Chlordecone

sc-239499

Material Safety Data Sheet

Hazard Alert Code Key: EXTREME HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Chlordecone

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY
ChemWatch
Within the US & Canada: 877–715–9305
Outside the US & Canada: +800 2436 2255
(1–800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C10-Ci10-O, "1, 3, 4-metheno-2H-cyclobuta(cd)pentalen-2-one", "1, 1a, 3, 3a, 4, 5, 5a, 6-decachlorooctahydro", "CIBA 8514", "Compound 1189", "1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 10-decachloro-", "(5.2.1.0.sup 2.6).0.sup 3.9).0.sup 5.8)decano-4-one", decachloroketone, "decachloro-1, 3, 4-metheno-2H-cyclobuta(cd)pentalene-2-one", "decachlorooctahydro-1, 3, 4-metheno-2H-cyclobuta(cd)pentalene-2-one", "1, 1a, 3, 3a, 4, 5, 5a, 6-decachlorooctahydro-", "1, 3, 4-metheno-2H-cyclobuta(cd)pentalene-2-one", "decachloropentacyclo(5.2.1.0.sup 2.6).0.sup 4.10).0.sup 5.9)decan-3-one", decachlorotetracyclodecanone, "decachlorotetrahydro-4, 7-methanoindeneone", "GC 1189", "General Chemicals 1189", Kepone, "Kepone-2-one, decachlorooctahydro-", Merex, insecticide

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Toxicity:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Body Contact:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Reactivity:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chronic:</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

CANADIAN WHMIS SYMBOLS

Min/Nil=0 Low=1 Moderate=2 High=3 Extreme=4
EMERGENCY OVERVIEW

RISK
May cause SENSITISATION by skin contact. Limited evidence of a carcinogenic effect. Toxic in contact with skin and if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
* Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
* Organochlorine pesticides excite the central nervous system, causing shortness of breath, cough, narrowing of airways and throat spasms. In the muscles it can cause twitches, spastic movements and seizures.
* Mice fed on a diet containing the mirex degradation product, chlordcone (30-100 mg/kg), showed increased liver size, focal necrosis, cellular hypertrophy, hyperplasia and congestion dependent on the length of the trial.

EYE
* Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn).
  
  Slight abrasive damage may also result.

SKIN
* Skin contact with the material may produce toxic effects; systemic effects may result following absorption.
* There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.
* Open cuts, abraded or irritated skin should not be exposed to this material.
* Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
* Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
* Dermatitis was reported in 60% of industrial workers exposed to the mirex degradation product, chlordcone.
* Exposure to the material may result in a skin inflammation called chloracne.
  
  This is characterized by white- and blackheads, keratin cysts, spots, excessive discoloration.
* Chlorinated cyclodiene pesticides are absorbed through the skin.
  
  Central nervous system effects can occur, including hypertreactibility of muscle, which can cause twitching, jerks and convulsions.

INHALED
* The material is not thought to produce respiratory irritation (as classified using animal models).
* Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
* Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
* Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

