

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.



#### SUPPLIER

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#### **PRODUCT USE**

Selective herbicide for control of broad-leaved and grass weeds in soya beans, peas, maize, oilseed rape, sugar cane, cassava, pumpkins and tobacco. Applied pre-emergence and pre-plant incorporated.

#### SYNONYMS

C12-H14-Cl-N-O2, C12-H14-Cl-N-O2, "3-isoxazolidinone, 2-[(2-chlorophenyl)methyl]-4, 4-dimethyl-", "3-isoxazolidinone, 2-[(2-chlorophenyl)methyl]-4, 4-dimethyl-", "3-isoxazolidinone, 2-[(2-chlorophenyl)methyl]-4, 4-dimethyl-", "2-(2-chlorobenzyl)-4, 4-dimethyl-1, 2-oxazolidin-3-one", "2-(2-chlorobenzyl)-4, 4-dimethyl-1, 2-oxazolidin-3-one", "2-(chlorobenzyl)-4, 4-dimethyl-1, 2-oxazolidin-3-one", "2-2-(chlorobenzyl)-4, 4-dimethylisoxazolidin-3-one", "2-2-(chlorobenzyl)-4, 4-dimethylisoxazolidin-3-one", "2-2(chlorophenyl)methyl]-4, 4-dimethylisoxazolidin-3-one", "2-[(2-chlorophenyl)methyl]-4, 4-dimethylisoxazolidin-3-one", "2-2(chlorophenyl)methyl]-4, 4-dimethylisoxazolidin-3-one", "2-2(chlorophenyl)methyl]-4, 4-dimethylisoxazolidinone", "2-[(2-chlorophenyl)methyl]-4, 4-dimethylisoxazolidinone", dimethazone, "carfentrazone ethyl", Command, FMC-57020, Gamit, Magister, "azole pesticide/ herbicide"

### Section 2 - HAZARDS IDENTIFICATION

### CANADIAN WHMIS SYMBOLS



sc-234404



Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

### **EMERGENCY OVERVIEW**

**Material Safety Data Sheet** 

#### RISK

Harmful by inhalation and if swallowed.

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

#### 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.

Aromatase inhibitors (including triazoles and azoles) produce several side effects including mood swing, depression, weight gain, hot flushes, vaginal dryness, bloating, early onset of menopause. Long-term use may result in bone weakness, increased risk of blood clots, gastrointestinal disturbance, and sweats.

Aromatase inhibitors lower the level of oestrogen in post-menopausal women who have hormone-receptor-positive breast cancers. Prior to menopause oestrogen is mostly produced in the ovaries. Post-menopausal women produce oestrogen from another hormone, androgen. Aromatase inhibitors prevent the enzyme, aromatase from catalysing this reaction. Breast cancer cell growth in post-menopausal women is stimulated by oestrogen.

#### EYE

■ There is some evidence that material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Moderate inflammation may be expected with redness; conjunctivitis may occur with prolonged exposure.

Because of their alkaline nature eye contact with oxazolidines may produces moderate to severe irritation depending on the duration of contact.

#### SKIN

There is some evidence to suggest that the material may cause moderate inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.
 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.

• Oxazolidines generally do not produce systemic harmful following skin contact but, because of their alkaline nature, may produce moderate to severe irritation. Dermal reactions may include necrosis, sloughing and scab formation.

#### INHALED

■ Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful.

■ Inhalation hazard is increased at higher temperatures.

The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

#### CHRONIC HEALTH EFFECTS

■ Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Exposure to the material may cause concerns for human fertility, on the basis that similar materials provide some evidence of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects, but which are not a secondary non-specific consequence of other toxic effects.

Based on experience with animal studies, there is a possibility that exposure to the material may result in toxic effects to the development of the fetus, at levels which do not cause significant toxic effects to the mother.

Imidazole is structurally related to histamine and has been used as an antagonist to counteract the effects of excess histamine found in certain induced physiological conditions (it therefore acts as an antihistamine).

Imidazoles have been reported to disrupt male fertility through disruption of testicular function.

2-Methylimidazole decreased luteinising hormone secretion and tissue interstitial fluid testosterone concentration two hours after injection into Sprague Dawley rats.

Imidazoles bind to cytochrome P450 haeme, resulting in inhibition of catalysis. However, 2-substituted imidazoles are considered to be poor inhibitors. Imidazole is probably an inducer of cytochrome P4502E1. In general, inducers of this isozyme stabilise the enzyme by preventing phosporylation of a serine which leads to haeme loss.

