

# Dihydrocapsaicin

sc-202578



The Power to Question

## Material Safety Data Sheet

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

Dihydrocapsaicin

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### 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

C18-H29-N-O3, "nonamide, 8-methyl-N-vanillyl-", "6, 7-dihydrocapsaicin", "nonanamide, N-((hydroxy-3-methoxyphenyl)methyl)-8-methyl-", "capsicum/ chili/ pepper extract"

## Section 2 - HAZARDS IDENTIFICATION

### CHEMWATCH HAZARD RATINGS

|               |   | Min | Max                 |
|---------------|---|-----|---------------------|
| Flammability: | 1 |     |                     |
| Toxicity:     | 3 |     |                     |
| Body Contact: | 2 |     | Min/Nil=0<br>Low=1  |
| Reactivity:   | 1 |     | Moderate=2          |
| Chronic:      | 2 |     | High=3<br>Extreme=4 |

### CANADIAN WHMIS SYMBOLS



## EMERGENCY OVERVIEW

### RISK

Toxic if swallowed.

May cause SENSITISATION by inhalation and skin contact.

Irritating to eyes, respiratory system and skin.

Inhalation may produce serious health damage\*.

Cumulative effects may result following exposure\*.

Exposure may produce irreversible effects\*.

\*(limited evidence).

## 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.

■ Mucous membranes throughout the gastrointestinal tract from mouth to anus may be temporarily irritated by ingestion of capsaicin. In addition to irritation, diarrhea and vomiting may occur

Capsaicinoids may produce severe gastritis and diarrhoea. Intragastric infusion of powdered red chillies (0.8 and 1.6 g per hour) caused a rapid and marked increase in the DNA content of the gastric aspirate, indicating exfoliation of the epithelial cells from the gastric mucosa. [Desai et al, Gut, 1973, 14, 974].

#### EYE

■ There is evidence that material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Severe inflammation may be expected with pain. There may be damage to the cornea. Unless treatment is prompt and adequate there may be permanent loss of vision. Conjunctivitis can occur following repeated exposure.

#### SKIN

■ This material can cause inflammation of the skin on contact in some persons.

■ The material may accentuate any pre-existing dermatitis condition.

■ Researchers applied 0.8 g of gel containing 0.075% of capsaicin to the skin of six human volunteers for 8 hours of exposure. They then calculated the average absorbed dose as 22.65 ug/cm<sup>2</sup> with a standard deviation of 3.73 ug/cm<sup>2</sup>. Topical application of pure capsaicin to the skin of mice resulted in peak plasma concentrations occurring 4 to 12 hours later, and capsaicin was detectable in the blood 24 hours after dosing. Doses of 5.12 mg/mouse/week led to maximum plasma concentrations of 51.5 ng/ml in male and 84.8 ng/ml in female mice

Capsaicin caused erythema and burning, but not vesication when applied to the skin [Smith et al, J. Invest. Derm., 1970, 54,170]

Administration may cause intense pain in humans and experimental animals. Prolonged treatment causes insensitivity to painful stimuli. In new-born rats it induces selective degeneration of certain primary sensory neurones which mediate chemogenic pain. [Merck Index].

■ 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.

■ Inhalation of dusts, generated by the material during the course of normal handling, may produce serious damage to the health of the individual.

■ Capsaicin temporarily causes bronchoconstriction, coughing, nausea, and incoordination in the upper body in humans following inhalation. Capsaicin administered in a nasal spray resulted in human volunteers experiencing greatly increased nasal discharge and lacrimation, and burning sensation.

■ 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.

If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

■ The material is a sternutator i.e. may produce violent sneezing.

### CHRONIC HEALTH EFFECTS

■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

Inhaling this product is more likely to cause a sensitisation reaction in some persons compared to the general population.

Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.

Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Chronic feeding studies in rodents consistently demonstrated weight loss when animals were either dosed via gavage or when the capsaicin was mixed with the food. However, another feeding study showed no such effects using ground red pepper *Capsicum annuum*

at up to 10% of the total diet in mice.

Different diets affected the toxic effects of capsaicin on the liver and spleen in rabbits, such that effects were greatest in animals fed the high-fat diets. In contrast, animals fed high protein, high carbohydrate diets showed no effects relative to controls. Test animals were given 5 g/kg of "red pepper" daily for one year.

