MATERIAL SAFETY DATA SHEET

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Section 1 - Product and Company Information

Product Name	L-3,4-DIHYDROXYPHENYLALANINE
Product Number	D009
Brand	SIGMA
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
3,4-DIHYDROXY-L-PHENYLALANINE	59-92-7	No

Formula C9H11NO4

Synonyms Alanine, 3-(3,4-dihydroxyphenyl)-, (-)- * 2-Amino-3-(3,4-dihydroxyphenyl)propanoic acid * Bendopa * Biodopa * Brocadopa * Cerepap * Cidandopa * DA * Deadopa * Dihydroxy-L-phenylalanine * L-Dihydroxyphenylalanine * 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-Dihydroxyphenylalanine * 3,4-Dihydroxyphenyl-L-alanine * 3,4-Dihydroxy-L-phenylalanine * DOPA * L-DOPA * Dopaflex * Dopal * Dopaidan * Dopal-fher * Dopalina * Dopar * Doparkine * Doparl * Dopasol * Dopaston * Dopastral * Doprin * Eldopal * Eldopatec * Eurodopa * Helfo DOPA * L-o-Hydroxytyrosine * 3-Hydroxy-L-tyrosine * Insulamina * Larodopa * Levodopa * Levopa * Maipedopa * Parda * Pardopa * Ro 4-6316 * Sobiodopa * L-Tyrosine, 3-hydroxy- (9CI) * Veldopa

RTECS Number: AY5600000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Harmful.

Harmful if swallowed. Irritating to eyes, respiratory system and skin.

Target organ(s): Heart. Calif. Prop. 65 developmental hazard.

HMIS RATING
HEALTH: 6
FLAMMABILITY: 0
REACTIVITY: 1

NFPA RATING
HEALTH: 2
FLAMMABILITY: 0
REACTIVITY: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP

Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING

User Exposure: Do not breathe dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep tightly closed.
Store at 2-8˚C

SPECIAL REQUIREMENTS

Air and light sensitive.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS

Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

Appearance

Physical State: Solid
Color: White
Form: Fine crystals

Property	Value	At Temperature or Pressure
Molecular Weight	197.19 AMU	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	276 ˚C	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	

Partition Coefficient	N/A
Decomposition Temp.	N/A
Flash Point	N/A
Explosion Limits	N/A
Flammability	N/A
Autoignition Temp	N/A
Refractive Index	N/A
Optical Rotation	Degree of Rotation: 10 g/l Solvent: 1 M HCl -13.5 - -12 (+/-1)
Miscellaneous Data	N/A
Solubility	N/A

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Conditions to Avoid: Light. Air.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Nitrogen oxides.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: Causes skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes eye irritation.
Inhalation: Material is irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled.
Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Heart.

SIGNS AND SYMPTOMS OF EXPOSURE
Nausea, headache, and vomiting. Exposure can cause:

TOXICITY DATA

Oral
Rat
1780 mg/kg
LD50
Remarks: Behavioral:Excitement. Behavioral:Ataxia. Behavioral:Aggression.

Intraperitoneal
Rat
624 MG/KG
LD50
Remarks: Skin and Appendages: Other: Hair. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Behavioral:Excitement.

Subcutaneous
Rat
2 GM/KG
LD50
Remarks: Lungs, Thorax, or Respiration:Other changes. Gastrointestinal:Changes in structure or function of salivary glands. Behavioral:Convulsions or effect on seizure threshold.

Intravenous
Rat
>100 MG/KG
LD50

Oral
Mouse
2363 mg/kg
LD50
Remarks: Behavioral:Excitement.

Intraperitoneal
Mouse
588 MG/KG
LD50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:Somnolence (general depressed activity). Lungs, Thorax, or Respiration:Other changes.

Subcutaneous
Mouse
4449 MG/KG
LD50
Remarks: Gastrointestinal:Changes in structure or function of salivary glands. Peripheral Nerve and Sensation:Local anesthetic. Behavioral:Convulsions or effect on seizure threshold.

Intravenous
Mouse
450 MG/KG
LD50

Oral
Rabbit
609 mg/kg
LD50

Oral
Bird (wild)
100 mg/kg
LD50

CHRONIC EXPOSURE - CARCINOGEN

Species: Man
Route of Application: Oral
Dose: 87520 MG/KG
Exposure Time: 1.5Y
Frequency: C
Result: Skin and Appendages: Other: Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 500 MG/KG
Route of Application: Oral
Exposure Time: (1-5D PREG)
Result: Specific Developmental Abnormalities: Other developmental abnormalities.

