Cytisine

Material Safety Data Sheet

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Cytisine

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Company: Santa Cruz Biotechnology, Inc.
Address: 2145 Delaware Ave
Santa Cruz, CA 95060
Telephone: 800.457.3801 or 831.457.3800
Emergency Tel: CHEMWATCH: From within the US and
Canada: 877-715-9305
Emergency Tel: From outside the US and Canada: +800 2436
2255 (1-800-CHEMCALL) or call +613 9573 3112

PRODUCT USE
Toxic alkaloid in seed of Laburnum anagyroides, Medik and other Leguminosae.

SYNONYMS
C11-H14-N2-O, baptitoxin, baptitoxine, cystisine, cytiton, cytitone, "1, 2, 3, 4, 5, 6-hexahydro-1, 5-methano-8H-pyrido[1, 2-a][1, 5]diazocin-, 8-one, "1, 2, 3, 4, 5, 6-hexahydro-1, 5-methano-8H-pyrido[1, 2-a][1, 5]diazocin-, 8-one, sophorine, ulexine

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW
RISK
Very toxic by inhalation, in contact with skin and if swallowed.
Irritating to eyes, respiratory system and skin.

POTENTIAL HEALTH EFFECTS
ACUTE HEALTH EFFECTS

SWALLOWED
- Severely toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 5 gram may be fatal or may produce serious damage to the health of the individual.
- Adverse effects of cytisine ingestion include nausea and vomiting, dilation of the pupils, tachycardia followed by dizziness, mental confusion, muscular incoordination and weakness and convulsions; respiratory paralysis which may lead to death by asphyxiation.
- Cytisine is similar to nicotine with respect to its structure an pharmacological action. The symptoms of cytisine intoxication are similar to those caused by nicotine, however the central stimulating effects directed to the medulla oblongata are more pronounced. The symptoms begin with an increase in blood pressure as a result of vasoconstriction and tachycardia followed by tonicclonic spasms, unconsciousness and respiratory arrest.
- Nicotine is amongst the most toxic of poisons, acting quickly. The probable lethal dose by ingestion, in man, is about 0.5-1.0 mg/kg. Nicotine is absorbed by the oral mucosa, respiratory tract, gastrointestinal tract (except stomach) and skin.
- Symptoms of poisoning may develop within 15 minutes. Gastrointestinal signs and symptoms occur first and may include
burning of the mouth and throat. Less severe poisonings are characterised by profuse salivation, nausea, vomiting, and occasionally diarrhoea, abdominal pain, dizziness, mental confusion, faintness, convulsions and prostration. Other systemic effects include agitation, headache, auditory and visual disturbances, weakness and incoordination. Serious overdose may produce central nervous system (CNS) symptoms headache, confusion, dizziness, agitation and incoordination. Convulsions and coma may follow. Other cholinergic effects include sweating, lachrymation, increased bronchial secretions, mirosis and mydriasis. Respiratory system effects may include tachypnea, but later, dyspnea, decreased respiratory rate and cyanosis. Respiratory arrest may occur within minutes, and death may result within one hour. Cardiovascular effects include a transient increase in blood pressure followed by hypotension, bradycardia, paroxysmal atrial fibrillation, or cardiac standstill. Exposure may produce transient stimulation and subsequent depression or paralysis of the central nervous system, all peripheral autonomic ganglia and motor end plates in skeletal muscles. Smooth muscle cells are also excited; this action which may explain observed vasodilatation and intestinal movements. Marked tolerance of the alkaloid is acquired by confirmed smokers. In lethal poisonings, postmortem examination often reveals congestion and bloody engorgement (hyperaemia) of the brain, meninges and visceral organs, especially the kidneys. Haemorrhage of the gastrointestinal tract and lungs has also been described. Death is usually rapid (always within one hour and sometimes within five minutes) with the traditional view suggesting paralysis of respiratory muscles.

Stimulation of nicotinic receptors primarily affects the autonomic ganglia, adrenal medulla, and the motor end-plate of striated muscle; nicotinic agonists primarily produce actions affecting the neuromuscular junctions (producing, for example, fasciculations, weakness and paralysis) and muscarinic effects (producing postganglionic stimulation and, as a result, cardiac inhibition, vasodilatation, salivation, lachrymation, bronchoconstriction and gastrointestinal stimulation).