Researchers applied pure capsaicin topically to the backs of mice once weekly for 26 weeks. Doses of 0.64, 1.28, and 2.56 mg/mouse/week resulted in skin abnormalities including inflammation, epidermal crusts, epidermis thickening, and ulcerations. Other signs included gross lesions in the stomach, salivary glands, and oral cavity.

Capsaicin applied to the hind-paws of rats twice daily for 10 weeks led to increased pain sensitivity in the animals exposed to the highest dose (0.75% capsaicin) although this sensitivity decreased with time. Rats treated with a lower dose (0.075% capsaicin) demonstrated reduced function in certain cells known as C fibers following prolonged dosing, but this impairment disappeared after treatment stopped.

Chronic exposure to capsaicin in a factory setting resulted in cough thresholds that were related to the extent of exposure on the job. Workers exposed to capsaicin demonstrated a bimodal cough threshold response that was not observed in unexposed workers, who showed a unimodal response. Some exposed workers were much more sensitive to capsaicin than other exposed workers

A condition known as "Hunan hand", which is a form of contact dermatitis, has been noted in workers handling peppers.

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. Prime symptom is breathlessness; lung shadows show on X-ray.

### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

| NAME             | CAS RN     | %   |
|------------------|------------|-----|
| dihydrocapsaicin | 19408-84-5 | >98 |

### 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.
- Although induction of vomiting may be recommended (IN CONSCIOUS PERSONS ONLY), such a first aid measure is dissuaded due to the risk of aspiration of stomach contents. (i) It is better to take the patient to a doctor who can decide on the necessity and method of emptying the stomach. (ii) Special circumstances may however exist; these include non- availability of charcoal and the ready availability of the doctor.

NOTE: If vomiting is induced, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear protective gloves when inducing vomiting.

- REFER FOR MEDICAL ATTENTION WITHOUT DELAY.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS. (ICSC20305/20307)

#### 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.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

#### SKIN

In case of skin contact (with capsaicinoids), bathe or immerse the irritated area in vinegar (5% acetic acid). Immersion should be continued as long as irritation is felt upon drying the affected area. several hours of immersion may be required in severe cases. An alternative treatment involves immersion of the irritated area in vegetable oil. Studies indicate that vegetable oil immersion provides better long-term relief than cold water. [New England J. Med. 306, 178, 1982 & Vet. and Human Tox., 28, 486, 1986 - quoted by Sigma/Aldrich].

#### 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.
- Transport to hospital, or doctor, without delay.

## NOTES TO PHYSICIAN

- Treat symptomatically.

Treatment regime for capsaicin may be useful:

Management is entirely supportive and involves cleansing of the effected area with water. Cases of aspiration may require bronchoscopy and pulmonary lavage. Immersion of irritated skin areas in vinegar (5% acetic acid) may provide relief even if initiated 30 minutes or longer after exposure. Several hours of bathing may be required in severe cases.

Comparison of cold water and vegetable oil immersion indicated that vegetable oil provided better long-term relief from green chili (*C. annum*) than cold water. [Ellenhorn & Barceloux, Medical Toxicology.

for poisons (where specific treatment regime is absent):

### 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.
- Monitor and treat, where necessary, for pulmonary oedema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures .
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

### ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

## Section 5 - FIRE FIGHTING MEASURES

|                             |               |
|-----------------------------|---------------|
| Vapour Pressure (mmHG):     | Not available |
| Upper Explosive Limit (%):  | Not available |
| Specific Gravity (water=1): | Not available |
| Lower Explosive Limit (%):  | Not available |

### EXTINGUISHING MEDIA

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

### FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

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; it is estimated that most organic dusts are combustible (circa 70%) - according to the circumstances under which the combustion process occurs, such materials may cause fires and / or dust explosions.
- Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions).

