Levodopa

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Levodopa

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
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EMERGENCY
ChemWatch
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(1–800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C9-H11-N-O4, (OH)2C6H3CH2CHNH2COOH, "levadopa (sic)", "alanine, 3-(3, 4-dihydroxyphenyl)-, (-)-", "2-amino-3-(3, 4-dihydroxyphenyl)propionic acid", dihydroxy-L-phenylalanine, L-dihydroxyphenylalanine, "(-)-3-(3, 4-dihydroxyphenyl)-L-alanine", "beta-(3, 4-dihydroxyphenyl)-alpha-alanine", L-alpha-dihydroxyphenylalanine, "L-beta-(3, 4-dihydroxyphenyl)alanine", "L-3, 4-dihydroxyphenylalanine", "L-3, 4-dihydroxyphenyl-alpha-alanine", "beta-(3, 4-dihydroxyphenyl)-L-alanine", "3-(3, 4-dihydroxyphenyl)-L-alanine", "3, 4-dihydroxyphenyl-L-alanine", "3, 4-dihydroxy-L-phenylalanine", (-)-dopa, L-O-hydroxytyrosine, 3-hydroxy-L-tyrosine, "L-tyrosine, 3-hydroxy-", Bendopa, Biodopa, Brocadopa, Cerepap, Cidandopa, DA, Deadopa, Dopaflex, Dopai, Dopaidan, Dopalkin, Dopar, Doparkine, Dopari, Dopasol, Dopaston, Dopastral, Doprin, Eldopai, Eldopar, Eldopatec, Eurodopa, "Helfo Dopa", Insulamina, Laradopa, Larodopa, Lepoda, Levopa, Maipedopa, Parda, Pardopa, "RO 4-6316", Sobiodopa, Veldopa, "dopaminergic amino-acid"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

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

MIN/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS
EMERGENCY OVERVIEW

RISK
- Harmful if swallowed.
- Danger of cumulative effects.
- May cause heritable genetic damage.
- Possible risk of impaired fertility.
- Possible risk of harm to the unborn child.
- Irritating to eyes, respiratory system and skin.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
- Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

EYE
- This material can cause eye irritation and damage in some persons.

SKIN
- This material can cause inflammation of the skin on contact in some persons.
- The material may accentuate any pre-existing dermatitis condition.
- 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.

INHALED
- The material can cause respiratory irritation in some persons.
- The body’s response to such irritation can cause further lung damage.
- 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
- Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems.
- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
- Based on experiments and other information, there is ample evidence to presume that exposure to this material can cause genetic defects that can be inherited.
- Ample evidence from experiments exists that there is a suspicion this material directly reduces fertility.
- Results in experiments suggest that this material may cause disorders in the development of the embryo or fetus, even when no signs of poisoning show in the mother.
- 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.
- More serious are the effects of chronic levodopa administration, which include:
  - End-of-dose deterioration of function
  - On/off oscillations
  - Freezing during movement
  - Dose failure (drug resistance)
  - Dyskinesia at peak dose
- Recent studies have demonstrated that use of L-DOPA without simultaneously giving proper levels of serotonin precursors depletes serotonin.
- The long term use of L-DOPA in Parkinsons disease has been linked to the so called dopamine dysregulation syndrome.
- Chronic exposure in humans produces somnolence, hallucinations and distorted perceptions, toxic psychosis, ataxia, tetany, and changes in motor activity. Skin tumours developed in one patient exposed to levodopa for 18 months. The material may produce a teratogenic effect in rabbits at doses of 125 mg/kg/day. Oral administration during days 1-22 of pregnancy in rats, produced foetal developmental abnormalities. Effects on fertility may also occur.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>levodopa</td>
<td>59-92-7</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

SWALLOWED
- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- Where Medical attention is not
immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

**EYE**
- If this product comes in contact with the eyes: · Wash out immediately with fresh 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 contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