CHRONIC HEALTH EFFECTS
* There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.
* Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.
* Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
* Exposure to the material may cause concerns for human fertility, on the basis that similar materials produced some evidence of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects, but which are not a secondary non-specific consequence of other toxic effects.
* Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung.
* Human exposure to cyclodiene can cause reduction of blood cell numbers, leukemia and anemia. Prolonged exposure causes cumulative effects such as irritability, drowsiness, loss of appetite and acute exposure symptoms.
* Exposure to organochlorine pesticides for long periods can cause multiple nervous system infections and disorders involving the brain and autonomic nerves with headache, dizziness, "pins and needles", tremor in the limbs, disturbances in nerves supplying blood vessels, pain in the bowel and stiffening of the bile duct, rapid heartbeat, hollow heart sounds and a tight pain in the chest. There can be blood problems with loss of platelets and while blood cells, change in blood cell distribution, anemia, loss of appetite and weight.
* In animal studies, mirex, a congener of chlordcone, produced benign and malignant tumours in mice and rats of both sexes. An excess of liver tumours and a suggestive production of reticulum-cell sarcomas were noted in male mice following a single subcutaneous injection. Increased incidences of pheochromocytomas of the adrenal gland, transitional cell papillomas of the kidney, and mononuclear cell leukaemia were reported in rats [NTP TR-313]
* High concentrations of chlordcone have been found in the liver, body fats and blood of workers exposed to the material. Human workers exposed by inhalation, ingestion and skin contact to chlordcone, showed signs of nervousness, tremors, visual deficiencies, pleural pain, joint pain, weight loss, tachycardia, and enlarged livers (hepatomegaly) Other signs included abnormal liver function tests, changes in the encephalogram and electromyogram patterns, demyelination of peripheral nerves and oligospermia with decreased sperm motility. The
severity of symptoms was proportional to blood levels. Chlordecone has
been reported to impair biliary function and to produce neurotoxicity.
A strong correlation exists between the neurotoxic effect and the inhibition of Mg(2+)-ATPases in fish brain and rat liver.
Rats and mice fed high doses of chlordecone in chronic studies showed nervous tremors. Mice receiving dietary concentrations of up to 40 mg/kg chlordecone, for 112 weeks showed an increased incidence of hepatocellular carcinomas. Rats receiving dietary concentrations of 50 and 80 mg/kg chlordecone, all died by the twenty-fifth week. Rats receiving lesser doses showed a significant increase in hepatocellular carcinoma after two years.
Female mice maintained on a diet of 40 mg/kg chlordecone, failed to reproduce. The animals appeared to be in constant oestrus and developed large ovarian follicles but no corpus lutea. The effects were consistent with partial blockage off the release of the luteinising hormone from the pituitary.
Chlordecone had an oestrogen-like effect on the oviducts of immature quail and on the testes of the male quail. Administration by gastric intubation to rats and mice on days 7-16 of gestation caused the foetus of surviving mothers to exhibit reduced body weight gain, reduced degree of ossification, oedema, undescended testes, enlarged renal pelvis and cerebral ventricles. Lower doses only reduced foetal weight and the degree of ossification. Foetotoxicity in mice occurred only at the highest doses rates and was manifest in foetal mortality and clubfoot malformation.

### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>chlordecone</td>
<td>143-50-0</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

### Section 4 - FIRST AID MEASURES

**SWALLOWED**

- Give a slurry of activated charcoal in water to drink. NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK. - At least 3 tablespoons in a glass of water should be given.

**EYE**

- If this product comes in contact with the eyes: - Immediately hold eyelids apart and flush the eye continuously with running water. - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

**SKIN**

- If skin or hair contact occurs: - Quickly but gently, wipe material off skin with a dry, clean cloth. - Immediately remove all contaminated clothing, including footwear.

**INHALED**

- If fumes or combustion products are inhaled remove from contaminated area. - Lay patient down. Keep warm and rested. - If dust is inhaled, remove from contaminated area. - Encourage patient to blow nose to ensure clear breathing passages. - Ask patient to rinse mouth with water but to not drink water. - Seek immediate medical attention.

**NOTES TO PHYSICIAN**

- Organochlorines are well absorbed from the lungs, gastrointestinal tract and skin.

- Intoxication from acute oral exposures generally begins within 45 minutes to several hours.

- Diazepam is the anticonvulsant of choice. [Phenobarbitone, sodium phenobarbitone or in repeated convulsions sodium pentothal (2.5% solution) may also be given - calcium gluconate may also be helpful] (Manufacturers; David Gray and Hoechst).

In humans have been shown to undergo extensive biliary excretion and enterohepatic circulation. Excretion in the faeces, unchanged and as the chlordecone alcohol derivative was the major route of elimination. Administration of the anionic exchange resin cholestyramine increased faecal excretion.

