

## Material Safety Data Sheet

### Diisopropyl Ether

#### Section 1 - Product Identification

Product name: Diisopropyl ether  
Product Number: -  
Brand: Santa Cruz Biotechnology, Inc  
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

#### Section 2 – Composition/Information on Ingredients

Synonyms : "diisopropyl ether", "diisopropyl oxide", "ether, isopropyl", "isopropyl ether", 2-isopropoxypropane  
Formula :  $(\text{CH}_3)_2\text{CHOCH}(\text{CH}_3)_2$   
Molecular Weight : 102.18 g/mol

Component	Classification	Concentration
Diisopropyl ether		
CAS-No. 108-20-3	-	>98 %

#### Section 3 – Hazards Identification

##### Emergency Overview

##### RISK

May form explosive peroxides.

HARMFUL - May cause lung damage if swallowed.

Highly flammable.

Repeated exposure may cause skin dryness and cracking.

Vapours may cause drowsiness and dizziness.

##### POTENTIAL HEALTH EFFECTS

##### ACUTE HEALTH EFFECTS

##### SWALLOWED

Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733). ! Accidental ingestion of the material may be damaging to the health of the individual. ! Lethal doses of diisopropyl ether, in animal, produced rapid, intense intoxication followed by respiratory

failure caused by depressant action. ! Ingestion of alkyl ethers may produce stupor, blurred vision, headache, dizziness and irritation of the nose and throat. Respiratory distress and asphyxia may result.

#### EYE

Eye contact with alkyl ethers (vapour or liquid) may produce irritation, redness and tears. ! There is some evidence that material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Moderate inflammation may be expected with redness; conjunctivitis may occur with prolonged exposure.

#### SKIN

Repeated exposure may cause skin cracking, flaking or drying following normal handling and use.

Skin contact with the material may damage the health of the individual; systemic effects may result following absorption. ! There is some evidence to suggest that the material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterised by redness, swelling and blistering. ! Alkyl ethers may defat and dehydrate the skin producing dermatoses. Absorption may produce headache, dizziness, and central nervous system depression. ! 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

Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo. ! Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. ! There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. ! Diisopropyl ether has a pronounced narcotic / anaesthetic effect and a severe acute inhalation exposure may cause rapid loss of consciousness. Minor vapour exposure may produce headache, nausea, vomiting. ! Following inhalation, ethers cause lethargy and stupor. Inhaling lower alkyl ethers results in headache, dizziness, weakness, blurred vision, seizures and possible coma. If exposure to highly concentrated vapour atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and unless resuscitated - death.

#### CHRONIC HEALTH EFFECTS

Prolonged or repeated skin contact may cause drying with cracking, irritation and possible dermatitis following. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. Chronic exposure to alkyl ethers may result in loss of appetite, excessive thirst, fatigue, and weight loss. Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes. [PATTYS].

## Section 4 – First-Aid Measures

#### SWALLOWED

If swallowed do NOT induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. Observe the patient carefully. Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

#### 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. Seek medical attention without delay; if pain persists or recurs seek medical attention. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

#### SKIN

If skin contact occurs Immediately remove all contaminated clothing, including footwear. Flush skin and hair with running water (and soap if available). Seek medical attention in event of irritation.

#### **INHALED**

If fumes or combustion products are inhaled remove from contaminated area. Lay patient down. Keep warm and rested. Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

#### **NOTES TO PHYSICIAN**

Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Treat symptomatically for lower alkyl ethers.

**BASIC TREATMENT** ----- Establish a patent airway with suction where necessary. Watch for signs of respiratory insufficiency and assist ventilation as necessary. Administer oxygen by non-rebreather mask at 10 to 15 l/min. A low-stimulus environment must be maintained.

## **Section 5 – Fire Fighting Measures**

Vapor Pressure (mmHg): 149.262

Upper Explosive Limit (%): 7.9

Specific Gravity (water=1): 0.723

Lower Explosive Limit (%): 1.4

#### **EXTINGUISHING MEDIA**

Foam. Dry chemical powder. BCF (where regulations permit). Carbon dioxide.

#### **FIRE FIGHTING**

Alert Fire Brigade and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or water course. When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 500 metres in all directions.

#### **GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**

Liquid and vapour are highly flammable. Severe fire hazard when exposed to heat, flame and/or oxidisers. Vapour may travel a considerable distance to source of ignition. Heating may cause expansion or decomposition leading to violent rupture of containers. Combustion products include carbon dioxide (CO<sub>2</sub>), other pyrolysis products typical of burning organic material. **WARNING** Long standing in contact with air and light may result in the formation of potentially explosive peroxides.

