

ALAR

GHS Safety Data Sheet

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

DAMINOZIDE, ALAR

OTHER NAMES

C6-H12-N2-O3, HO2CCH2CH2CONHN(CH3)2, "succinic acid, mono(2, 2-dimethylhydrazide)", "succinic 2, 2-dimethylhydrazide", "succinic 2, 2-dimethylhydrazide", "Alar, ", "Alar-85, aminozide, B-9, "B 995", "B Nine", "bernsteinsaeure-2, 2-dimethylhydrazid", "bernsteinsaeure-2, 2-dimethylhydrazid", "butanedioic acid mono(2, 2-dimethylhydrazide)", "Dimas, "N-dimethyl amino-beta-carbamyl propionic acid", "N-dimethyl amino-beta-carbamyl propionic acid", "dimethylaminosuccinamic acid", "N-(dimethylamino)succinamic acid", "N-(dimethylamino)succinamic acid",

PRODUCT USE

■ Unsymmetrical dimethyl hydrazine (UDMH) is a contaminant of commercial daminozide and a metabolite of daminozide which is formed in the body, during food processing, or when spray mixes containing daminozide are left standing in the mixing tank. Commercial daminozide contains 0.005% (50 ppm) UDMH. A metabolism study in swine has indicated that 1% of ingested daminozide is converted to UDMH. EPA estimates that 0.012% of a daminozide solution converts to UDMH when allowed to stand in a tank for 24 hours. Plant growth regulator. Growth retardant for apples, cherries, grapes, nectarines, peaches, tomato transplant, peanut vines, chrysanthemums, azaleas, hydrangeas and many bedding plants. Half-life 17.3 hours in sandy loam at pH 5.6, containing 7.34% organics. Slowly decomposed by light (half-life 105 days). WHO Class Table 5; EPA Toxicity Class IV

SUPPLIER

Company: S D FINE - CHEM LIMITED

Address:

315- 317, T.V.IND.ESTATE,

248 WORLI ROAD,

MUMBAI- 400 030, INDIA

technical@sdfine.com

Telephone: 91- 22 24959898

Telephone: 91- 22 24959899

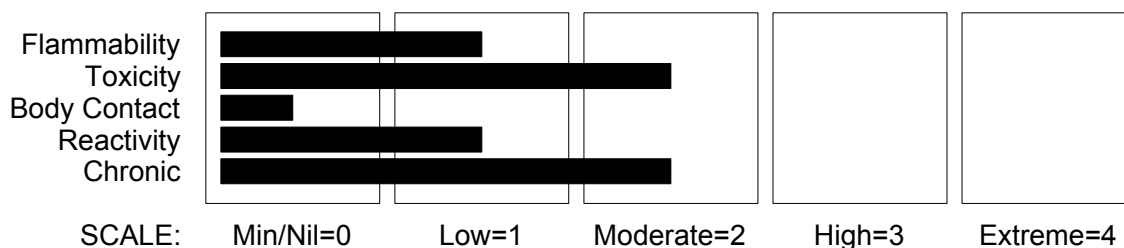
Fax: 91- 22 24937232

Section 2 - HAZARDS IDENTIFICATION

HAZARD RATINGS

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Section 2 - HAZARDS IDENTIFICATION

**GHS Classification**

Acute Aquatic Hazard Category 3

Carcinogen Category 2

Respiratory Sensitizer Category 1

**EMERGENCY OVERVIEW****HAZARD****DANGER**

Determined by using GHS criteria:

H334 H351 H402

May cause allergic or asthmatic symptoms or breathing difficulties if inhaled

Suspected of causing cancer

Harmful to aquatic life

PRECAUTIONARY STATEMENTS**Prevention**

Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood.

Avoid breathing dust/fume/gas/mist/vapours/spray.

Avoid release to the environment.

Use personal protective equipment as required.

In case of inadequate ventilation wear respiratory protection.

Response

IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing.

IF exposed or concerned: Get medical advice/ attention.

If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

Storage

Store locked up.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
daminozide	1596-84-5	>98
contaminant as		
1, 1- dimethylhydrazine	57-14-7	

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Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

EYE

- If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin or hair contact occurs:
- 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.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

- Treat symptomatically.

In poisonings involving hydrazine:

Correction of early hypoglycaemia, with large parenteral doses of pyridoxine appears to suppress convulsions and other neurological effects.