**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

**SKIN**
- This material can cause eye irritation and damage in some persons.
- 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, 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.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

**CHRONIC HEALTH EFFECTS**
- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
- Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
- 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

**HAZARD RATINGS**

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Toxity:</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Body Contact:</td>
<td>4</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>

**NAME**

cydisine

**CAS RN**

485-35-8

**%**

>98

### Section 4 - FIRST AID MEASURES

**SWALLOWED**
- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:
  - For advice, contact a Poisons Information Center or a doctor.
  - If conscious, give water to drink.
  - INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
  - In the meantime, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
  - 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.

**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 Center 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
- If skin or hair contact occurs:
  - Immediately flush body and clothes with large amounts of water, using safety shower if available.
  - Quickly remove all contaminated clothing, including footwear.
  - Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
  - Transport to hospital, or doctor.

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.
  - For nicotine intoxication:
    - Administer 6 to 8 heaped teaspoons of activated charcoal, as a slurry, in water.
    - Because nicotine induces vomiting by stimulating the chemoreceptor trigger zones of the brainstem, it seems inadvisable to administer syrup of ipecac, which acts by the same mechanism.
    - Unless spontaneous emesis is vigorous and productive, gastric lavage with a 0.5% solution of tannic acid, or a 1:5000 solution of potassium permanganate. Use water if these solutions are not immediately available.
    - If nicotine is spilled on skin, wash thoroughly and IMMEDIATELY with diluted vinegar and / or cold running water. (Nicotine salts are less readily absorbed).
    - Administer artificial ventilation and oxygen therapy until spontaneous breathing is adequate or until the heart ceases to beat. Central respiratory stimulants are rarely if ever indicated. Keep airway clear. Profuse salivation may require continuous oral suction.
    - If severe or persistent, convulsions may be controlled with small intravenous doses of barbiturates or diazepam.
    - Most of the visceral manifestations can be controlled by various combinations of autonomic blocking drugs, such as atropine and phenoybenzamine (Dibenzyline). Caraphen (Parpanit) hydrochloride and diethazine (Diparcol) hydrochloride have been recommended in the experimental poisoning but may not be readily available.

- GOSSELIN, SMITH & HODGE: Clinical Toxicology of Commercial Products. 5th Ed.
- Nicotine undergoes a large first-pass effect during which the liver metabolises 80-89%. Smaller amounts are metabolised in the lung and kidney. Nicotine and its metabolites (cotinine and nicotine-1’-N-oxide) are excreted in the urine. At a pH of 5.5 or less, 23% is excreted unchanged. At a pH of 8, only 2% is excreted in the urine. The effect of urinary pH on total clearance is entirely due to changes in renal clearance. Blood cotinine levels, and possibly, saliva cotinine levels, are good measures of passive smoking. Tobacco is less toxic than expected from its nicotine content, among tobacco chewers. Apparently intestinal absorption of nicotine from tobacco is so slow that metabolic inactivation keeps pace with absorption. For ingested poison.

Section 5 - FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</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
- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING
- Alert Emergency Responders 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.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- 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.
- Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), nitrogen oxides (NOx), other pyrolysis products typical of burning organic material.
- May emit poisonous fumes.
FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:
Gloves:
Respirator:
Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Emergency Responders 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 labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled 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.

PROTECTIVE ACTIONS FOR SPILL

From IERG (Canada/Australia)

<table>
<thead>
<tr>
<th>Isolation Distance</th>
<th>Downwind Protection Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 meters</td>
<td>250 meters</td>
</tr>
</tbody>
</table>

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered “small spills”. LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a “one-tonne” compressed gas cylinder.


6 IERG information is derived from CANUTEC - Transport Canada.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

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.
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.
- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled 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 molded 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.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer’s storing and handling recommendations.

**SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS**

![Chemical Compatibility Chart]

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

### Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

#### EXPOSURE CONTROLS

<table>
<thead>
<tr>
<th>Source</th>
<th>Material (Inert or Nuisance)</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>US - Oregon Permissible Exposure Limits (Z3)</td>
<td>cytisine (Inert or Nuisance Dust: (d) Total dust)</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
<td>cytisine (Inert or Nuisance Dust: (d) Respirable fraction)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
<td>cytisine (Inert or Nuisance Dust: (d) Total dust)</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Hawaii Air Contaminant Limits</td>
<td>cytisine (Particulates not otherwise regulated - Total dust)</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Hawaii Air Contaminant Limits</td>
<td>cytisine (Particulates not otherwise regulated - Respirable fraction)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Oregon Permissible Exposure Limits</td>
<td>cytisine (Inert or Nuisance Dust: (d) Total dust)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Oregon Permissible Exposure Limits</td>
<td>cytisine (Inert or Nuisance Dust: (d) Respirable fraction)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Limits (Z3) Dust: (d) Respirable fraction

