

Chlorpyrifos

Company Information

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SECTION 1: Identification

1.1GHS Product identifier

Product name Chlorpyrifos

1.2Other means of identification

Product number -

Other names Chlorpyrifos; DURSBAN; 0,0-Diethyl-O-[3,5,6-trichloro-2-pyridyl]phosphorothioate

1.3Recommended use of the chemical and restrictions on use

Identified uses Organophosphates and carbamates

Uses advised against no data available

SECTION 2: Hazard identification

2.1Classification of the substance or mixture

Acute toxicity - Category 3, Oral

Hazardous to the aquatic environment, short-term (Acute) - Category Acute 1

Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 1

2.2GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H301 Toxic if swallowed

H400 Very toxic to aquatic life

H410 Very toxic to aquatic life with long lasting effects

Precautionary statement(s)

Prevention

P264 Wash ... thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P273 Avoid release to the environment.

Response	P301+P316 IF SWALLOWED: Get emergency medical help immediately. P321 Specific treatment (see ... on this label). P330 Rinse mouth. P391 Collect spillage.
Storage	P405 Store locked up.
Disposal	P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

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
Chlorpyrifos	Chlorpyrifos	2921-88-2	220-864-4	100%

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled

Fresh air, rest. Refer immediately for medical attention. See Notes.

Following skin contact

Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer immediately for medical attention. See Notes.

Following eye contact

Rinse with plenty of water (remove contact lenses if easily possible). Refer for medical attention.

Following ingestion

Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention. See Notes.

4.2 Most important symptoms/effects, acute and delayed

Symptoms of organophosphate insecticide poisoning: cholinesterase inhibition, headache, fatiguedizziness, blurred vision, weakness, nausea, cramps, diarrhea, chest discomfort, sweating, miosis, tearing, salivation, vomiting, cyanosis, papilledema, and muscle twitching. In advanced cases convulsions, coma, loss of reflexes, and loss of sphincter control may occur. EYES: Can produce mild to moderate eye irritation and transient corneal injury. SKIN: Undiluted liquid products can cause skin irritation. Prolonged or repeated exposure may cause superficial burns. (USCG, 1999)

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

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean

patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. Organophosphates and related compounds

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

If material is on fire or involved in a fire: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn, or burns with difficulty.) Keep runoff water out of sewers and water sources. Other regulated substances, solid, NOS

5.2 Specific hazards arising from the chemical

Excerpt from ERG Guide 152 [Substances - Toxic (Combustible)]: Combustible material: may burn but does not ignite readily. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. (ERG, 2016)

5.3 Special protective actions for fire-fighters

Use water spray, foam, powder, carbon dioxide. In case of fire: keep drums, etc., cool by spraying with water.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

6.2 Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Sweep spilled substance into covered 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

Environmental considerations: land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner. / Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Organophosphorus pesticides, solid, NOS

SECTION 7: Handling and storage

7.1 Precautions for safe handling

NO open flames. 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

Store only in original container. Keep in a well-ventilated room. Separated from food and feedstuffs. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access. Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited. ... Store in original container in secured dry storage area. Prevent

cross-contamination with other pesticides and fertilizers. Do not store above 1002F for extended periods of time. If container is damaged or spills occurs, use product immediately or dispose of product . Dursban W

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

TLV: 0.1 mg/m3, as TWA; (skin); A4 (not classifiable as a human carcinogen); BEI issued

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 face shield or eye protection in combination with breathing protection if powder.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	Chlorpyrifos is a white crystalline or irregularly flaked solid. It has a very faint mercaptan-type odor. It is not soluble in water. It can cause slight irritation to the eye and skin.
Colour	White granular crystals
Odour	Mild mercaptan odor
Melting point/freezing point	42-44°C
Boiling point or initial boiling point and boiling range	200°C
Flammability	Combustible Solid
Lower and upper explosion limit/flammability limit	no data available
Flash point	-33°C
Auto-ignition temperature	no data available
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available

Solubility	approximately 2 mg/L at 77° F (NTP, 1992)
Partition coefficient n-octanol/water	log Kow = 4.96
Vapour pressure	4.09E-06mmHg at 25°C
Density and/or relative density	1.398
Relative vapour density	12.09 (calculated) (NTP, 1992) (Relative to Air)
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

Decomposes at approximately 160°C. This produces toxic and corrosive fumes including hydrogen chloride, phosgene, phosphorus oxides, nitrogen oxides and sulfur oxides. Attacks copper and brass.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

CHLORPYRIFOS is sensitive to heat and is decomposed by moisture. This chemical is hydrolyzed by strong alkalis. It is corrosive to copper and brass. It is also corrosive to copper alloys. It reacts with water and most reactive hydrogen compounds. The rate of hydrolysis in water increases with pH, with temperature and with the presence of copper and possibly other metals that can form chelates. (NTP, 1992)

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Incompatible Materials: Brass

10.6 Hazardous decomposition products

Decomposition temperature: approx 160 deg C

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 albino Rats males oral 151 mg/kg purity 99%
- Inhalation: LC50 Rat inhalation >36 mg/cu m/4 hr (Vapor, nose-only exposure)
- 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

EPA: Not evaluated. IARC: Not evaluated. NTP: Not evaluated

Reproductive toxicity

no data available

STOT-single exposure

The substance may cause effects on the nervous system by a cholinesterase inhibiting effect. Exposure far above the OEL could cause death. The effects may be delayed. Medical observation is indicated.

STOT-repeated exposure

Cholinesterase inhibition. Cumulative effects are possible. See Acute Hazards/Symptoms.

Aspiration hazard

A harmful concentration of airborne particles can be reached quickly on spraying or when dispersed, especially if powdered.