In man, hydrazine-induced hyperexcitability and coma may respond to massive doses of pyridoxine but there is no evidence that liver necrosis or damage can be prevented or corrected by this antidote.

GOSSELIN, SMITH & HODGE: Clinical Toxicology of Commercial Products, 5 th Ed.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

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

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use water delivered as a fine spray to control fire and cool adjacent 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.

FIRE/EXPLOSION HAZARD

- 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.
 - 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)
 - 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 (CO₂), nitrogen oxides (NO_x), 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.

Personal Protective Equipment

Gas tight chemical resistant suit.

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

- 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.
- Recover product wherever possible.
- IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. IF WET: Vacuum/shovel up and place in labelled containers for disposal.
- ALWAYS: Wash area down with large amounts of water and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise Emergency Services.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

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.

SUITABLE CONTAINER

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

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Section 7 - HANDLING AND STORAGE

STORAGE INCOMPATIBILITY

- Avoid reaction with oxidising agents.
- Avoid strong acids, bases.

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.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+: May be stored together

O: May be stored together with specific preventions

X: Must not be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	Notes
Australia Exposure Standards	1, 1- dimethylhydrazine (1, 1- Dimethylhydrazine)	0.01	0.025	Sk

The following materials had no OELs on our records

- daminozide: CAS:1596- 84- 5

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m ³)	Revised IDLH Value (ppm)
1, 1- dimethylhydrazine		15

MATERIAL DATA

DAMINOZIDE:

■ It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

Limited under EC Directive on Drinking Water Quality 80/778/EEC. Pesticides: maximum admissable concentration 0.1 ug/l

1,1-DIMETHYLHYDRAZINE:

- 1,1-dimethylhydrazine (unsymmetrical dimethylhydrazine):
Odour Threshold Value: 6.1-14 ppm (detection)

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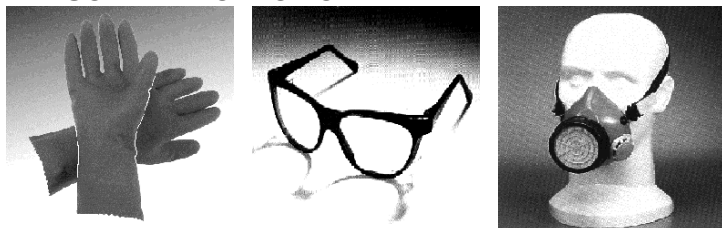
Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

A substantially lower value than the concentration causing mild anaemia, weight loss and lethargy is recommended. Based on skin absorption observed in dogs and the blood vessel and lung tumours observed in mice a skin notation and carcinogen warning are thought to be appropriate.

Odour Safety Factor(OSF)

OSF=0.0059 ("1,1-DIMETHYL HYDRAZINE").

PERSONAL PROTECTION



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].

HANDS/FEET

■ 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.

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
- fluorocarbon
- polyvinyl chloride

Gloves should be examined for wear and/ or degradation constantly.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

- 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).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- 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

■ Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	AK- AUS P	-
1000	50	-	AK- AUS P
5000	50	Airline *	-
5000	100	-	AK- 2 P
10000	100	-	AK- 3 P
	100+		Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:
 - (a): particle dust respirators, if necessary, combined with an absorption cartridge;
 - (b): filter respirators with absorption cartridge or canister of the right type;
 - (c): fresh-air hoods or masks
- Build-up of electrostatic charge on the dust particle, 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.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:

Air Speed:

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direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).

1- 2.5 m/s (200- 500 f/min.)

2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

1: Room air currents minimal or favourable to capture

2: Contaminants of low toxicity or of nuisance value only

3: Intermittent, low production.

4: Large hood or large air mass in motion

Upper end of the range

1: Disturbing room air currents

2: Contaminants of high toxicity

3: High production, heavy use

4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

2 m

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

White crystalline powder; mixes with water (100 g/l), acetone, methanol.

PHYSICAL PROPERTIES

Solid.

Mixes with water.