<table>
<thead>
<tr>
<th>Country/Material</th>
<th>Limit Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants</td>
<td>cytisine (Particulates not otherwise regulated Respirable fraction)</td>
<td>5</td>
</tr>
<tr>
<td>US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants</td>
<td>cytisine (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)</td>
<td>5</td>
</tr>
<tr>
<td>US - Michigan Exposure Limits for Air Contaminants</td>
<td>cytisine (Particulates not otherwise regulated, Respirable dust)</td>
<td>5</td>
</tr>
</tbody>
</table>

MATERIAL DATA

CYTISINE:

- For nicotine:
  - At the TLV-TWA an 8-hour intake of nicotine received by inhalation is calculated to be 0.07 mg/kg/day based on the metabolism and controlled dosing of human volunteers. Chronic studies using rodents have found a no-observed-adverse-effect level (NOAEL) of 1.14 mg/kg/day.
  - Absorption through intact human skin has produced serious (and even life threatening) intoxication.
  - Airborne particulate or vapor must be kept to levels as low as is practicably achievable given access to modern engineering controls and monitoring hardware. Biologically active compounds may produce idiosyncratic effects which are entirely unpredictable on the basis of literature searches and prior clinical experience (both recent and past).

PERSONAL PROTECTION

Consult your EHS staff for recommendations

**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]

**HANDS/FEET**

- Elbow length PVC gloves.
  - Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
    - frequency and duration of contact,
    - chemical resistance of glove material,
    - glove thickness and
    - dexterity
  - Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
  - When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
  - When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
  - Contaminated gloves should be replaced.
  - Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
  - Rubber gloves (nitrile or low-protein, powder-free latex). Employees allergic to latex gloves should use nitrile gloves in preference.
  - Double gloving should be considered.
  - PVC gloves.
  - Protective shoe covers.
  - Head covering.

**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
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
• Try to avoid creating dust conditions.

**RESPIRATOR**

<table>
<thead>
<tr>
<th>Protection Factor</th>
<th>Half-Face Respirator</th>
<th>Full-Face Respirator</th>
<th>Powered Air Respirator</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 x PEL</td>
<td>Air-line*</td>
<td>P1</td>
<td>PAPR-P1</td>
</tr>
<tr>
<td>50 x PEL</td>
<td>Air-line**</td>
<td>P2</td>
<td>PAPR-P2</td>
</tr>
<tr>
<td>100 x PEL</td>
<td>-</td>
<td>P3</td>
<td>-</td>
</tr>
<tr>
<td>100+ x PEL</td>
<td>Air-line**</td>
<td>-</td>
<td>PAPR-P3</td>
</tr>
</tbody>
</table>

* - Negative pressure demand ** - Continuous flow

**Explanation of Respirator Codes:**
- Class 1 low to medium absorption capacity filters.
- Class 2 medium absorption capacity filters.
- Class 3 high absorption capacity filters.
- PAPR Powered Air Purifying Respirator (positive pressure) cartridge.
- Type A for use against certain organic gases and vapors.
- Type AX for use against low boiling point organic compounds (less than 65°C).
- Type B for use against certain inorganic gases and other acid gases and vapors.
- Type E for use against sulfur dioxide and other acid gases and vapors.
- Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

- Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.
- Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

**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 no 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
    - 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 vapors.

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.

---

**Section 9 - PHYSICAL AND CHEMICAL PROPERTIES**

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>State</th>
<th>Solubility in water (g/L)</th>
<th>Melting Range (°F)</th>
<th>Boiling Range (°F)</th>
<th>Viscosity</th>
<th>Flash Point (°F)</th>
<th>Decomposition Temp (°F)</th>
<th>pH (as supplied)</th>
<th>Decomposition Temp (°F)</th>
<th>pH (as supplied)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid</td>
<td>Miscible</td>
<td>305.6- 307.4</td>
<td>424.4 (2 mm Hg)</td>
<td>Not Applicable</td>
<td>Not available</td>
<td>Not Available</td>
<td>Not applicable</td>
<td>Not Available</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Mixes with water</td>
<td>Miscible</td>
<td></td>
<td></td>
<td>Not Applicable</td>
<td>Not available</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Not Available
- Miscible
human health. The potential for surfaces in an enclosed space to facilitate reactions should be considered.

Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect

### Section 10 - CHEMICAL STABILITY

#### CONDITIONS CONTRIBUTING TO INSTABILITY

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

#### STORAGE INCOMPATIBILITY

- Avoid reaction with oxidizing agents.

