. HUMAN CARCINOGENICITY DATA: Inadequate.

Reproductive toxicity

Limited information is available regarding the reproductive or developmental effects of lindane in humans. The one available study reported increased levels (not statistically significant) of follicle stimulating hormone and decreased levels of testosterone in men occupationally exposed to lindane. It is not known whether these hormonal changes could result in diminished reproductive capability. Animal studies have reported reproductive effects, such as decreased sperm count, increased testicular weight, and disruption of spermatogenesis from oral exposure to lindane. Disrupted ovarian cycling and reduced ovulation rate were reported in female animals exposed to lindane by gavage (experimentally placing the chemical in the stomach). Lindane has not been reported to cause developmental effects, such as birth defects, in animals via oral exposure.

STOT-single exposure

no data available

STOT-repeated exposure

no data available

Aspiration hazard

no data available

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: LC50 Danio rerio (Zebra danio) 1780 ug/L/24 hr (95% confidence limit: 1320-3590 ug/L); static /formulated product
- Toxicity to daphnia and other aquatic invertebrates: LC50 Daphnia magna (Water flea) 1.64 mg/L/24 hr (95% confidence limit: 1.15-1.78 mg/L); static
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

12.2 Persistence and degradability

AEROBIC: beta-Hexachlorocyclohexane is expected to be recalcitrant under aerobic conditions(SRC). No biodegradation of beta-hexachlorocyclohexane was observed in contaminated soil from Hengelo, Netherlands over a 100 day incubation period(1). No biodegradation of beta-hexachlorocyclohexane was observed in contaminated moist soils or slurries over a 40 week incubation period(2) and no biodegradation of beta-hexachlorocyclohexane was observed in hexachlorocyclohexane contaminated moist soils or slurries over a 23 week incubation period(3). Approximately 30 percent biodegradation was observed for beta-hexachlorocyclohexane after 570 days in a field test in Japan using agricultural plots(4). The half-life of beta-hexachlorocyclohexane on cropped and uncropped soils was reported as 184 and 100 days, respectively(5). Pure cultures of Pseudomonas sp, isolated from sugarcane soil, completely biodegraded beta-hexachlorocyclohexane under aerobic conditions in 72 hours(6).

12.3 Bioaccumulative potential

An avg log BCF of 2.8 (BCF = 631) was reported for beta-hexachlorocyclohexane(SRC) in various fish in a flowing water simulator(1). According to a classification scheme(2), this BCF value suggests that bioconcentration in aquatic organisms is high(SRC).

12.4 Mobility in soil

Experimentally determined log Koc values of 3.4-4.1 were reported in 2 oil contaminated soils(1). According to a classification scheme(2), these Koc values suggest that beta-hexachlorocyclohexane is expected to have low mobility in soil(SRC).

12.5 Other adverse effects

no data available

SECTION 13: Disposal considerations

13.1 Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

14.1 UN Number

ADR/RID: no data available

IMDG: no data available

IATA: no data available

14.2 UN Proper Shipping Name

ADR/RID: no data available

IMDG: no data available

IATA: no data available

14.3 Transport hazard class(es)

ADR/RID: no data available

IMDG: no data available

IATA: no data available

14.4 Packing group, if applicable

ADR/RID: no data available

IMDG: no data available

IATA: no data available

14.5 Environmental hazards

ADR/RID: No

IMDG: No

IATA: No

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
(1Î±,2Î±,3Î±,4Î²,5Î²,6Î²)-1,2,3,4,5,6-hexachlorocyclohexane	(1Î±,2Î±,3Î±,4Î²,5Î²,6Î²)-1,2,3,4,5,6-hexachlorocyclohexane	6108-10-7	228-068-9
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Listed.
China Catalog of Hazardous chemicals 2015			Not Listed.
New Zealand Inventory of Chemicals (NZIoC)			Not Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Not Listed.
Vietnam National Chemical Inventory			Not Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Not Listed.
Korea Existing Chemicals List (KECL)			Not Listed.

SECTION 16: Other information

Information on revision

Creation Date July 15, 2019

Revision Date July 15, 2019

Abbreviations and acronyms

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

References

- IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>
- HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>
- eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>
- ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>
- ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>
- Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
- ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>