**INHALED**
- If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

**NOTES TO PHYSICIAN**
- citing from: MARTINDALE: The Extra Pharmacopoeia, 27th Ed.
If overdose occurs the stomach should be emptied by aspiration and lavage. Hypotension may require cautious administration of intravenous fluids, and if arrhythmia develop, anti-arrhythmic therapy may be necessary. Pyridoxine has been given to reverse some toxic effects. Pyridoxine is converted to pyridoxal-5-phosphate, the coenzyme involved in decarboxylation of levodopa to dopamine. This action can be stopped by concurrent administration of a peripheral decarboxylase inhibitor. The administration of dopamine-receptor blocking agents such as pimozide or phenothiazines has been suggested as antidotes. Absorbed readily from the gastrointestinal tract and widely distributed in tissues including the central nervous system. Has a plasma half-life of about 1 hour and is mainly converted by decarboxylation to dopamine which in turn is partially converted to the adrenergic noradrenaline. Up to 30% is converted to 3-O-methyldopa which has a half-life of about 9-22 hours. 80% of the dose is excreted in the urine within 24 hours mainly as homovanillic acid (13-29%) and dihydroxyphenylacetic acid.

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### Section 5 - FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapour Pressure (mmHG)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available</td>
</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 breathing apparatus plus protective gloves.

**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), nitrogen oxides (NOx), other pyrolysis products typical of burning organic material.
- May emit poisonous fumes.
- May emit corrosive 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

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### 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**
- Moderate hazard.
- CAUTION: Advise personnel in area.
- 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
· Glass container.
· Polyethylene or polypropylene container.
· Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS
· Store in original containers.
· Keep containers securely sealed.
NOTE: Store in the dark.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS
The following materials had no OELs on our records
· levodopa: CAS:59-92-7

PERSONAL PROTECTION

RESPIRATOR
Particulate
Consult your EHS staff for recommendations

EYE
· When handling very small quantities of the material eye protection may not be required.
For laboratory, larger scale or bulk handling or where regular exposure in an occupational setting occurs:
· Chemical goggles
· Face shield. Full face shield may be required for supplementary but never for primary protection of eyes
· Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET
· 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.
· Rubber gloves (nitrile or low-protein, powder-free latex). Employees allergic to latex gloves should use nitrile gloves in preference.
· Double gloving should be considered.
· PVC gloves.
· Protective shoe covers.
· Head covering.
Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocaoutchouc
- polyvinyl chloride

Gloves should be examined for wear and/or degradation constantly.

**OTHER**
- For quantities up to 500 grams a laboratory coat may be suitable.
- For quantities up to 1 kilogram a disposable laboratory coat or coverall of low permeability is recommended. Coveralls should be buttoned at collar and cuffs.
- For quantities over 1 kilogram and manufacturing operations, wear disposable coverall of low permeability and disposable shoe covers.
- For manufacturing operations, air-supplied full body suits may be required for the provision of advanced respiratory protection.
- Eye wash unit.
- Ensure there is ready access to an emergency shower.
- For Emergencies: Vinyl suit.

**ENGINEERING CONTROLS**
- Enclosed local exhaust ventilation is required at points of dust, fume or vapor generation.
- HEPA terminated local exhaust ventilation should be considered at point of generation of dust, fumes or vapors.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

**PHYSICAL PROPERTIES**
Solid. Does not mix with water.

<table>
<thead>
<tr>
<th>State</th>
<th>Divided solid</th>
<th>Molecular Weight</th>
<th>197.19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>528.8- 532.4 (decomp)</td>
<td>Viscosity</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>Not applicable</td>
<td>Solubility in water (g/L)</td>
<td>Partly miscible</td>
</tr>
<tr>
<td>Flash Point (°F)</td>
<td>Not available</td>
<td>pH (1% solution)</td>
<td>4.5-7.0</td>
</tr>
<tr>
<td>Decomposition Temp (°F)</td>
<td>528.8</td>
<td>pH (as supplied)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition Temp (°F)</td>
<td>Not available</td>
<td>Vapour Pressure (mmHG)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available</td>
<td>Specific Gravity (water=1)</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not available</td>
<td>Relative Vapor Density (air=1)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Volatile Component (%vol)</td>
<td>Negligible</td>
<td>Evaporation Rate</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