#### **FIRE INCOMPATIBILITY**

Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result.

## **Section 6 – Accidental Release Measures**

#### **MINOR SPILLS**

Remove all ignition sources. Clean up all spills immediately. Avoid breathing vapours and contact with skin and eyes. Control personal contact by using protective equipment.

#### **MAJOR SPILLS**

Clear area of personnel and move upwind. Alert Fire Brigade and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves.

## Section 7 – Handling and Storage

### PROCEDURE FOR HANDLING

Containers, even those that have been emptied, may contain explosive vapours. Do NOT cut, drill, grind, weld or perform similar operations on or near containers. The tendency of many ethers to form explosive peroxides is well documented. Ethers lacking non-methyl hydrogen atoms adjacent to the ether link are thought to be relatively safe DO NOT concentrate by evaporation, or evaporate extracts to dryness, as residues may contain explosive peroxides with DETONATION potential. Any static discharge is also a source of hazard. Before any distillation process remove trace peroxides by shaking with excess 5% aqueous ferrous sulfate solution or by percolation through a column of activated alumina. Distillation results in uninhibited ether distillate with considerably increased hazard because of risk of peroxide formation on storage. DO NOT allow clothing wet with material to stay in contact with skin The substance forms explosive levels of peroxides without concentration by evaporation or distillation. Purchases of peroxidisable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidised. A responsible person should maintain an inventory of peroxidisable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation. An expiration date should be determined. The chemical should either be treated to remove peroxides or disposed of before this date. The person or laboratory receiving the chemical should record a receipt date on the bottle. The individual opening the container should add an opening date. Avoid all personal contact, including inhalation. Wear protective clothing when risk of exposure occurs. Use in a well-ventilated area. Prevent concentration in hollows and sumps.

### RECOMMENDED STORAGE METHODS

Packing as supplied by manufacturer. Plastic containers may only be used if approved for flammable liquid. Check that containers are clearly labelled and free from leaks. For low viscosity materials (i) Drums and jerry cans must be of the non-removable head type. (ii) Where a can is to be used as an inner package, the can must have a screwed enclosure. For materials with a viscosity of at least 2680 cSt. (23 deg. C) For manufactured product having a viscosity of at least 250 cSt. (23 deg. C) Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (25 deg. C)

### STORAGE REQUIREMENTS

Easily peroxidisable. Products formed as a result of peroxidation are not only safety hazards but may chemically alter the chemical behavior of the parent compound. Should have a warning label affixed bearing the date of receipt in the laboratory and the date on which the label was first opened. Store-room items should have the label affixed by the Store-room whilst for nonstoreroom items or materials synthesised in the laboratory, an individual chemist should be responsible for warning labels. **WARNING** This product may form peroxides to a hazardous level simply on storage and should be evaluated every THREE months after opening, redated if safe or else discarded. The oxidation of iodide to iodine or the conversion of colourless ferrothiocyanate to red ferrithiocyanate by peroxides are simple and convenient tests for most peroxides. Rotate all stock to prevent ageing. Use on FIFO (First In-First Out) basis. Store in original containers in approved flame-proof area. No smoking, naked lights, heat or ignition sources. DO NOT store in pits, depressions, basements or areas where vapours may be trapped. Keep containers securely sealed.

## Section 8 – Exposure Controls/Personal Protection

### RESPIRATOR

Type AX Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

### EYE

Safety glasses with side shields. Chemical goggles. 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], [AS/NZS 1336 or national equivalent]

#### HANDS/FEET

Wear chemical protective gloves, eg. PVC. Wear safety footwear or safety gumboots, eg. Rubber. Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include frequency and duration of contact, chemical resistance of glove material, glove thickness and dexterity

#### OTHER

Overalls. PVC Apron. PVC protective suit may be required if exposure severe. Eyewash unit. Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity. For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

#### ENGINEERING CONTROLS

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

## Section 9 – Physical and Chemical Properties

### PHYSICAL PROPERTIES

Liquid. Does not mix with water. Floats on water.

State	Liquid	Molecular	102.17
Melting Range	-123	Viscosity	Not available
Boiling Range	154	Solubility in water (g/L)	Partly miscible
Flash Point	Oto- 28	pH (1% solution)	Not applicable
Decomposition Temp	Not available	pH (as supplied)	Not applicable
Autoignition Temp	829	Vapor Pressure (mmHg)	149.262
Upper Explosive Limit	7.9	Specific Gravity (water=1)	0.723
Lower Explosive Limit	1.4	Relative Vapor Density (air=1)	3.52
Volatile component	100	Evaporation Rate	Fast
Diisopropyl ether			



Log Kow (prager 1995)		1.56	
Log know (Sangster 1997)		1.52	

#### APPEARANCE

Volatile highly flammable liquid with an ethereal odor. Refractive index 1.368 Slightly soluble in water = 0.2% Mixes with most organic solvents.