### Section 5 - FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Vapour Pressure (mmHG):</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Explosive Limit (%):</td>
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</tr>
<tr>
<td>Specific Gravity (water=1):</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower Explosive Limit (%):</td>
<td>Not available</td>
</tr>
</tbody>
</table>

**EXTINGUISHING MEDIA**

- Foam.
- Dry chemical powder.

**FIRE FIGHTING**

- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

**GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**

- Combustible solid which burns but propagates flame with difficulty.

- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), hydrogen chloride, phosgene, other pyrolysis products typical of burning organic material. May emit poisonous fumes.

**FIRE INCOMPATIBILITY**
- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

**PERSONAL PROTECTION**
- Glasses: Chemical goggles.
- Gloves:
- Respirator:
- Particulate

### Section 6 - ACCIDENTAL RELEASE MEASURES

**MINOR SPILLS**
- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

**MAJOR SPILLS**
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.

### Section 7 - HANDLING AND STORAGE

**PROCEDURE FOR HANDLING**
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

**RECOMMENDED STORAGE METHODS**
- Lined metal can, Lined metal pail/drum
- Plastic pail.
- For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

**STORAGE REQUIREMENTS**
- Store in original containers.
- Keep containers securely sealed.

### Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

**EXPOSURE CONTROLS**

<table>
<thead>
<tr>
<th>Source</th>
<th>Material</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>US NIOSH Recommended Exposure Limits (RELs)</td>
<td>chlordecone (Kepone)</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See Appendix A; Ca</td>
<td></td>
</tr>
<tr>
<td>Canada - Alberta Occupational Exposure Limits</td>
<td>chlordecone (Kerosene/Jet fuels, as total hydrocarbon vapour)</td>
<td>200</td>
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<td></td>
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</tr>
<tr>
<td>Canada - Alberta Occupational Exposure Limits</td>
<td>chlordecone (Diesel fuel, as total hydrocarbons)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Canada - Saskatchewan
Occupational Health and Safety Regulations - Contamination Limits
chlordecone (Diesel fuel as total hydrocarbons, (vapour)) 100 150 Skin

Canada - British Columbia
Occupational Exposure Limits
chlordecone (Diesel fuel, as total hydrocarbons, Inhalable) 100 (V) Skin

ENDOELTABLE

PERSONAL PROTECTION

RESPIRATOR
Particulate
Consult your EHS staff for recommendations

EYE
· Safety glasses with side shields.
· Chemical goggles.

HANDS/FEET
■ Wear chemical protective gloves, eg. PVC.
NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
· Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

OTHER
· Overalls.
· Eyewash unit.

ENGINEERING CONTROLS
· Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
· Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES
Solid.
Does not mix with water.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>State</td>
<td>Divided solid</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>490.60</td>
</tr>
<tr>
<td>Melting Range (°C)</td>
<td>662 (sublimes)</td>
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<tr>
<td>Viscosity</td>
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<tr>
<td>Boiling Range (°C)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Solubility in water (g/L)</td>
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<tr>
<td>Flash Point (°C)</td>
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<tr>
<td>pH (1% solution)</td>
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</tr>
<tr>
<td>Decomposition Temp (°C)</td>
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</tr>
<tr>
<td>pH (as supplied)</td>
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</tr>
<tr>
<td>Autoignition Temp (°C)</td>
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<tr>
<td>Vapour Pressure (mmHg)</td>
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</tr>
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</table>
random eye movements, muscle weakness, gait ataxia, incoordination, or slurred speech revealed a greater degree of neurological impairment. Nerve biopsies obtained from 5 workers with detectable tremor, mental disturbances consisting of irritability and poor recent memory, rapid eye movements, muscle weakness, gait ataxia, incoordination, or slurred speech revealed a greatly decreased number of small sensory fibers and sensory ganglion cells.

Headaches of mild-to-moderate severity were reported by 9 of the 23 workers. Three of these 9 had increased cerebrospinal fluid pressure and papilloedema.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY
- Presence of incompatible materials.
- Product is considered stable.

STORAGE INCOMPATIBILITY
- Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

CHLORDECONE

TOXICITY AND IRRITATION

CHLORDECONE:
- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

<table>
<thead>
<tr>
<th>Material</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Dermal (rat) LD50</td>
<td>&gt;2000 mg/kg</td>
</tr>
<tr>
<td>Dermal (rabbit) LD50</td>
<td>345 m/kg</td>
</tr>
</tbody>
</table>

Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type.

for mirex and chlordecone:

Mirex and chlordecone are structurally similar insecticides. The only structural difference is that mirex has two bridgehead chlorine atoms where chlordecone has a carbonyl oxygen atom. As suggested by this similarity in structure, these two chemicals produce similar toxicities in a number of organs. However, several aspects of the toxicity of mirex are distinctly different from those of chlordecone, and vice versa.

Acute effects: Diarrhoea is a relatively common result of high-dose mirex exposure. Several acute- and intermediate-duration studies have identified diarrhoea in treated animals. Mild diarrhoea has also been observed in a 33-day gavage study in mice exposed to 10 mg/kg/day chlordecone.

Inhalation effects: Pleuritic chest pain was reported by 32 of 133 workers employed at a facility that manufactured chlordecone. Among 23 workers with blood chlordecone levels in excess of 2 ug/L, 18 reported pleuritic chest pains. Further examination of these 18 workers revealed no dyspnea and chest x-rays were normal.

Dermal effects: Eighty-nine of 133 workers interviewed as a result of intermediate- or chronic-duration exposure to high levels of chlordecone during its manufacture reported skin rashes of an erythematous, macropapular nature that occurred at some time during their exposure. Among 23 workers with blood chlordecone levels above 2 ug/L, 16 reported exposure-related rashes.

Hepatotoxicity: Hepatic changes were observed in one chronic human exposure to mirex, as well as in a number of workers exposed to chlordecone for intermediate or chronic durations. The hepatic effects of mirex have been well characterized in experimental animals. The changes observed in livers include both adaptive and toxic effects. In addition to the adaptive effects described above, marked hepatic toxicity has been observed after acute-duration oral exposure of animals to mirex. The primary form of hepatotoxicity observed in rats after acute-duration oral exposures is hepatobiliary toxicity. Impaired biliary excretion in the presence of increased bile flow has been observed in three acute duration studies conducted with mirex or chlordecone in rats.

Like mirex, chlordecone causes both adaptive and toxic changes in the livers of experimental animals. Adaptive responses of the liver were seen after oral exposure of rats, mice, or gerbils to chlordecone.

Renal toxicity: Animal studies indicate that acute- and intermediate-duration exposures to mirex are without significant renal toxicity but that chronic-duration exposure to low levels of mirex may result in toxic effects on the kidneys.

Like mirex, chlordecone produced observable renal effects following oral exposure primarily in chronic-duration studies. However, no adverse renal effects were observed after acute exposure.

Neurotoxicity: Sixty-one of 133 workers examined as a result of intermediate- or chronic-duration inhalation exposures to high concentrations of chlordecone during its production experienced tremors; 58 experienced nervousness or unfounded anxiety; and 42 experienced visual difficulties. Tremors were observed in all 23 workers with blood chlordecone levels in excess of 2 ug/L. The tremors were characterised as intention tremors or as occurring with a fixed posture against gravity. The tremors were most apparent in the upper extremities but were also detectable in the lower extremities. In the more severe cases, gait was affected. Mental disturbances consisting of irritability and poor recent memory were reported by 13 of the 23 workers.

Headaches of mild-to-moderate severity were reported by 9 of the 23 workers. Three of these 9 had increased cerebrospinal fluid pressure and papilloedema.

Nerve biopsies obtained from 5 workers with detectable tremor, mental disturbances consisting of irritability and poor recent memory, rapid random eye movements, muscle weakness, gait ataxia, incoordination, or slurred speech revealed a greatly decreased number of small sensory fibers and sensory ganglion cells.
myelinated and unmyelinated axons.