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

### Section 11 - TOXICOLOGICAL INFORMATION

For nicotine:

- Acutely toxic by all routes of exposure (oral, dermal, and inhalation).
- LD50 of nicotine is 50 mg/kg for rats and 3 mg/kg for mice. A dose of 40-60 mg can be a lethal dosage for adult human beings and doses as low as 1-4 mg can be associated with toxic effects in some individuals.
- Nicotine is an agonist at nicotinic receptors in the peripheral and central nervous system.

For cytisine:

- Toxicity and irritation

<table>
<thead>
<tr>
<th>Route</th>
<th>LD50</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (mouse)</td>
<td>101 mg/kg</td>
<td>Nil Reported</td>
</tr>
<tr>
<td>Intraperitoneal (mouse)</td>
<td>8.55 mg/kg</td>
<td>Nil Reported</td>
</tr>
<tr>
<td>Intravenous (mouse)</td>
<td>1.73 mg/kg</td>
<td>Nil Reported</td>
</tr>
<tr>
<td>Intravenous (cat)</td>
<td>0.4 mg/kg</td>
<td>Nil Reported</td>
</tr>
</tbody>
</table>

- Asymptomatic 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. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

For nicotine:

- Asthma-like symptoms may occur in individuals exposed to nicotine.

#### Toxicity

- Oral (mouse) LD50: 101 mg/kg
- Intraperitoneal (mouse) LD50: 8.55 mg/kg
- Intravenous (mouse) LD50: 1.73 mg/kg
- Intravenous (cat) LD50: 0.4 mg/kg

#### Irritation

- Nil Reported

### Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

#### CYTISINE

- For nicotine:
  - Environmental fate:
  - Terrestrial fate: If released to soil, nicotine may biodegrade to a variety of different products including oxynicotine, 3-pyridyl/methyl ketone, 2,3-dipryidyl, N-methylmysosmine and a purple crystalline pigment. In moist soil chemical hydrolysis and volatilisation are not expected to be important fate processes. Under alkaline condition, nicotine should be highly mobile.
  - Aquatic fate:
  - Atmospheric fate: If released to air, nicotine is expected to degrade rather quickly in the presence of light and air. A resinous product may form. In the ambient atmosphere, nicotine may react with photochemically generated hydroxyl radicals (vapor phase 1 1/2 / day) or be removed by wet deposition. Slight potential exists for direct photolysis, since it adsorbs UV light only weakly above 290 nm.
  - Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health. The potential for surfaces in an enclosed space to facilitate reactions should be considered.

<table>
<thead>
<tr>
<th>Source of unsaturated substances</th>
<th>Unsataturated substances (Reactive Emissions)</th>
<th>Major Stable Products produced following reaction with ozone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupants (inhaled breath, ski oils, personal care products)</td>
<td>Isoprene, nitric oxide, squalene, unsaturated sterols, oleic acid and other unsaturated fatty acids, unsaturated oxidation products</td>
<td>Methacrolein, methyl vinyl ketone, nitrogen dioxide, acetone, 6MHQ, geranyl acetone, 4OPA, formaldehyde, nonanol, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid.</td>
</tr>
<tr>
<td>Ingredient</td>
<td>Persistence: Water/Soil</td>
<td>Persistence: Air</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Cytisine</td>
<td>HIGH</td>
<td></td>
</tr>
</tbody>
</table>

**Section 13 - DISPOSAL CONSIDERATIONS**

**Disposal Instructions**

All waste must be handled in accordance with local, state and federal regulations. Puncture containers to prevent re-use and bury at an authorized landfill. 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.

**DO NOT** allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- **Recycle** wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- **Dispose of by**: Burial in a licensed land-fill or incineration in a licensed apparatus (after admixture with suitable combustible material). Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

**Section 14 - TRANSPORTATION INFORMATION**
Section 15 - REGULATORY INFORMATION

cytisine (CAS: 485-35-8) is found on the following regulatory lists;
“Canada Non-Domestic Substances List (NDSL)”, “US Toxic Substances Control Act (TSCA) - Inventory”

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Cumulative effects may result following exposure*.
  * (limited evidence).

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

- Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.
- The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

This document is copyright. Apart from any fair dealing for the purposes of private study, research, review or criticism, as permitted under the Copyright Act, no part may be reproduced by any process without written permission from CHEMWATCH. TEL (+61 3) 9572 4700.

Issue Date: Mar-11-2009
Print Date: Apr-21-2010