State	Divided solid	Molecular Weight	160.20
Melting Range (°C)	162- 164	Viscosity	Not Applicable
Boiling Range (°C)	Not available	Solubility in water (g/L)	Miscible
Flash Point (°C)	Not available	pH (1% solution)	Not applicable
Decomposition Temp (°C)	Not available	pH (as supplied)	Not applicable
Autoignition Temp (°C)	Not available	Vapour Pressure (kPa)	Negligible
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapour Density (air=1)	Not applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

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Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

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

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

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual.
- No ill-effects were noted in dogs fed up to 70000 mg/kg diet daminozide total dose. Reports in Russian literature describe alterations in liver function of experimental animals given very large doses.
- In animals, hydrazine and its derivatives cause convulsions, nervous system changes, muscle spasms and seizures, fever, and other symptoms, and in severe cases, causes failure of breathing and death.

EYE

- Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

SKIN

- The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
- 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 is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of dusts, or fumes, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
- Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
- 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.
- Symptoms of inhalation of hydrazine (and some of its derivatives) may include nausea and headache. Central nervous system (CNS) excitement may lead to convulsions, and, in severe cases, breathing stoppage and death. There may also be twitching of the extremities, seizure-like movements, brisk reflexes, convulsions and fever; these may progress to lethargy, inco-ordination, confusion, coma and low blood pressure. Decreased urinary frequency, blood in the urine, high or low blood sugar, and elevated liver function tests are common. Increased white cells, pins and needles, and peripheral nerve damage may occur, but be delayed for several days. Respiratory and skin exposure may cause deficits in concentration, comprehension, memory, task performance

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and mood status.

Irritation of the mucous membranes may produce nose inflammation, salivation, coughing, choking and dyspnoea.

CHRONIC HEALTH EFFECTS

■ There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.

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.

Non-carcinogenic in 2-yr feeding trial in rats at 5000 mg/kg diet daminozide and in mice at 3000 mg/kg diet.

In a three generation study in rats a no observable effect level on reproduction (NOEL) was 1000 mg/kg. In rabbits the NOEL on teratogenicity and embryotoxicity was 3000 mg/kg.

When given by mouth, hydrazine induced tumours in animal testing. A study of 423 men involved in the manufacture of hydrazine revealed three stomach, one prostate and one neurogenic cancer.

TOXICITY AND IRRITATION

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

TOXICITY

Oral (rat) LD50: 8400 mg/kg

Inhalation (rat) LC50: >147000 mg/m³

Oral (mouse) LD50: 6300 mg/kg

Intraperitoneal (mouse) LD50: 1325 mg/kg

Dermal (rabbit) LD50: >5000 mg/kg

■ for daminozide:

The oral LD50 for daminozide in rats is 8,400 mg/kg, and in mice is 6,300 mg/kg. Its dermal LD50 on rabbits is > 1600 mg/kg. The inhalation LC50 in rabbits is > 147 mg.

96-hours after administration of a single oral dose of 5 mg/kg to miniature swine, daminozide was detected in all body tissues at levels up to 73 ppb. The highest levels were found in the liver and kidney. Urinalysis showed that about 84% of the dose was eliminated in the urine and that 1% of the dose was metabolised to UDMH. The majority of daminozide residues ingested by milk animals is rapidly excreted in the urine and faeces. Carcinogenic effects: Unsymmetrical dimethyl hydrazine (UDMH) is a contaminant of commercial daminozide and a metabolite of daminozide which is formed in the body, during food processing, or when spray mixes containing daminozide are left standing in the mixing tank. Both daminozide and UDMH have caused increases in the incidence of benign and malignant tumors in test animals. Malignant tumors were found in female rats given dietary doses of 5000 and 10,000 ppm. Malignant and benign blood vessel tumors also occurred in treated mice. The U.S. EPA has classified daminozide and its metabolite UDMH as probable human carcinogens based on the occurrence of tumors in laboratory animals.

No increase in tumor formation occurred in rats fed 5, 25, 250 or 500 mg/kg/day of daminozide for two years, nor in mice fed 15, 150, 300 or 500 mg/kg/day for 2 years.

When rats were given UDMH in their drinking water at concentrations of 0, 1, 50 or 100 ppm for 2 years, there was a significant, but slight, dose-related increase in liver tumors in females, and bile duct hyperplasia and inflammation of the liver in males receiving 100 ppm and in females receiving 50 and 100 ppm.

Mice given UDMH in their drinking water for 2 years at 0, 1, 5 or 10 ppm for males and 0, 1, 5 or 20 ppm for females exhibited decreased survival at the highest dose tested. This study also showed a significant increase in the incidence of lung tumors.

In another study, mice given UDMH in their drinking water for two years at 0, 40 or 80 ppm exhibited a significant increase in the incidence of lung and vascular tumors.