Reproductive effects: The available human data on chlordecone provide qualitative evidence to support the conclusion that intermediate- or chronic-duration exposures to high concentrations of chlordecone in the workplace causes oligospermia and decreases sperm motility among male workers. The threshold for abnormally low sperm counts was =1ug chlordecone per liter of serum, and the number of motile sperm cells increased as the serum chlordecone concentration decreased. Despite loss of sperm motility in some of the workers, there were no reported difficulties with fertility.

Studies in animals suggest that both male and female reproductive systems are adversely affected by mirex. Acute exposure of male rats to 6 mg/kg/day mirex daily for 10 days decreased their fertility significantly.

Gestational exposure of female rats at 10 mg/kg/day for 5 days resulted in decreased ovarian and uterine weights and reduced blood flow to the ovaries, uterus, and fetuses. This effect was not observed if the duration of exposure during gestation was shortened to 1 day or lengthened to 10 days; thus, the significance of this effect is unknown.

Chlordecone also produced reproductive toxicity in both male and female animals. Exposure of male rats to doses of chlordecone as low as 0.625 mg/kg/day for 10 days resulted in a decreased sperm count, although at the highest dose tested (10 mg/kg/day) decreased testes weight and an increase in sperm count was observed.

Persistent vaginal oestrus was reported in female mice receiving 2 mg/kg chlordecone daily for 2 weeks.

Carcinogenicity: Extremely limited information is available regarding cancer in humans following inhalation exposure to chlordecone. Liver biopsy samples taken from 12 workers with hepatomegaly resulting from intermediate- or chronic-duration exposures to high concentrations of chlordecone showed no evidence of cancer. Chlordecone was also shown to be carcinogenic by the oral route in mice and rats in several studies. The predominant carcinogenic lesions observed in these studies were hepatomas and neoplastic nodules of the liver, and mononuclear cell leukemia and transitional cell papillomas of the kidney. A positive trend in pheochromocytomas was also observed in one of the studies. Both male and female mice showed a significant increase in the incidence of hepatomas in a screening study in which mirex was administered first by gavage from 7 until 28 days of age and then in the diet until 18 months of age (time-weighted-average dose = 3.6 mg/kg/day).

In rats, an increase in the incidence of neoplastic nodules was also observed in male CD rats administered mirex (4.9 mg/kg/day) in the diet for 18 months.

Chlordecone was also shown to be carcinogenic in rats and mice. The results of bioassays in mice and rats clearly suggest that chlordecone induces hepatocellular carcinomas in both sexes of rats and mice.

Endocrine effects: Studies in rats indicate that mirex is toxic to the thyroid. Ultrastructural analyses of thyroids from rats treated for 28 days showed dilation of the rough endoplasmic reticulum at 0.25 mg/kg/day and increased columnar cells with irregularly shaped lysosomal bodies, dilation of cisternae, and increased vacuolization at 2.5 mg/kg/day.

Studies in animals indicate that the adrenal gland hypertrophies and releases increased levels of corticosterone in response to mirex exposure; consistent with the ability of corticosterone to mobilise fatty acids for energy, a decrease in body fats was observed. Less information is available regarding the effects of chlordecone on the adrenal glands of animals.

Endocrine effects: Studies in animals indicate that the adrenal gland hypertrophies and releases increased levels of corticosterone in response to mirex exposure; consistent with the ability of corticosterone to mobilise fatty acids for energy, a decrease in body fats was observed. Less information is available regarding the effects of chlordecone on the adrenal glands of animals.

Increased relative adrenal weight was observed following a single oral dose of 35 mg/kg in rats.

An enlarged adrenal with hyperplasia and hypertrophy of the cortical cells was observed in a 30-day dietary study in rats at 1.17 mg/kg/day. Also, decreased adrenal lipid was observed at 1.25 mg/kg/day in a 90-day dietary study in rats. Consistent with a corticosterone-induced increase in lipid utilization, decreased body fat was observed following a 16-day dietary exposure at 2.5 or 5 mg/kg/day in rats.