- 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 (420 micron or less) may burn rapidly and fiercely if ignited - particles exceeding this limit will generally not form flammable dust clouds.; once initiated, however, larger particles up to 1400 microns diameter will contribute to the propagation of an explosion.
- In the same way as gases and vapours, dusts in the form of a cloud are only ignitable over a range of concentrations; in principle, the concepts of lower explosive limit (LEL) and upper explosive limit (UEL).are applicable to dust clouds but only the LEL is of practical use; - this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the "Minimum Explosible Concentration", MEC)
- When processed with flammable liquids/vapors/mists,ignitable (hybrid) mixtures may be formed with combustible dusts. Ignitable mixtures will increase the rate of explosion pressure rise and the Minimum Ignition Energy (the minimum amount of energy required to ignite dust clouds - MIE) will be lower than the pure dust in air mixture. The Lower Explosive Limit (LEL) of the vapour/dust mixture will be lower than the individual LELs for the vapors/mists or dusts
- A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people.
- Usually the initial or primary explosion takes place in a confined space such as plant or machinery, and can be of sufficient force to damage or rupture the plant. If the shock wave from the primary explosion enters the surrounding area, it will disturb any settled dust layers, forming a second dust cloud, and often initiate a much larger secondary explosion. All large scale explosions have resulted from chain reactions of this type.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.
- All movable parts coming in contact with this material should have a speed of less than 1-meter/sec
- A sudden release of statically charged materials from storage or process equipment, particularly at elevated temperatures and/ or pressure, may result in ignition especially in the absence of an apparent ignition source
- One important effect of the particulate nature of powders is that the surface area and surface structure (and often moisture content) can vary widely from sample to sample, depending of how the powder was manufactured and handled; this means that it is virtually impossible to use flammability data published in the literature for dusts (in contrast to that published for gases and vapours).
- Autoignition temperatures are often quoted for dust clouds (minimum ignition temperature (MIT)) and dust layers (layer ignition temperature (LIT)); LIT generally falls as the thickness of the layer increases.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

#### **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**

- 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.

Wipe area with a slurry of diatomaceous earth and ethanol.

### **MAJOR SPILLS**

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Neutralise/decontaminate residue (see Section 13 for specific agent).
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

Wipe area with a slurry of diatomaceous earth and ethanol.

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

- 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.
  - DO NOT enter confined spaces until atmosphere has been checked.
  - DO NOT allow material to contact humans, exposed food or food utensils.
  - Avoid contact with incompatible materials.
  - When handling, DO NOT eat, drink or smoke.
  - Keep containers securely sealed when not in use.
  - Avoid physical damage to containers.
  - Always wash hands with soap and water after handling.
  - Work clothes should be laundered separately. Launder contaminated clothing before re-use.
  - Use good occupational work practice.
  - Observe manufacturer's storing and handling recommendations.
  - Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
  - Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions)
  - Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame.
  - Establish good housekeeping practices.
  - Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds.
  - Use continuous suction at points of dust generation to capture and minimise the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimise the probability of a "secondary" explosion. According to NFPA Standard 654, dust layers 1/32 in.(0.8 mm) thick can be sufficient to warrant immediate cleaning of the area.
  - Do not use air hoses for cleaning.
  - Minimise dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used.
  - Control sources of static electricity. Dusts or their packages may accumulate static charges, and static discharge can be a source of ignition.
  - Solids handling systems must be designed in accordance with applicable standards (e.g. NFPA including 654 and 77) and other national guidance.
  - Do not empty directly into flammable solvents or in the presence of flammable vapors.
  - The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges.
- 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 is suitable for laboratory quantities
- Lined metal can, lined metal pail/ can.
- Plastic pail.
- Polyliner drum.
- Packing as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

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.

For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):

- Removable head packaging;
  - Cans with friction closures and
  - low pressure tubes and cartridges
- may be used.

-

Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages \*.

-

In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage \*.

-

\* unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity

criteria, must be hermetically sealed.

### STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.
- Store at 4 °C.

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

The following materials had no OELs on our records

- dihydrocapsaicin: CAS:19408-84-5

### PERSONAL PROTECTION



### RESPIRATOR

- Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

### EYE

- Chemical protective goggles with full seal
- Shielded mask (gas-type)
- 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

NOTE:

- The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

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

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).

- 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, AS/NZS 2161.10.1 or national equivalent) 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, AS/NZS 2161.10.1 or national equivalent) 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, latex/ nitrile). Employees allergic to latex gloves should use nitrile gloves in preference.
- Double gloving should be considered.
- PVC gloves.
- Change gloves frequently and when contaminated, punctured or torn.
- Wash hands immediately after removing gloves.
- Protective shoe covers. [AS/NZS 2210]
- Head covering.