Mutagenic Effects: Several studies have shown that daminozide is not mutagenic in either in vivo or in vitro tests. There is inconclusive evidence that UDMH may be mutagenic. Dimethylnitrosamine (DMN), another metabolite of daminozide, is mutagenic.

The NOEL for a 2-year study with rats fed 5, 25, 250 or 500 mg/kg/day was 5 mg/kg. Effects observed at higher doses included atrophy of ovaries and enlargement of the liver bile duct (hyperplasia). No effects were seen in dogs fed 7.5, 75 or 187.5 mg/kg/day daminozide for one year.

Reproductive Effects: A 3-generation study with rats fed 300 mg/kg showed no significant effects on fertility or reproductive capacity. The reproductive NOEL for a 2-generation study with rats fed 5, 50 or 500 mg/kg/day was 5 mg/kg/day.

Teratogenic Effects: No birth defects occurred in the offspring of pregnant rats fed 500 mg/kg/day, the

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Section 11 - TOXICOLOGICAL INFORMATION

highest dose tested. When pregnant rats were given 85, 390 or 1,800 mg/kg/day, ossification of the bones of the sternum and spine occurred in offspring at 1,800 mg/kg/day. The reproductive NOEL for this study was 390 mg/kg/day. No teratogenic or developmental effects occurred in the offspring of pregnant rabbits given 50, 150 or 300 mg/kg/day.

NOTE: The substance is classified under EC Directive on Dangerous Substances (67/548/EEC): Possible risk of irreversible effects, (substances suspected of being carcinogenic and/or mutagenic).

Carcinogenic by RTECS criteria

ADI: 0.7 mg/kg/day

NOEL: 75 mg/kg/day

CARCINOGEN

1, 1- Dimethylhydrazine	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2B
CAS~	Australia Exposure Standards - Carcinogens	Carcinogen Category	2

SKIN

1, 1- dimethylhydrazine	Australia Exposure Standards - Skin	Notes	Sk
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Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

1,1-DIMETHYLHYDRAZINE:

DAMINOZIDE:

■ DO NOT discharge into sewer or waterways.

■ For hydrazine:

Environmental fate:

Hydrazines or dimethylhydrazines released to water or soil may volatilise into air or sorb onto soil. These chemicals have low vapor pressures and are miscible in water. Therefore, volatilisation is not expected to be an important removal process. Studies indicate that volatilisation of these chemicals from water increases with higher concentrations of the chemical and in the presence of sunlight (due to increased temperature of the hydrazine pool). Hydrazine and dimethylhydrazines degrade rapidly in air through reactions with ozone, hydroxyl (OH) radicals, and nitrogen dioxide. The reaction of hydrazine and 1,1-dimethylhydrazine with ozone is probably the major fate of these chemicals in the atmosphere. Hydrazine undergoes complex interactions with soils, including both reversible physical-sorption and irreversible chemisorption to colloids. In a study on the adsorption and leaching characteristics of hydrazine fuels, no adsorption of 1,1-dimethylhydrazine was observed on sand, with almost 100% of the chemical leaching with water. In three other soils, adsorption ranged from 26% to 80%. No correlation between adsorption and soil organic content or pH was observed. Hydrazine adsorption studies with clays and soils indicate that adsorption may be correlated with soil organic matter and clay content and is highly dependent on pH; hydrazine appears to be adsorbed by different mechanisms under acidic and alkaline conditions. Autooxidation appears to be the major factor contributing to disappearance of the chemical, but the study authors attributed about 20% of removal to biodegradation. Several heterotrophic soil bacteria were reported to degrade hydrazine, indicating that microbial degradation may contribute to removal of the chemical from soil.

Hydrazine and 1,1-dimethylhydrazine degrade in aqueous systems, but the rate of degradation is dependent on specific aquatic environmental factors, including pH, hardness, temperature, oxygen concentration, and the presence of organic matter and metal ions. Oxidation and biodegradation are the primary removal mechanisms. Reaction of hydrazine with dissolved oxygen is catalyzed by metal ions, particularly copper. The reaction rate is strongly influenced by pH; degradation proceeds more rapidly in alkaline solutions. Hydrazine is rapidly removed from polluted waters, with less than one-third of the original concentration remaining in

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dirty river water after 2 hours. However, chlorinated, filtered, and softened city water contained almost the original amount of hydrazine after 4 days. Organic matter in the water and hardness were reported to be the major factors in the differing rates of degradation.