Several drugs containing an imidazole moiety were retained and bound in connective tissue when administered to laboratory animals. The bound material was primarily recovered from elastin (70%) and the collagen. It is postulated that reaction with aldehydes gives an aldol condensation product.

Azole fungicides show a broad antifungal activity and are used either to prevent fungal infections or to cure an infection. Therefore, they

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are important tools in integrated agricultural production. According to their chemical structure, azole compounds are classified into triazoles and imidazoles; however, their antifungal activity is due to the same molecular mechanism. The cell membrane assembly of fungi and yeast is disturbed by blocking the synthesis of the essential membrane component ergosterol. This fundamental biochemical mechanism is the basis for the use of azole fungicides in agriculture and in human and veterinary antimycotic therapies. The enzyme involved is sterol 14[alpha]-demethylase, which is found in several phyla. In mammals, it converts lanosterol into the meiosis-activating sterols (MAS) which regulate or modify cell division. These precursors of cholesterol have been discovered to moderate the development of male and female germ (sexual) cells. Several metabolites of lanosterol have been regarded only as precursors of cholesterol without any biological function in animals. This view dramatically changed recently with the observation that FF-MAS isolated from human follicle fluid and T-MAS isolated from bull testis as well as the MAS-412 and MAS-414 induced resumption of meiosis in cultivated mouse oocytes (Byskov et al. 1995).

Aromatase is another target enzyme of azole compounds. In steroidogenesis, it converts androgens into the corresponding oestrogens. The importance of androgens and oestrogens for the development of reproductive organs, for fertility, and in certain sex steroiddependent diseases is well known. Therefore, azole compounds can be directed against aromatase to treat oestrogen-responsive diseases. Based on the inhibitory activity of azoles on key enzymes involved in sex steroid hormone synthesis, it is likely that effects on fertility, sexual behavior, and reproductive organ development will occur depending on dose level and duration of treatment of laboratory animals. Several azole compounds were shown to inhibit the aromatase and to disturb the balance of androgens and estrogens in vivo. In fact, the clinical use of azole compounds in estrogen-dependent diseases is based on this effect. Additionally, azole antifungals developed to inhibit the sterol 14[alpha]-demethylase of fungi and yeast in agriculture and medicine are also inhibiting aromatase. Therefore, these antifungals may unintentionally disturb the balance of androgens. Until now, it is not clear whether this effect is compensated by an increased expression of aromatase or by other unknown mechanisms.

The broad use of biologically active compounds in human therapy as well as in nonhuman applications may involve some risks, as exemplified by emerging antibiotic resistance. In agriculture, fungi and yeast are well known to develop resistance to azoles, and some molecular mechanisms of resistance development have been described. The significance of the agricultural azole resistance for human clinical antimycotic therapies has been discussed in Europe, but is not clarified yet. The actual target enzyme of azole antifungals, the fungal sterol 14[alpha]-demethylase, is expressed in many species including humans, and it is highly conserved through evolution. Hence, it seems reasonable to assume that most of the azole antifungals used in agriculture and medicine as well as azoles used in management of breast cancer also act as inhibitors on human sterol 14[alpha]-demethylase to an unknown extent. The toxicologic profiles of individual azole fungicides provide evidence for endocrine effects. In fact, many of these fungicides have effects on prostate, testis, uterus, and ovaries as well as on fertility, development, and sexual behavior. The current database does not allow us to establish using relationships of these effects with inhibition of sterol 14[alpha]-demethylase and/or aromatase, but the overall view strongly suggests a connection with disturbed steroidogenesis.

Zam et al; Environmental Health Perspectives - 3/1/2003

Some azoles have been associated with prolongation of the QT interval on the electrocardiogram.

In animal studies, clomazone did not cause reproductive toxicity, teratogenicity or carcnogenicity. Liver enlargement and elevated cholesterol levels are often seen in laboratory animals following ingestion of large doses of clomazone over the course of their life. An overall absence of genotoxicity has been demonstrated in tests of mutagenicity, DNA damage and chromosomal aberrations.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS



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Section 4 - FIRST AID MEASURES						

## SWALLOWED

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- 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.
- Urgent hospital treatment is likely to be needed.
- 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.
- NOTE: Wear a protective glove when inducing vomiting by mechanical means.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

#### 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.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

#### SKIN

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

#### INHALED

• If fumes or combustion products are inhaled remove from contaminated area.

- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

#### NOTES TO PHYSICIAN

■ for poisons (where specific treatment regime is absent):

BASIC TREATMENT

- -----
- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary edema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures .
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

ADVANCED TREATMENT

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

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

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

## Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	0.143
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	1.192
Lower Explosive Limit (%):	Not available

### **EXTINGUISHING MEDIA**

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

#### **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 water delivered as a fine spray to control fire and cool adjacent area. •
- Avoid spraying water onto liquid pools.
- 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.

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

- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).
- May emit acrid smoke.

Mists containing combustible materials may be explosive. •

Combustion products include: carbon dioxide (CO2), hydrogen chloride, phosgene, nitrogen oxides (NOx), other pyrolysis products typical of burning organic material.

#### FIRE INCOMPATIBILITY

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

#### PERSONAL PROTECTION

Glasses: Safety Glasses. Chemical goggles.

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Gloves: Respirator:

Respirator: Type A-P Filter of sufficient capacity

## Section 6 - ACCIDENTAL RELEASE MEASURES

#### MINOR SPILLS

- Environmental hazard contain spillage.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labeled container for waste disposal.

MAJOR SPILLS

Environmental hazard - contain spillage.

Moderate hazard.

- Clear area of personnel and move upwind.
- Alert Emergency Responders 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 course.
- No smoking, naked lights or ignition sources. Increase ventilation.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

### PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia) Isolation Distance -Downwind Protection Distance 10 meters

#### 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.

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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.

5 Guide 171 is taken from the US DOT emergency response guide book.

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

- DO NOT allow clothing wet with material to stay in contact with skin
- 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.
- Avoid smoking, naked lights or ignition sources.
- 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.
- 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.

#### **RECOMMENDED STORAGE METHODS**

- Metal can or drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

#### STORAGE REQUIREMENTS

- - o. . . . . . .
- 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.

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 LOW

 • Observe manufacturer's storing and handling recommendations.

 SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

 Image: Colspan="3">Image: Colspan="3" Image: Colspan="3" Im

X: Must not be stored together

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O: May be stored together with specific preventions

+: May be stored together

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### **EXPOSURE CONTROLS**

The following materials had no OELs on our records

• clomazone: CAS:81777-89-1 CAS:89493-06-1

### MATERIAL DATA

#### CLOMAZONE:

■ Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

#### PERSONAL PROTECTION





Consult your EHS staff for recommendations

- EYE
- Safety glasses with side shields.

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• Chemical goggles.

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• Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

#### HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: 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.

Neoprene gloves

#### OTHER

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

#### 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	A-1 P	-
1000	50	-	A-1 P
5000	50	Airline*	-
5000	100	-	A-2 P
10000	100	-	A-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.

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**

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection an approved self contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area.

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

Type of Contaminant:

Air Speed:

solvent, vapors, degreasing etc., evaporating from tank (in still air). 0.25-0.5 m/s (50-100 f/min.)

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aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	g 0.5-1 m/s (10	0-200 f/min.)	
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generat into zone of rapid air motion)	ion 1-2.5 m/s (20	0-500 f/min.)	
grinding, abrasive blasting, tumbling, high speed wheel general dusts (released at high initial velocity into zone of very high rap air motion).	ted id 2.5-10 m/s (5	00-2000 f/min.)	
Within each range the appropriate value depends on:			
Lower end of the range	Upper end of	the range	
1: Room air currents minimal or favorable to capture	1: Disturbing	room air currents	
2: Contaminants of low toxicity or of nuisance value only.	2: Contamina	ints of high toxicity	
3: Intermittent, low production.	3: High produ	iction, heavy use	
4: Large hood or large air mass in motion	4: Small hoo	d-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 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant 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.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

LIQUID	Molecular Weight	239.72
77	Viscosity	Not Applicable
527	Solubility in water (g/L)	Partly miscible
158- 167 (CC)	pH (1% solution)	Not applicable.
Not Available	pH (as supplied)	Not applicable
Not available	Vapor Pressure (mmHg)	0.143
Not available	Specific Gravity (water=1)	1.192
Not available	Relative Vapor Density (air=1)	>1
Not available	Evaporation Rate	Not available
	LIQUID 77 527 158- 167 (CC) Not Available Not available Not available Not available Not available	LIQUIDMolecular Weight77Viscosity527Solubility in water (g/L)158- 167 (CC)pH (1% solution)Not AvailablepH (as supplied)Not availableSpecific Gravity (water=1)Not availableRelative Vapor Density (air=1)Not availableEvaporation Rate

#### APPEARANCE

Clear, colourless to light-brown viscous liquid; does not mix well with water (1.1 g/l). Miscible with acetone, acetonitrile, chlrooform, cyclohexanone, dichloromethane, methanol, toluene, heptane, dimethylformamide. Stable at ambient temperatures for at least 2 years.; stable at 50 deg. C. for at least 3 months. In sunlight DT50 >30 d in aqueous solutions.

### Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

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Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW	
<ul> <li>Presence of incompatible materials.</li> <li>Product is considered stable.</li> <li>Hazardous polymerization will not occur.</li> </ul>					
STORAGE INCOMPATIN Oxazolidines: are saturated heterocyclic may hydrolyse in water to react readily with most ph useful reaction rates	BILITY compounds which behav yield free amine and hydr enolic compounds althou	e, chemically, both as aldel oxyl groups that react with igh phenol itself is the leas	hydes and amines. isocyanate to form urea and st reactive species requiring	d urethane linkages gelevated temperatures for	
<ul> <li>reaction rates may be dim</li> <li>are effective crosslinkers opening of the heterocyclin</li> </ul>	inished by strong bases, I for proteins with reaction cring followed by reaction	ower alcohols and glycols and contract of a	and alkylhydroxylamines r alkaline conditions -reaction protein	on is thought to involve an	

- emulsify oils and waxes due to their alkaline nature and their esters may decompose in the presence of acids
- contact with copper, brass and aluminium should be avoided.

Avoid reaction with oxidizing agents.

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

## **Section 11 - TOXICOLOGICAL INFORMATION**

#### clomazone

S .

#### TOXICITY AND IRRITATION

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

TOXICITY	IRRITATION		
Inhalation (rat) LC50: 4800 mg/m³/4h	Skin: irritating *		
Dermal (rabbit) LD50: >2000 mg/kg	Eye: irritating *		
Oral (quail) LD50: >2510 mg/kg			
Oral (duck) LD50: >2510 mg/kg			
Oral (Rat) LD50: 1369 mg/kg			
Oral (rat) LD50: 1369 mg/kg (female) *			

Oral (rat) LD50: 2077 mg/kg (male) \*

[\* The Pesticides Manual, Incorporating The Agrochemicals Handbook, 10th Edition, Editor Clive Tomlin, 1994, British Crop Protection Council].

NOEL (1 y) for dogs 500 mg/kg diet \* Toxicity Class: EPA III \*

### Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows: CLOMAZONE:

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.

For clomazone:

log Kow: 2.5

BCF 27:

Unlikely to accumulate in the environment.

Environmental fate:

Breakdown in soil and groundwater: Clomazone is moderately persistent in soil.

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Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Soil and water: DT50 in soil 30-135 days approx.

Clomazone is readily degraded in soils under aerobic and anaerobic conditions (half-life 1 to 4.5 months). Clomazone is stable to chemical hydrolysis and has a low potential for movement in the soil.

Microbial degradation of the clomazone-containing product, Command, is promoted by high soil moisture, warm temperature, and by increasing the pH to 6.5. Degradation was faster in a sandy loam than in silt or clay loams. In field studies, the half-life of clomazone was 28 to 84 days, depending on soil type and the organic matter content. Clomazone is highly soluble in water, but it has a moderate tendency to adsorb to soil particles. It therefore has a low to moderate potential to contaminate groundwater The product Command has low mobility in sandy loam, silt loam, and clay loam soils. It is moderately mobile in fine sand .

Breakdown in water: Under laboratory conditions, clomazone was not readily hydrolysed in sterile water. However, clomazone is subject to photodegradation in water with a half life of 1.5 to 7 days reported for clomazone in solutions containing acetone, a photochemical sensitiser.

Breakdown in vegetation: Clomazone inhibits synthesis of chlorophyll and carotenoids in plants. It is absorbed by plants through the roots from the soil and by shoots. It is then translocated in the xylem and diffuses within leaves. It does not move downward in plants or from leaf to leaf. There is no foliar absorption of clomazone. Clomazone is metabolized by plants Ecotoxicity:

Birds: Acute oral LD50 for bobwhite quail and mallard ducks >2510 mg/kg

Fish LC50 (96 h): for bluegill sunfish 34, Atlantic silverside 6.26, rainbow trout 19 mg/l

Pink shrimp LC50: 8.9 m/l

Eastern oyster: 5.3 mg/l

Moderate to slight toxicity to aquatic algae, arthropods and fish; slightly toxic to birds.

■ For azole-containing substances.

Azole fungicides and systemically used antifungal drugs directly interfere with steroidogenesis by acting as potent inhibitors of steroidogenic enzymes and are known to cause endocrine disruption mainly via this mechanism.