## 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

■ For potent pharmacological agents:

### Powders

To prevent contamination and overexposure, no open handling of powder should be allowed.

- Powder handling operations are to be done in a powders weighing hood, a glove box, or other equivalent ventilated containment system.
- In situations where these ventilated containment hoods have not been installed, a non-ventilated enclosed containment hood should be used.
- Pending changes resulting from additional air monitoring data, up to 300 mg can be handled outside of an enclosure provided that no grinding, crushing or other dust-generating process occurs.
- An air-purifying respirator should be worn by all personnel in the immediate area in cases where non-ventilated containment is used, where significant amounts of material (e.g., more than 2 grams) are used, or where the material may become airborne (as through grinding, etc.).
- Powder should be put into solution or a closed or covered container after handling.
- If using a ventilated enclosure that has not been validated, wear a half-mask respirator equipped with HEPA cartridges until the enclosure is validated for use.

### Solutions Handling:

- Solutions can be handled outside a containment system or without local exhaust ventilation during procedures with no potential for aerosolisation. If the procedures have a potential for aerosolisation, an air-purifying respirator is to be worn by all personnel in the immediate area.
- Solutions used for procedures where aerosolisation may occur (e.g., vortexing, pumping) are to be handled within a containment system or with local exhaust ventilation.
- In situations where this is not feasible (may include animal dosing), an air-purifying respirator is to be worn by all personnel in the immediate area. If using a ventilated enclosure that has not been validated, wear a half-mask respirator equipped with HEPA cartridges until the enclosure is validated for use.
- Ensure gloves are protective against solvents in use.

Unless written procedures, specific to the workplace are available, the following is intended as a guide:

- For Laboratory-scale handling of Substances assessed to be toxic by inhalation. Quantities of up to 25 grams may be handled in Class II biological safety cabinets\*; Quantities of 25 grams to 1 kilogram may be handled in Class II biological safety cabinets\* or equivalent containment systems; Quantities exceeding 1 kg may be handled either using specific containment, a hood or Class II biological safety cabinet\*.
- HEPA terminated local exhaust ventilation should be considered at point of generation of dust, fumes or vapours.
- The need for respiratory protection should also be assessed where incidental or accidental exposure is anticipated. Dependent on levels of contamination, PAPR, full face air purifying devices with P2 or P3 filters or air supplied respirators should be evaluated. When handling: Quantities of up to 25 grams, an approved respirator with HEPA filters or cartridges should be considered; Quantities of 25 grams to 1 kilogram, a half-face negative pressure, full negative pressure, or powered helmet-type air purifying respirator should be considered. Quantities in excess of 1 kilogram, a full face negative pressure, helmet-type air purifying, or supplied air respirator should be considered.

Written procedures, specific to a particular work-place, may replace these recommendations

\* For Class II Biological Safety Cabinets, Types B2 or B3 should be considered. Where only Class I, open fronted Cabinets are available, glove panels may be added, Laminar flow cabinets do not provide sufficient protection when handling these materials unless especially designed to do so.

### Pilot Plant and Production

- Wear appropriate gloves; lab coat, nylon coveralls or disposable Tyvek suit; safety glasses, safety shoes, and disposable booties. Use good manufacturing practices (i.e., cGMPs).
- Protective garment (coveralls, Tyvek, lab coat) is not to be worn outside the work area.
- Clean/dirty/decontamination areas are to be established.
- Negative/positive air pressure relationships and buffer zones required (i.e., ante-room/degowning room/airlock).
- Area access is to be restricted.
- High-energy operations such as milling, particle sizing, spraying or fluidising should be done within an approved emission control or containment system.
- Develop cleaning procedures and techniques that limit potential exposure

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

## PHYSICAL PROPERTIES

Solid.

Does not mix with water.

|                           |               |                                 |                 |
|---------------------------|---------------|---------------------------------|-----------------|
| State                     | Divided solid | Molecular Weight                | 307.4           |
| Melting Range (°F)        | 147- 149      | Viscosity                       | Not Applicable  |
| Boiling Range (°F)        | Not available | Solubility in water (g/L)       | Partly miscible |
| Flash Point (°F)          | Not available | pH (1% solution)                | Not applicable  |
| Decomposition Temp (°F)   | Not Available | pH (as supplied)                | Not applicable  |
| Autoignition Temp (°F)    | Not available | Vapour Pressure (mmHG)          | Not available   |
| Upper Explosive Limit (%) | Not available | Specific Gravity (water=1)      | Not available   |
| Lower Explosive Limit (%) | Not available | Relative Vapour Density (air=1) | >1              |
| Volatile Component (%vol) | Not available | Evaporation Rate                | Not available   |

## APPEARANCE

Powder; does not mix with water. Soluble in chloroform.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

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

### STORAGE INCOMPATIBILITY

- Avoid reaction with oxidising agents

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

## Section 11 - TOXICOLOGICAL INFORMATION

dihydrocapsaicin

### TOXICITY AND IRRITATION

#### DIHYDROCAPSAICIN:

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

■ For capsaicin (as a congener of the capsaicinoids)

Acute toxicity: Capsaicin can cause skin irritation. Little absorption occurs across the skin. Oedema following dermal exposure in mouse ears in several studies peaked within 1 hour of application, although subsequent applications produced less of a response. Capsaicin can severely irritate the eyes, and was found to cause corneal lesions in rats and mice

Airway resistance increased following inhalation of capsaicin in both mild asthmatics and non-asthmatic people at doses that are below those eliciting the cough response

People suffering from asthma and other respiratory diseases may be more sensitive to capsaicin than other individuals.

A more recent study suggested that people with sensory hyper-reactivity have enhanced sensitivity to capsaicin. This was associated with increased levels of serum nerve growth factors in nasal lavage fluid.

Capsaicin produces its repellent effect when it contacts either eye or respiratory tract mucus membranes. In animals signs of acute exposure include coughing, inability to vocalise, and temporary blindness.

Mice and rats dosed orally with 96 to 200 mg/kg capsaicin demonstrated immediate salivation, convulsions, reddening of the skin, and dyspnea, or labored breathing. Animals either died within 26 minutes of dosing, or showed no further symptoms 24 hours after dosing.

Capsaicin fed to rats was rapidly absorbed from the stomach, with 85% of a 3 mg dose absorbed within 3 hours

Inhalation exposure to capsaicinoids in pepper sprays damaged rat bronchial, tracheal, nasal, and alveolar cells, causing acute inflammation.

Carcinogenicity: Several researchers reviewed evidence that capsaicin is carcinogenic in animals and found that the evidence was inconclusive.

Researchers have demonstrated that capsaicin is mutagenic and genotoxic in some studies using bacterial and rodent models but not in others.

Researchers applied pure trans-capsaicin to the dorsal skin of mice weekly for 26 weeks at rates of 0.64, 1.28, or 2.56 mg/ mouse/week. No increase of neoplastic skin lesions or other abnormal skin growth was noted over control mice. A lifetime diet containing 0.03% capsaicin fed to mice led to slight increases in benign tumors of the caecum

Capsaicinoids fed to male mice at 1% of the diet for 79 weeks resulted in kidney lesions in male mice. However, female mice fed a diet of 0.25% capsaicinoids for 83 weeks developed fewer tumors compared with controls. Hepatocellular neoplasms, or abnormal growths

in the liver, also occurred less often in male and female mice fed greater concentrations of capsaicinoids in their diet.

Genetic toxicity: Capsaicin has demonstrated mutagenic effects in some research but not in other studies. Impurities in the extract may be responsible for mutagenic effects because the studies that failed to demonstrate mutagenic effects used pure capsaicin.

People consuming 90-250 mg of capsaicin per day (in the form of jalapeno peppers) had a greater risk of gastric cancer compared with people who consumed less capsaicin (0-29.9 mg capsaicin per day).

Capsaicin exerted an anti-proliferative effect on human prostate cancer cells in vitro in a dose-dependent manner, completely halting proliferation at  $5 \times 10^{-4}$  mol/L.

Distribution: Rats injected intravenously accumulated capsaicin primarily in the brain and spinal cord 3 minutes after dosing, with lower levels found in the liver and blood. Ten minutes after dosing, the greatest concentrations remained in the spinal cord.

When the capsaicin was injected subcutaneously, rat blood concentrations peaked 5 hours following dosing, and brain and spinal cord tissue concentrations were somewhat lower. Kidneys contained the greatest concentrations and liver concentrations were low. Researchers detected capsaicin in all tissues 10 minutes following dosing but residues were undetectable in any tissues 17 hours later. The researchers concluded that the low concentrations in the liver were due to metabolic breakdown of the capsaicin.

Metabolism: Metabolism occurs primarily by the liver in the rat. Metabolism of capsaicin by P450 enzymes may follow a number of pathways and produce a variety of metabolites, some of which may be associated with increased toxicity. Research using human, rat, mouse, goat, and rabbit liver and lung microsomes demonstrated that metabolism rates were much greater in liver microsomes compared with lung microsomes for each species. Although the same metabolites were produced, the relative amounts of each metabolite were species-dependent.

Excretion: Less than 10% of an oral dose of capsaicin given to rats was excreted unchanged 48 hours after dosing.

Capsaicin is representative of the capsaicinoids although each may differ in potency. Capsaicin is the main capsaicinoid in chili peppers, followed by dihydrocapsaicin. These two compounds are also about twice as potent to the taste and nerves as the minor capsaicinoids nordihydrocapsaicin, homodihydrocapsaicin, and homocapsaicin. The pharmacological action and toxicology of capsaicin has been well developed in both human and animal studies. Capsaicin is highly toxic by all routes of administration except rectal and dermal. Intravenous doses cause convulsions within 5 secs and death within 2 to 5 minutes. Toxic signs include excitement, convulsions with limbs extended, dyspnea and death due to respiratory failure. Capsaicin's acute toxicity in mice falls between that of nicotine and strychnine, two well known potent poisons. The toxicity of the oleoresin which contains capsaicin, in female mice, is around 4 times more toxic than capsaicin alone. Guinea pigs appear to more susceptible than rats and mice whilst hamsters and rabbits were less vulnerable to the toxic effects both capsaicin.

Inhalation of capsaicin is consistent with the induction of the Kratshmer reflex, which is apnoea, bradycardia, and a biphasic fall and rise in aortic blood pressure. Exposure to capsaicin cause bronchoconstriction in animals and humans, the release of substance P, a neuropeptide, from sensory nerve terminals and mucosal oedema. The pulmonary effects appear to be species dependent. In guinea pigs, intravenous and intra-arterial administration causes bronchoconstriction. The bronchoconstriction in dog and cat after intravenous capsaicin depends on vagal cholinergic reflex, as does bronchoconstriction in the cat after aerosol exposure. In guinea pig, bronchoconstriction following aerosol exposure suggest both a vagal-cholinergic and non-cholinergic local axon reflex.

The burning and painful sensations associated with capsaicin result from its chemical interaction with sensory neurons. Capsaicin triggers the release of the neuropeptide P from the sensory nerve fibers of the C type. In mammals, capsaicin (a member of the vanilloid family) binds to a receptor called the vanilloid receptor subtype 1 (TRPV1). TRPV1 is an ion channel-type receptor. TRPV1, which can also be stimulated with heat and physical abrasion, permits cations to pass through the cell membrane and into the cell when activated. The resulting depolarisation of the neuron stimulates it to signal the brain. By binding to the TRPV1 receptor, the capsaicin molecule produces the same sensation that excessive heat or abrasive damage would cause, explaining why the spiciness of capsaicin is described as a burning sensation. Research has shown that the capsaicinoids are all physiologically (virtually) identical, with very few differences other than binding efficacy to TRPV1. Upon binding to TRPV1 receptor capsaicin releases sensory neuropeptides that trigger a neurogenic inflammatory response.

No significant acute toxicological data identified in literature search.

NOTE: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

Hamster lung cell mutagen.