Species: Rat
Dose: 6600 MG/KG
Route of Application: Oral
Exposure Time: (7-17D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Rat
Dose: 700 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1-7D PREG)
Result: Specific Developmental Abnormalities: Other developmental abnormalities.

Species: Mouse
Dose: 4800 MG/KG
Route of Application: Oral
Exposure Time: (7-12D PREG)
Result: Effects on Embryo or Fetus: Fetal death.

Species: Mouse
Dose: 900 MG/KG
Route of Application: Oral
Exposure Time: (7-12D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Newborn: Physical.

Species: Mouse
Dose: 1200 MG/KG
Route of Application: Oral
Exposure Time: (7-12D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse
Dose: 1200 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (7-12D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rabbit
Dose: 2250 MG/KG
Route of Application: Oral
Exposure Time: (7-15D PREG)
Result: Specific Developmental Abnormalities: Cardiovascular (circulatory) system.

CHRONIC EXPOSURE - MUTAGEN

Species: Human
Dose: 39400 UG/L
Cell Type: Embryo

Mutation test: Micronucleus test

Species: Human
Dose: 3 MMOL/L
Cell Type: fibroblast
Mutation test: DNA damage

Species: Human
Dose: 3 MMOL/L
Cell Type: Other cell types
Mutation test: DNA damage

Species: Human
Dose: 3 MMOL/L
Cell Type: fibroblast
Mutation test: DNA inhibition

Species: Human
Dose: 3 MMOL/L
Cell Type: Other cell types
Mutation test: DNA inhibition

Species: Human
Dose: 3 MMOL/L
Cell Type: fibroblast
Mutation test: Other mutation test systems

Species: Human
Dose: 3 MMOL/L
Cell Type: Other cell types
Mutation test: Other mutation test systems

Species: Rat
Dose: 25 UMOL/L
Cell Type: lung
Mutation test: DNA damage

Species: Mouse
Dose: 3800 NMOL/L
Cell Type: Other cell types
Mutation test: DNA inhibition

Species: Mouse
Dose: 100 MG/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster
Dose: 98500 UG/L
Cell Type: lung
Mutation test: Micronucleus test

Species: Hamster
Dose: 100 UMOL/L
Cell Type: lung
Mutation test: Mutation in mammalian somatic cells.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 22 GM/KG
Route of Application: Oral

Exposure Time: (1-22D PREG)
Result: Effects on Newborn: Viability index (e.g., # alive at day 4 per # born alive).

Species: Rat
Dose: 3600 MG/KG
Route of Application: Oral
Exposure Time: (9-14D PREG)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Rat
Dose: 480 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (9-14D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 4500 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (15D MALE)
Result: Paternal Effects: Testes, epididymis, sperm duct. Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Species: Rat
Dose: 5 MG/KG
Route of Application: Subcutaneous
Exposure Time: (1D PRE)
Result: Maternal Effects: Ovaries, fallopian tubes.

Species: Mouse
Dose: 5 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Other measures of fertility

Species: Mouse
Dose: 2400 MG/KG
Route of Application: Oral
Exposure Time: (7-12D PREG)
Result: Effects on Newborn: Weaning or lactation index (e.g., # alive at weaning per # alive at day 4).

Species: Mouse
Dose: 600 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (7-12D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: None
Non-Hazardous for Transport: This substance is considered to be non-hazardous for transport.

IATA

Non-Hazardous for Air Transport: Non-hazardous for air transport.

Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION

Symbol of Danger: Xn
Indication of Danger: Harmful.
R: 22-36/37/38
Risk Statements: Harmful if swallowed. Irritating to eyes, respiratory system and skin.
S: 26-36
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing.

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Harmful.
Risk Statements: Harmful if swallowed. Irritating to eyes, respiratory system and skin.
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing.
US Statements: Target organ(s): Heart. Calif. Prop. 65 developmental hazard.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: No
TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65

California Prop - 65: This product is or contains chemical(s) known to the state of California to cause developmental toxicity.

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: No
NDSL: Yes

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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