Chlorhexidine, Dihydrochloride

Material Safety Data Sheet

SC-203886

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Chlorhexidine, Dihydrochloride

STATEMENT OF HAZARDOUS NATURE

NFPA

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

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

SYNONYMS
C22-H30-Cl2-N10.2HCl, “2, 4, 11, 13-tetraazatetrdecanediimide, N, N” -bis(chlorophenyl)-3, 12-”, diimino-, dihydrochloride, “chlorhexidine dihydrochloride”, “chlorhexidinium dichloride”, “dihydrochloride of”; “biguanide, 1, 1’ -hexamethylenebis(5-(p- chlorophenyl))-”, 1-6-bis(5-(p-chlorophenyl)biguanido)hexane, “1, 6-bis(p-chlorophenylbiguanido)hexane”, “1, 6-di(4’-chlorophenyldiguanido)hexane”, “1, 1’ -hexamethylenebis(5-(p-chlorophenyl)biguanide”, Hibitane, disinfectant

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

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

CANADIAN WHMIS SYMBOLS

Flash: 1
Health: 3
Instability: 0

1 of 10
EMERGENCY OVERVIEW

RISK
Harmful if swallowed.
Risk of serious damage to eyes.
May cause SENSITISATION by skin contact.
Irritating to respiratory system and skin.
Very toxic to aquatic organisms.
Cumulative effects may result following exposure*.
Possible respiratory sensitiser*.
* (limited evidence).

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.
■ Biguanides, drugs used in treating type II diabetes mellitus, have been associated with the metabolic condition lactic acidosis which is highly dangerous and often fatal especially if taken with alcohol.
Overexposure may cause fixed dilated pupils and lack of eye reflexes, nausea, vomiting, diarrhoea, loss of appetite and weight, abdominal discomfort, blood in vomit, agitation, confusion, lethargy, spasticity, and coma.
■ At sufficiently high doses the material may be nephrotoxic(i.e.
- At sufficiently high doses the material may be hepatotoxic(i.e.

EYE
■ If applied to the eyes, this material causes severe eye damage.

SKIN
■ This material can cause inflammation of the skin on contact in some persons.
■ The material may accentuate any pre-existing dermatitis condition.
■ Open cuts, abraded or irritated skin should not be exposed to this material.
■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED
■ The material can cause respiratory irritation in some persons.
The body's response to such irritation can cause further lung damage.
■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
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.
■ Not normally a hazard due to non-volatile nature of product.

CHRONIC HEALTH EFFECTS
■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
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.
There is some evidence that inhaling this product is more likely to cause a sensitisation reaction in some persons compared to the general population.
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.
Sensitisation may give severe responses to very low levels of exposure, i.e. hypersensitivity. Sensitised persons should not be allowed to work in situations where exposure may occur.
Hepatotoxic and nephrotoxic in mice and rats. excretion is mainly through the bile and is slow.
Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>chlorhexidine hydrochloride</td>
<td>3697-42-5</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

May decompose to form

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-chloroaniline</td>
<td>106-47-8</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

SWALLOWED
- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- For advice, contact a Poisons Information Centre or a doctor.
- Urgent hospital treatment is likely to be needed.
- 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.

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.

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
- Treat symptomatically.

Suggested treatment regime for biguanide intoxication:
- Establish airway and assist ventilation with positive end expiratory pressure, if required, after endotracheal intubation. Circulatory competence must be maintained - monitor blood pressure carefully.
- Induction of emesis with ipecac may be contraindicated as a result of biguanide-induced gastric mucosal irritation.
- Gastric lavage, following endotracheal intubation may be preferred. Activated charcoal and cathartics placed through the lavage tube may be useful.
- Forcing fluids may be counterproductive and result in fluid overload.
- Should not be used on the brain, meninges or perforated ear drum.

Section 5 - FIRE FIGHTING MEASURES

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

EXTINGUISHING MEDIA
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
Section 6 - ACCIDENTAL RELEASE MEASURES

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

Environmental hazard - contain spillage.

MAJOR SPILLS
Environmental hazard - contain spillage.
Moderate hazard.
- CAUTION: Advise personnel in area.
- Alert Emergency Services and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.

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.

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.
- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry area protected from environmental extremes.
Store away from incompatible materials and foodstuff containers.

### Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

**EXPOSURE CONTROLS**

The following materials had no OELs on our records:

- chlorhexidine hydrochloride: CAS:3697-42-5
- p-chloroaniline: CAS:106-47-8

**PERSONAL PROTECTION**

**RESPIRATOR**

- Type AK-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, 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**

**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

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc

**OTHER**

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.

**ENGINEERING CONTROLS**

**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

Solid.
Does not mix with water.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Divided solid</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>578.37</td>
</tr>
<tr>
<td>Melting Range (°F)</td>
<td>491 (decomp)</td>
</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point (°F)</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition Temp (°F)</td>
<td>491</td>
</tr>
<tr>
<td>Autoignition Temp (°F)</td>
<td>Not available</td>
</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Volatile Component (%vol)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Solubility in water (g/L)</td>
<td>Immiscible</td>
</tr>
<tr>
<td>pH (as supplied)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapour Pressure (mmHG)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>Not available</td>
</tr>
<tr>
<td>Relative Vapour Density (air=1)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

Material Value

P-CHLOROANILINE:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>log Kow (Prager 1995)</td>
<td>1.83</td>
</tr>
</tbody>
</table>

APPEARANCE

Crystalline powder; does not mix with water (1:1700). Bitter taste.