## Section 12 - ECOLOGICAL INFORMATION

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

### Ecotoxicity

| Ingredient       | Persistence:<br>Water/Soil | Persistence: Air  | Bioaccumulation | Mobility |
|------------------|----------------------------|-------------------|-----------------|----------|
| dihydrocapsaicin | HIGH                       | No Data Available | LOW             | LOW      |

### GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

| Name / EHS<br>Cas No<br>/<br>RTECS<br>No | TRN      | A1a      | A1b | A1 | A2  | B1 | B2 | C1  | C2  | C3  | D1  | D2  | D3 | E1 | E2 | E3 |
|------------------------------------------|----------|----------|-----|----|-----|----|----|-----|-----|-----|-----|-----|----|----|----|----|
| Fatty acids,<br>linear                   | 226<br>1 | 278<br>0 | 5   | 0  | (R) | 0  | NI | (0) | (0) | (1) | (1) | (1) |    |    | NI | 2  |

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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/EC1C50 (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

### Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

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. In most instances the supplier of the material should be consulted.

- 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 - TRANSPORTATION INFORMATION

### DOT:

|                         |        |                                                   |                         |
|-------------------------|--------|---------------------------------------------------|-------------------------|
| Symbols:                | None   | Hazard class or Division:                         | 6.1                     |
| Identification Numbers: | UN1544 | PG:                                               | II                      |
| Label Codes:            | 6.1    | Special provisions:                               | IB8, IP2, IP4, T3, TP33 |
| Packaging: Exceptions:  | 153    | Packaging: Non-bulk:                              | 212                     |
| Packaging: Exceptions:  | 153    | Quantity limitations:<br>Passenger aircraft/rail: | 25 kg                   |

Quantity Limitations: Cargo 100 kg  
aircraft only:

Vessel stowage: Location: A

Vessel stowage: Other: None

Hazardous materials descriptions and proper shipping names:  
Alkaloids, solid, n.o.s. or Alkaloid salts, solid, n.o.s. poisonous

**Air Transport IATA:**

|                     |      |                    |      |
|---------------------|------|--------------------|------|
| ICAO/IATA Class:    | 6.1  | ICAO/IATA Subrisk: | None |
| UN/ID Number:       | 1544 | Packing Group:     | II   |
| Special provisions: | A3   |                    |      |

**Cargo Only**

|                       |     |                   |        |
|-----------------------|-----|-------------------|--------|
| Packing Instructions: | 676 | Maximum Qty/Pack: | 100 kg |
|-----------------------|-----|-------------------|--------|

**Passenger and Cargo**

**Passenger and Cargo**

|                       |     |                   |       |
|-----------------------|-----|-------------------|-------|
| Packing Instructions: | 669 | Maximum Qty/Pack: | 25 kg |
|-----------------------|-----|-------------------|-------|

**Passenger and Cargo  
Limited Quantity**

**Passenger and Cargo  
Limited Quantity**

|                       |      |                   |      |
|-----------------------|------|-------------------|------|
| Packing Instructions: | Y644 | Maximum Qty/Pack: | 1 kg |
|-----------------------|------|-------------------|------|

Shipping name:ALKALOIDS, SOLID, N.O.S. or ALKALOID SALTS, SOLID, N.O.S.(contains dihydrocapsaicin)

**Maritime Transport IMDG:**

|             |         |                     |        |
|-------------|---------|---------------------|--------|
| IMDG Class: | 6.1     | IMDG Subrisk:       | None   |
| UN Number:  | 1544    | Packing Group:      | II     |
| EMS Number: | F-A,S-A | Special provisions: | 43 274 |

Limited Quantities: 500 g

Shipping name:ALKALOIDS, SOLID, N.O.S. or ALKALOID SALTS, SOLID, N.O.S.(contains dihydrocapsaicin)

**Section 15 - REGULATORY INFORMATION**



**dihydrocapsaicin (CAS: 19408-84-5) is found on the following regulatory lists;**

"GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO Provisional Categorization of Liquid Substances - List 1: Pure or technically pure products", "OECD List of High Production Volume (HPV) Chemicals", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

**Section 16 - OTHER INFORMATION**

**LIMITED EVIDENCE**

- Inhalation may produce serious health damage\*.
- Cumulative effects may result following exposure\*.
- Exposure may produce irreversible effects\*.

\* (limited evidence).

■ 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. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

■ For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:  
OSHA Standards - 29 CFR:

1910.132 - Personal Protective Equipment - General requirements  
1910.133 - Eye and face protection  
1910.134 - Respiratory Protection  
1910.136 - Occupational foot protection  
1910.138 - Hand Protection  
Eye and face protection - ANSI Z87.1  
Foot protection - ANSI Z41  
Respirators must be NIOSH approved.

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