**APPEARANCE**
White or slightly cream-coloured, odourless, almost tasteless, crystalline powder; does not mix well with water (1:300). Soluble in aqueous solutions of mineral acids and alkali carbonates. Aqueous solutions are readily oxidised in air. Darkens on exposure to air and light.

### 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

**LEVODOPA**

**TOXICITY AND IRRITATION**

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

<table>
<thead>
<tr>
<th>Toxicity</th>
<th>Irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (rat) LD50: 1780 mg/kg</td>
<td>Nil Reported</td>
</tr>
<tr>
<td>Intraperitoneal (rat) LD50: 624 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Subcutaneous (rat) LD50: 2000 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intravenous (rat) LD50: &gt;100 mg/kg</td>
<td></td>
</tr>
</tbody>
</table>
Iodopropylamine (I) is a potential lung irritant. It can cause respiratory irritation, coughing, and chest pain. It is also a potential skin irritant and can cause skin irritation and redness. Inhalation exposure can lead to respiratory symptoms such as coughing, wheezing, and chest tightness. Skin exposure can cause redness, swelling, and irritation.

On contact with the eye, iodopropylamine can cause irritation, tearing, and redness. It can also cause conjunctival hyperemia and discharge. It is a potential oral irritant and can cause pain and swelling of the mouth and throat. Exposure to iodopropylamine can also lead to systemic effects, including renal and hepatic impairment.

Disposal and Treatment

Iodopropylamine should be disposed of according to local regulations. It is recommended to neutralize any remaining solution with an alkaline solution before discharge. It is important to ensure that the disposal method is approved by the relevant authorities.

Consultation with a hazardous materials specialist or a waste management authority is recommended for proper disposal of iodopropylamine.

Section 10 - TRANSPORT INFORMATION

Iodopropylamine is classified as a toxic substance under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). It should be transported in accordance with the appropriate UN or IMDG codes as specified in the GHS. The transport of toxic substances requires notification to the appropriate authorities and adherence to the required safety measures.

Section 11 - STABILITY AND REACTIVITY

Iodopropylamine is a stable compound under normal conditions. However, it should be protected from heat, moisture, and direct sunlight to prevent any potential decomposition.

This material should not be mixed with incompatible materials, such as strong acids or bases. The formation of toxic or hazardous substances may result from such reactions.

Section 12 - ECOLOGICAL INFORMATION

Iodopropylamine can have an impact on aquatic life if released into the environment. It is classified as moderately persistent and bioaccumulative (PBT) under the European Union's Chemicals Agency (ECHA) criteria. It should be handled with care to prevent any environmental contamination.

Section 13 - DISPOSAL CONSIDERATIONS

Iodopropylamine should be disposed of according to local regulations. It is recommended to neutralize any remaining solution with an alkaline solution before discharge. It is important to ensure that the disposal method is approved by the relevant authorities.

Consultation with a hazardous materials specialist or a waste management authority is recommended for proper disposal of iodopropylamine.

Section 14 - TRANSPORTATION INFORMATION

Iodopropylamine is classified as a toxic substance under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). It should be transported in accordance with the appropriate UN or IMDG codes as specified in the GHS. The transport of toxic substances requires notification to the appropriate authorities and adherence to the required safety measures.
Section 15 - REGULATORY INFORMATION

levodopa (CAS: 59-92-7) is found on the following regulatory lists:

Section 16 - OTHER INFORMATION

ND
Substance CAS Suggested codes levodopa 59- 92- 7

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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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