An important P450 enzyme involved in the steroidogenesis is aromatase. Aromatase demethylates C10 and specifically converts androstenedione and testosterone. On the protein level, the amino acid sequence homology between aromatase from fish and humans is about 50% and between rats and humans is about 78%. In mammals, aromatase is mainly expressed in the brain and the gonads, but it is also found in placental, adipose, and bone tissue. The physiologic balance between different sex steroid hormones is crucial for the development, maintenance, and function of the reproductive system as well as for the differentiation of the sexual phenotype during ontogeny. Oestrogens (estrone and estradiol) are products of the androgens (androstenedione and testosterone), and the reaction is catalysed by aromatase. In mammals, differentiation of the male phenotype depends not only on testosterone but also on estradiol generated from testosterone by neuronal aromatase in central nervous system. Therefore, disturbances in aromatase expression and/or changes in its catalytic activity are expected to exhibit negative effects on reproduction parameters

Azole-containing compounds produce profound effects in the environment. In part this is due to inhibition of several enzyme systems including those involving sterol 14[alpha]-demethylase. Sterol 14[alpha]-demethylase is a member of the superfamily of haeme-containing cytochrome P450 enzymes involved in metabolism of endogenous and xenobiotic substances. The antifungal effect of azoles is due to inhibition of sterol 14[alpha]-demethylase in fungi and yeast, thereby blocking the biosynthesis of ergosterol The subsequent lack of ergosterol is detrimental because ergosterol is an essential sterol component in the membranes of fungi and yeast. Sterol 14[alpha]-demethylase is not only expressed in fungi and yeast but is also found in many other species ranging from bacteria to mammals. In plants, the sterol 14[alpha]-demethylase reaction is part of the metabolic pathway leading to biosynthesis of phytosterols. Cholesterol in turn is the substrate for the production of many other sterols (e.g., the sex steroid hormones).

The DNA sequences encoding sterol 14[alpha]-demethylase of many fungi and yeast are known, as well as the sequences of mice, rats, pigs, and humans. On the protein level, the amino acid sequences are highly conserved along the phylogenetic tree. This fact is considered by many authors as an indication of the pivotal role of sterol 14[alpha]-demethylase in all organisms. The homology of the amino acid sequence level between rats and humans is 93% and 40% between fungi and humans. In humans, the sterol 14[alpha]-demethylase is expressed in many different tissues.

■ DO NOT discharge into sewer or waterways.

#### Ecotoxicity

ngredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
clomazone	HIGH		LOW	MED

### 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.

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LOW

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE

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)

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This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

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

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorized landfill.

## **Section 14 - TRANSPORTATION INFORMATION**



DOT					
Symbols:	G	Hazard class or Division:	9		
Identification Numbers:	UN3082	PG:	III		
Label Codes:	9	Special provisions:	8, 146, 335, IB3, T4, TP1, TP29		
Packaging: Exceptions:	155	Packaging: Non-bulk:	203		
Packaging: Exceptions:	155	Quantity limitations: Passenger aircraft/rail:	No limit		
Quantity Limitations: Cargo aircraft only:	No limit	Vessel stowage: Location:	A		
Vessel stowage: Other:	None				
Hazardous materials descriptions Environmentally hazardous substa Air Transport IATA:	and proper shipping names: ance, liquid, n.o.s				
ICAO/IATA Class:	9	ICAO/IATA Subrisk:	黐		
UN/ID Number:	3082	Packing Group:	III		
Special provisions:	A97				
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *(CONTAINS CLOMAZONE) Maritime Transport IMDG:					
IMDG Class:	9	IMDG Subrisk:	None		
UN Number:	3082	Packing Group:	III		
EMS Number:	F-A,S-F	Special provisions:	274 909 944		
Limited Quantities:	5 L				

Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.(contains clomazone)





Hazard Alert Code Key: EXTREME HIGH MODERATE LOW

## Section 15 - REGULATORY INFORMATION

No data for clomazone (CAS: , 81777-89-1, 89493-06-1)

### **Section 16 - OTHER INFORMATION**

#### LIMITED EVIDENCE

**Material Safety Data Sheet** 

- Cumulative effects may result following exposure\*.
- May produce discomfort of the eyes respiratory tract and skin\*.
- May possibly affect fertility\*.
- May possibly be harmful to the fetus/ embryo\*.
- \* (limited evidence).

#### Ingredients with multiple CAS Nos

Ingredient Name clomazone CAS 81777-89-1, 89493-06-1

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■ 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.

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Issue Date: Nov-2-2009 Print Date:May-27-2010