Ocular effects: In contrast to the results obtained with mirex, chlordecone was not found to be cataractogenic (causing cataracts) in the very young. Exposure of maternal rats to doses as high as 10 mg/kg/day or maternal mice to doses as high as 24 mg/kg/day during the first 4 days of lactation, and the resulting exposure of the young through the mother’s milk, resulted in no incidences of cataracts among the offspring of treated dams.

Thermoregulation: Also, no studies were located regarding effects on thermoregulation in animals following oral exposure to mirex. Chlordecone was shown to cause a decrease in core temperature following ingestion of a single dose of 55 or 75 mg/kg in rats. The core temperatures were depressed for up to 12 days after administration of 75 mg/kg of chlordecone. Slight hyperthermia occurred after the body temperature recovered. Slight hyperthermia was also observed in rats after 12 weeks of exposure at 7.1 mg/kg/day.

WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

Reproductive effectors in rats.

Carcinogenic by RTECS criteria.

**CARCINOGEN**

CHLORDECONE (KEPONE) US Environmental Defense Scorecard Recognized Carcinogens Reference(s) P65

CHLORDECONE (KEPONE) US Environmental Defense Scorecard Suspected Carcinogens Reference(s) P65

**SKIN**

chlordecone Canada - Alberta Occupational Exposure Limits - Skin Substance Interaction 1

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**Section 12 - ECOLOGICAL INFORMATION**

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

This material and its container must be disposed of as hazardous waste.

Avoid release to the environment.

Refer to special instructions/ safety data sheets.

**Ecotoxicity**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
<th>Bioaccumulation</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>chlordecone</td>
<td>HIGH</td>
<td>HIGH</td>
<td>LOW</td>
<td>LOW</td>
</tr>
</tbody>
</table>

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**Section 13 - DISPOSAL CONSIDERATIONS**
US EPA Waste Number & Descriptions

B. Component Waste Numbers

When chlordecone is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U142 (waste code T).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations. Puncture containers to prevent re-use and bury at an authorized landfill. Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. A Hierarchy of Controls seems to be common - the user should investigate:

· Reduction
· Reuse
· Recycling
· Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

· Recycle wherever possible.
· Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 6.1
Identification Numbers: UN2761 PG: III
Label Codes: 6.1 Special provisions: IB8, IP3, T1, TP33
Packaging: Exceptions: 153 Quantity limitations: 100 kg
Passenger aircraft/rail: Quantity Limitations: Cargo 200 kg Vessel stowage: Location: A aircraft only:
Vessel stowage: Other: 40
Hazardous materials descriptions and proper shipping names:
Organochlorine pesticides, solid, toxic

Air Transport IATA:
ICAO/IATA Class: 6.1 ICAO/IATA Subrisk: None
UN/ID Number: 2761 Packing Group: III
Special provisions: A3 Cargo Only
Packing Instructions: 619 Maximum Qty/Pack: 200 kg
Passenger and Cargo Passenger and Cargo
Packing Instructions: 619 Maximum Qty/Pack: 100 kg
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: Y619 Maximum Qty/Pack: 10 kg
Shipping Name: ORGANOCHLORINE PESTICIDE, SOLID, TOXIC
*(CONTAINS CHLORDECOME)

Maritime Transport IMDG:
IMDG Class: 6.1 IMDG Subrisk: None
UN Number: 2761 Packing Group: III
EMS Number: F-A, S-A Special provisions: 61 223 274
Limited Quantities: 5 kg Marine Pollutant: Yes
Shipping Name: ORGANOCHLORINE PESTICIDE, SOLID, TOXIC

Section 15 - REGULATORY INFORMATION

chlordecone (CAS: 143-50-0) is found on the following regulatory lists;

"Canada - Saskatchewan Occupational Health and Safety Regulations - Designated Chemical Substances","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","OSPAR List of Substances of Possible Concern","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which production, use or other presence must be reported","US -
Section 16 - OTHER INFORMATION

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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