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: EC50; Species: *Lepomis macrochirus* (Bluegill) weight 0.35 g; Conditions: freshwater, 90% renewal, 25 deg C; Concentration: 1.78 ug/L for 48 hr; Effect: avoidance of probe while maintaining equilibrium /99.5% purity
- Toxicity to daphnia and other aquatic invertebrates: LC50; Species: *Daphnia magna* (Water flea) age <24 hr; Conditions: freshwater, static, 19.5 deg C, pH 6.8-7.0; Concentration: 3.7 ug/L for 24 hr (95% confidence limit: 2.5-5.9 ug/L)
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

12.2 Persistence and degradability

AEROBIC: Chlorpyrifos, applied at a concentration of 50 mg/plant, to cauliflower and brussels sprout crops treated with organic fertilizers had measured soil half-lives ranging from 19 to 41 days in soils with an organic carbon content ranging from 0.92 to 2.69%(1). Measured half-lives of 4 weeks (clay loam) and 12 weeks (silt loam) in non-sterile soils versus 24 weeks in both soils sterilized by autoclaving was indicative of measurable biodegradation(2). Half-lives of one week (sandy loam) and 2.5 weeks (organic) in non-sterile soils versus half-life of 17 and 40 weeks, respectively, in the sterilized soils was observed(3). After 4 weeks of incubation, 33-38% of applied chlorpyrifos was degraded in a clay loam sterilized by autoclaving or gamma irradiation; 62% degradation was observed in the non-sterile soil(4). The degradation rate in non-sterile sandy loam and muck soils was found to be significantly faster than in the sterilized soils with the degradation rate in non-sterile soil decreasing with a decrease in temperature (3 to 28 deg C) and variable with moisture content(5,6). After applying 300 ppm chlorpyrifos to autoclaved soil, approximately 80% remained after 30 days, but only 50% remained in a non-sterile soil(7). The half-life of chlorpyrifos in Hessarghatta soil (pH 7.09, clay content 20.2%) was 2.8-11.5 days, the half-life in Chettalli soil (pH 6.24, clay content 22.5%) was 10-25.1 days and the half-life in Bellary soil (pH 9, clay content 33.2%) was 1.6-8.7 days(8). The half-life of chlorpyrifos in a field measurement using a sandy soil was 81 days(9).

12.3 Bioaccumulative potential

A measured log BCF value for chlorpyrifos of 2.67 (BCF of 468) was determined from a 35-day flowing-water study using mosquito fish(1). An experimental log BCF value of 2.50 was determined from a static ecosystem study using mosquito fish(2). In a review of the environmental fate of chlorpyrifos, BCF values of 100-4,667 were reported in a variety of fish under field conditions(3). BCF values of 58-1,000 were reported in a variety of fish using flow-through aquariums(3). A BCF of 2727 was measured in Bluegill (*Lepomis macrochirus*)(4). A BCF range of 49-2880 was measured in fish for chlorpyrifos using carp (*Cyprinus carpio*) which were exposed over an 8-week period at concentrations of 1-10 ug/L(5). According to a classification scheme(6), the BCF range suggests the potential for bioconcentration in aquatic organisms is moderate to very high(SRC), provided the compound is not metabolized by the organism(SRC).

12.4 Mobility in soil

Koc values of 4,381 to 6,129 were measured in four different soils with organic carbon content varying from 0.88 to 6.55%; virtually complete adsorption was noted in soil of organic content of 31.65%(1). An average Koc value of 6,070 was determined in soil column studies using 3 agricultural soils(2). An experimental Koc value of 13,600 was reported for a single soil type(3). After incubation for 1 day in sediment from an urban freshwater stream, the Koc for chlorpyrifos was reported as 2,900 to 17,000(4). Koc values of 2740 and 995 were determined in a clay loam and high clay soil respectively, with a mean Koc of 1868(5). In a review of the environmental fate of chlorpyrifos, Koc values of 995-31,000 were reported in a variety of soils(6). Based on multiple Koc values, chlorpyrifos was assigned a selected Koc value of 9930(7). According to a classification scheme(8), these measured Koc values suggest that chlorpyrifos is expected to have low to no mobility in soil. Greater than 99% of chlorpyrifos applied to a loam soil remained in the upper 2.5 cm soil layer after periodic irrigation with overhead sprinklers indicating relative immobility(9). In laboratory studies using a sandy loam soil, chlorpyrifos was determined to be relatively immobile(10). In a simulated ecosystem study, the chlorpyrifos concentration in the sediment was as much as 4 times greater than in the water-phase(11). Chlorpyrifos applied to a natural pond was observed to rapidly absorb to bottom sediments(12). Koc of >7430 was observed with sediment in a nursery recycling pond study(13).

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: UN2398 (For reference only, please IMDG: UN2398 (For reference only, please IATA: UN2398 (For reference only, please check.) check.) check.)

14.2 UN Proper Shipping Name

ADR/RID: METHYL tert-BUTYL ETHER (For reference only, please check.) IMDG: METHYL tert-BUTYL ETHER (For reference only, please check.) IATA: METHYL tert-BUTYL ETHER (For reference only, please check.)

14.3 Transport hazard class(es)

ADR/RID: 3 (For reference only, please check.) IMDG: 3 (For reference only, please check.) IATA: 3 (For reference only, please check.)

14.4 Packing group, if applicable

ADR/RID: II (For reference only, please check.) IMDG: II (For reference only, please check.) IATA: II (For reference only, please check.)

14.5 Environmental hazards

ADR/RID: Yes IMDG: Yes IATA: Yes

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
Chlorpyrifos	Chlorpyrifos	2921-88-2	220-864-4
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Not Listed.
China Catalog of Hazardous chemicals 2015			Not Listed.
New Zealand Inventory of Chemicals (NZIoC)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Listed.
Korea Existing Chemicals List (KECL)			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/>

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