Biodegradation may be a significant removal process at low hydrazine concentrations in ambient waters, but at higher concentrations the chemical is toxic to microorganisms.

Ecotoxicity:

Based on data for a number of hydrazines, the material may be hazardous to plant life and aquatic organisms.

Hydrazine, itself, has a high acute toxicity to algae, fish and daphnids

In a study of hydrazine in aqueous systems, the chemical was reported to be absorbed by guppies from a 0.5 ug/L solution. After 96 hours, the hydrazine concentration in fish was 144 ug/g, indicating a moderate tendency to bioconcentrate. However, the bioconcentration of hydrazine and dimethylhydrazines is not expected to be important in aquatic systems because of the rapid degradation of these chemicals in water as well as their low octanol-water partition coefficients.

DAMINOZIDE:

■ Harmful to aquatic organisms.

■ for daminozide:

Environmental fate: Daminozide is soluble in water and very mobile in soils. It appears to leach, but because it does not persist in soil, it is unlikely to contaminate groundwater

Daminozide appears to resist photodegradation, but it is subject to degradation by soil microorganisms. The half-life of daminozide in soil is approximately 21 days. In field tests, 50% of applied Alar disappeared within one week. In greenhouse tests, 90% of the applied Alar disappeared within 2 weeks.

In water, daminozide degrades to 1,1-dimethylhydrazine (UDMH).

Daminozide is rapidly absorbed through the leaves, roots and stems of plants. It is translocated within plants and can accumulate in roots, fruits and other plant parts. It does not accumulate in subsequent crops grown on treated sites

Ecotoxicity

Fish LC50 (96 h): rainbow trout 149-306 mg/l; bluegill 423-552 mg/l

Daphnia sp LC50 (48 h): 98.5 mg/l

Birds LC50 (96 h): quail 5620 mg/kg

Birds LC50, dietary (8 d): mallard ducks, bobwhite quail 10,000 kg/kg

Daminozide is of low toxicity to fish not toxic to birds.).

Daminozide does not bioconcentrate in fish

Daminozide is of low toxicity to terrestrial wildlife.

It is non- toxic to bees.

Half-life (hr) soil: 72-96

Toxicity Fish: LC50(96)149-423mg/L

Degradation Biological: sig

processes Abiotic: slow photodecomp

1,1-DIMETHYLHYDRAZINE:

Marine Pollutant:

■ Hazardous Air Pollutant:	Yes
■ Fish LC50 (96hr.) (mg/l):	Yes
■ Half- life Soil - High (hours):	10.1- 26.5
■ Half- life Soil - Low (hours):	528
■ Half- life Air - High (hours):	192
■ Half- life Air - Low (hours):	7.7
■ Half- life Surface water - High (hours):	0.8
■ Half- life Surface water - Low (hours):	528
■ Half- life Ground water - High (hours):	192
■ Half- life Ground water - Low (hours):	1056
■ Aqueous biodegradation - Aerobic - High (hours):	384
■ Aqueous biodegradation - Aerobic - Low (hours):	528
■ Aqueous biodegradation - Anaerobic - High (hours):	192
■ Aqueous biodegradation - Anaerobic - Low (hours):	2112
■ Photooxidation half- life air - High (hours):	768
■ Photooxidation half- life air - Low (hours):	7.7
	0.8

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- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters. Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
daminozide	HIGH		LOW	HIGH
1, 1- dimethylhydrazine	LOW	LOW	LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

- 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.
- 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

HAZCHEM:

None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: UN, IATA, IMDG

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Section 15 - REGULATORY INFORMATION

REGULATIONS

daminozide (CAS: 1596-84-5) is found on the following regulatory lists;

"Australia ADI list - Acceptable daily intakes for agricultural and veterinary chemicals", "Australia Inventory of Chemical Substances (AICS)", "Australia New Zealand Food Standards Code - Maximum Residue Limits (Australia only) - Schedule 1", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 5"
Regulations for ingredients

1,1-dimethylhydrazine (CAS: 57-14-7) is found on the following regulatory lists;

"Australia Exposure Standards", "Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Chemical Secretariat (ChemSec) REACH SIN* List (*Substitute It Now!) 1.0"

Section 16 - OTHER INFORMATION

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by using available literature 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.

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

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