## Section 10 – Chemical Stability

#### CONDITIONS CONTRIBUTING TO INSTABILITY

Presence of incompatible materials. Product is considered stable. Hazardous polymerisation will not occur.

#### STORAGE INCOMPATIBILITY

Diisopropyl ether is exceptionally vulnerable to the formation of unstable peroxide peroxides that precipitate as dry crystalline material and may detonate with heat, shock, sunlight or friction reacts violently with strong oxidisers, propionyl chloride, strong acids, chlorosulfonic acid, nitric acid attacks some plastics, rubber and coatings may generate electrostatic charges due to low conductivity Ethers may react violently with strong oxidising agents and acids. Ethers are generally stable to water under neutral conditions and ambient temperatures. The ether function is hydrolysed by heating in the presence of halogen acids, particularly hydrogen iodide The tendency of many ethers to form explosive peroxides is well documented. Ethers lacking non-methyl hydrogen atoms adjacent to the ether link are thought to be relatively safe. When solvents have been freed from peroxides (by percolation through a column of activated alumina for example), the absorbed peroxides must promptly be desorbed by treatment with the polar solvents methanol or water, which should be discarded safely. Avoid strong acids, acid chlorides, acid anhydrides and chloroformates.

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

## Section 11 – Toxicological Information

di-iso-propyl ether

#### TOXICITY AND IRRITATION

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

#### DI-ISO-PROPYL ETHER

for diisopropyl ether Available data shows DIPE to be or a low order of acute oral, dermal, and inhalation toxicity with LD50 values in excess of 2000 mg/kg and an inhalation LC50> 20 mg/kg. High concentrations of DIPE cause CNS depression which is readily reversible on cessation of exposure. The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

#### ALLYL ETHYL ETHER

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. No significant acute toxicological data identified in literature search.

#### CARCINOGEN

di-iso-propyl ether: US - Rhode Island Hazardous Substance List: IARC

## Section 12 – Ecological Information

Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships) NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation, B1=Acute aquatic toxicity LC/EC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg), C2=Acute mammalian dermal toxicity LD50 (mg/kg), C3=Acute mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion, D2=Eye irritation & corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference with coastal amenities, For column A2: R=Readily biodegradable, NR=Not readily biodegradable. For column D3: C=Carcinogen, M=Mutagenic, R=Reprotoxic, S=Sensitising, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lung injury, N=Neurotoxic, I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Floater, S=Sinking substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships)

## Section 13 – Disposal Considerations

### US EPA Waste Number & Descriptions

General Product Information Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

### Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations. # 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. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. 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 or process equipment to enter drains. It may be necessary to collect all wash water for treatment before disposal. In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. Where in doubt contact the responsible authority. Recycle wherever possible. Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified. Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material). Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

## Section 14 – Transport Information

### DOT:

Symbols: None

Identification Numbers: UN1159

Label Codes: 3

Packaging Exceptions: 150

Packaging Exceptions: 150

Quantity Limitations (Cargo aircraft only): 60 L

Vessel Stowage (Other) : 40

Hazardous materials descriptions and proper shipping names:

Diisopropyl ether

Air Transport IATA

ICAO/IATA Class: 3

UN/ID Number: 1159  
Special provisions: None  
Packing Instructions: 364  
Passenger and Cargo  
Packing Instructions: 353  
Passenger and Cargo Limited Quantity  
Packing Instructions: Y341  
Shipping Name: DIISOPROPYL ETHER

## Section 15 – Regulatory Information

ddi-iso-propyl ether (CAS: 108-20-3) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Industrial Hazardous Substances", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "US - Alaska Limits for Air Contaminants", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Permissible exposure limits of air contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA High Production Volume Program Chemical List", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

Regulations for ingredients

allyl ethyl ether (CAS: 557-31-3) is found on the following regulatory lists;

"Canada Ingredient Disclosure List (SOR/88-64)", "Canada Non-Domestic Substances List (NDSL)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "US - New Jersey Right to Know Hazardous Substances", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

## Section 16 : Additional Information

### LIMITED EVIDENCE

Inhalation, skin contact and/or ingestion may produce health damage\*. ! Cumulative effects may result following exposure\*. ! May produce discomfort of the eyes, respiratory tract and skin\*. \* (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances



Substance	CAS	Suggested codes
allyl ethyl ether	557- 31- 3	N; R51/53

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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](http://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.

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