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

chlorhexidine hydrochloride

TOXICITY AND IRRITATION

Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential; the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound.

Animal studies show that chlorhexidine diacetate has mild to moderate toxicity on skin contact, swallowing or inhalation – it was shown to cause liver damage. In repeat eye irritation studies, though, the chemical is severely toxic. It has not been shown to cause mutations, developmental toxicity or birth defects.

CARCINOGEN
Para-Chloroaniline
International Agency for Research on Cancer (IARC) - Agents
Reviewed by the IARC Monographs
Group 2B

P-CHLOROANILINE
US Environmental Defense Scorecard Recognized Carcinogens
Reference(s) P65

p-chloroaniline
US - Maine Chemicals of High Concern List
Carcinogen CA Prop 65

Section 12 - ECOLOGICAL INFORMATION

Very toxic to aquatic organisms.
This material and its container must be disposed of as hazardous waste.
Avoid release to the environment.
Refer to special instructions/ safety data sheets.

Ecotoxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
<th>Bioaccumulation</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-chloroaniline</td>
<td>HIGH</td>
<td>No Data Available</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions
B. Component Waste Numbers
When p-chloroaniline is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number P024 (waste code T).

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 cannot 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:

<table>
<thead>
<tr>
<th>Symbols:</th>
<th>G</th>
<th>Hazard class or Division:</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification Numbers:</td>
<td>UN3077</td>
<td>PG:</td>
<td>III</td>
</tr>
<tr>
<td>Label Codes:</td>
<td>9</td>
<td>Special provisions:</td>
<td>8, 146, 335, B54, IB8, IP3, N20, T1, TP33</td>
</tr>
<tr>
<td>Packaging: Exceptions:</td>
<td>155</td>
<td>Packaging: Non-bulk:</td>
<td>213</td>
</tr>
<tr>
<td>Packaging: Exceptions:</td>
<td>155</td>
<td>Quantity limitations:</td>
<td>No limit</td>
</tr>
<tr>
<td>Quantity Limitations: Cargo</td>
<td>No limit</td>
<td>airport only:</td>
<td></td>
</tr>
<tr>
<td>Vessel stowage: Other:</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hazardous materials descriptions and proper shipping names:
Environmentally hazardous substance, solid, n.o.s

Air Transport IATA:

<table>
<thead>
<tr>
<th>ICAO/IATA Class:</th>
<th>9</th>
<th>ICAO/IATA Subrisk:</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN/ID Number:</td>
<td>3077</td>
<td>Packing Group:</td>
<td>III</td>
</tr>
<tr>
<td>Special provisions:</td>
<td>A97</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cargo Only

<table>
<thead>
<tr>
<th>Packing Instructions:</th>
<th>956</th>
<th>Maximum Qty/Pack:</th>
<th>400 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger and Cargo</td>
<td></td>
<td>Passenger and Cargo</td>
<td></td>
</tr>
<tr>
<td>Packing Instructions:</td>
<td>956</td>
<td>Maximum Qty/Pack:</td>
<td>400 kg</td>
</tr>
<tr>
<td>Passenger and Cargo</td>
<td>Limited Quantity</td>
<td>Passenger and Cargo</td>
<td>Limited Quantity</td>
</tr>
<tr>
<td>Packing Instructions:</td>
<td>Y956</td>
<td>Maximum Qty/Pack:</td>
<td>30 kg G</td>
</tr>
</tbody>
</table>

Shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains chlorhexidine hydrochloride)

Maritime Transport IMDG:

<table>
<thead>
<tr>
<th>IMDG Class:</th>
<th>9</th>
<th>IMDG Subrisk:</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN Number:</td>
<td>3077</td>
<td>Packing Group:</td>
<td>III</td>
</tr>
<tr>
<td>EMS Number:</td>
<td>F-A,S-F</td>
<td>Special provisions:</td>
<td>274 335</td>
</tr>
<tr>
<td>Limited Quantities:</td>
<td>5 kg</td>
<td>Marine Pollutant:</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains chlorhexidine hydrochloride)

Section 15 - REGULATORY INFORMATION

chlorhexidine hydrochloride (CAS: 3697-42-5) is found on the following regulatory lists;
*Canada - Alberta Ambient Air Quality Guidelines*, *Canada - Alberta Ambient Air Quality Objectives*, *Canada - British Columbia
Respirators must be NIOSH approved.

Foot protection - ANSI Z41

Eye and face protection - ANSI Z87.1

1910.138 - Hand Protection

1910.136 - Occupational foot protection

1910.134 - Respiratory Protection

1910.133 - Eye and face protection

OSHA Standards - 29 CFR:

■ For detailed advice on Personal Protective Equipment, refer to the following U.S. regulations and standards:

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS</th>
<th>Suggested codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-chloroaniline (CAS: 106-47-8)</td>
<td>106-47-8</td>
<td>R43 N; R50/53</td>
</tr>
</tbody>
</table>

Regulations for ingredients

p-chloroaniline (CAS: 106-47-8) is found on the following regulatory lists:
