GT PRODUCTS GT-2100

Hazard Alert Code: MODERATE

Chemwatch Material Safety Data Sheet (REVIEW)
Issue Date: 11-Oct-2010
NC317TCP

CHEMWATCH 18-2521
Version No:2.0

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
GT PRODUCTS GT-2100

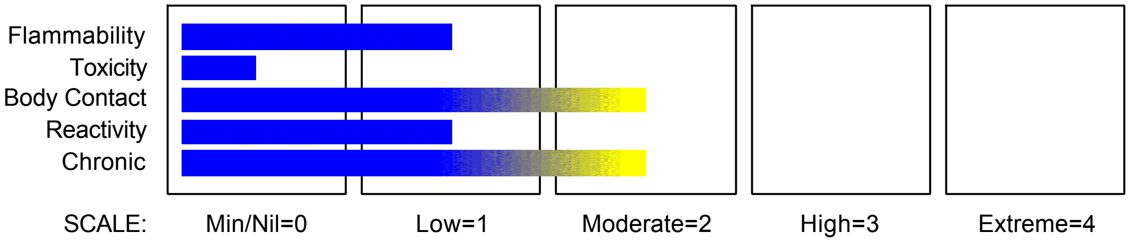
PRODUCT USE

SUPPLIER
Company: Thermon Australia Pty Ltd
Address:
30 London Drive
Bayswater
Victoria, 3153
Australia
Telephone: +61 3 9762 6900
Fax: +61 3 9762 9519

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE
NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.

CHEMWATCH HAZARD RATINGS



RISK
- None under normal operating conditions.

SAFETY
- Avoid contact with skin.

- Wear eye/ face protection.
- In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Centre.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
methyltriacetoxysilane	4253-34-3	1-5
may generate		
formaldehyde	50-00-0	NotSpec
ethyltriacetoxysilane	17689-77-9	1-5
in contact with water or humid air generate		

continued...

acetic acid glacial	64-19-7	NotSpec

Section 4 - FIRST AID MEASURES

SWALLOWED

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

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 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.
- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

■ Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

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

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear 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.

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FIRE/EXPLOSION HAZARD

- 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 monoxide (CO), carbon dioxide (CO_2), silicon dioxide (SiO_2), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.
May emit corrosive fumes.

FIRE INCOMPATIBILITY

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

HAZCHEM

None

Personal Protective Equipment

Gloves, boots (chemical resistant).

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Wear impervious gloves and safety goggles.
- Trowel up/scrape up.
- Place spilled material in clean, dry, sealed container.
- Flush spill area with water.

MAJOR SPILLS

■ Minor hazard.

- Clear area of personnel.
- Alert Fire Brigade and tell them location and nature of hazard.
- Control personal contact by using protective equipment as required.
- Prevent spillage from entering drains or water ways.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite and place in appropriate containers for disposal.
- Wash area and prevent runoff into drains or waterways.
- If contamination of drains or waterways occurs, advise emergency services.

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

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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.

SUITABLE CONTAINER

- Lined metal can, lined metal pail/ can.
- Plastic pail.
- Polyliner drum.
- Packing as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.
- Metal can or drum
- Packaging as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

STORAGE INCOMPATIBILITY

- Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air.

Acetic acid:

- vapours forms explosive mixtures with air (above 39 C.)
- reacts violently with bases such as carbonates and hydroxides (giving off large quantities of heat), oxidisers, organic amines, acetaldehyde, potassium tert-butoxide
- reacts (sometimes violently), with strong acids, aliphatic amines, alkanolamines, alkylene oxides, epichlorohydrin, acetic anhydride, 2-aminoethanol, ammonia, ammonium nitrate, bromine pentafluoride, chlorosulfonic acid, chromic acid, chromium trioxide, ethylenediamine, ethyleneimine, hydrogen peroxide, isocyanates, oleum, perchloric acid, permanganates, phosphorus isocyanate, phosphorus trichloride, sodium peroxide, xylene
- attacks cast iron, stainless steel and other metals, forming flammable hydrogen gas
- attacks many forms of rubber, plastics and coatings.

Formaldehyde:

- is a strong reducing agent
- may polymerise in air unless properly inhibited (usually with methanol up to 15%) and stored at controlled temperatures
- will polymerize with active organic material such as phenol
- reacts violently with strong oxidisers, hydrogen peroxide, potassium permanganate, acrylonitrile, caustics (sodium hydroxide, yielding formic acid and flammable hydrogen), magnesium carbonate, nitromethane, nitrogen oxides (especially a elevated temperatures), peroxyformic acid

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- is incompatible with strong acids (hydrochloric acid forms carcinogenic bis(chloromethyl)ether*), amines, ammonia, aniline, bisulfides, gelatin, iodine, magnesite, phenol, some monomers, tannins, salts of copper, iron, silver.
- acid catalysis can produce impurities: methylal, methyl formate

Aqueous solutions of formaldehyde:

- slowly oxidise in air to produce formic acid
- attack carbon steel

Concentrated solutions containing formaldehyde are:

- unstable, both oxidising slowly to form formic acid and polymerising; in dilute aqueous solutions formaldehyde appears as monomeric hydrate (methylene glycol) - the more concentrated the solution the more polyoxymethylene glycol occurs as oligomers and polymers (methanol and amine-containing compounds inhibit polymer formation)
- readily subject to polymerisation, at room temperature, in the presence of air and moisture, to form paraformaldehyde (8-100 units of formaldehyde), a solid mixture of linear polyoxymethylene glycols containing 90-99% formaldehyde; a cyclic trimer, trioxane (CH_2O_3), may also form

Flammable and/or toxic gases are generated by the combination of aldehydes with azo, diazo compounds, dithiocarbamates, nitrides, and strong reducing agents

*The empirical equation may be used to determine the concentration of bis(chloromethyl)ether (BCME) formed by reaction with HCl:

$$\log(\mathrm{BCME})\mathrm{ppb} = -2.25 + 0.67 \log(\mathrm{HCHO})\ \mathrm{ppm} + 0.77 \log(\mathrm{HCl})\mathrm{ppm}$$

Assume values for formaldehyde, in air, of 1 ppm and for HCl of 5 ppm, resulting BCME concentration, in air, would be 0.02 ppb.

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

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

+	+	+	+	X	+

+: 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

continued...

Source	Material	TWA ppm	TWA mg/m^3	STEL ppm	STEL mg/m^3	Peak ppm	Peak mg/m^3	TWA F/CC	Notes
Australia Exposure Standards	formaldehyde (Formaldehyde (h))	1	1.2	2	2.5				Sen
Australia Exposure Standards	acetic acid glacial (Acetic acid)	10	25	15	37				

The following materials had no OELs on our records

• methyltriacetoxysilane:	CAS:4253- 34- 3
• ethyltriacetoxysilane:	CAS:17689- 77- 9

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m^3)	Revised IDLH Value (ppm)
formaldehyde	0	20
acetic acid glacial	5	50

MATERIAL DATA

ACETIC ACID GLACIAL:
ETHYLTRIACETOXYSILANE:
GT PRODUCTS GT-2100:
METHYLTRIACETOXYSILANE:

■ for acetic acid:

NOTE:Detector tubes for acetic acid, measuring in excess of 1 ppm, are commercially available.

Exposure at or below the TLV-TWA and TLV-STEL is thought to protect the worker against conjunctival, nose and respiratory tract irritation.

Odour Safety Factor(OSF)

OSF=21 ("ACETIC ACID, GLACIAL").

FORMALDEHYDE:
GT PRODUCTS GT-2100:

■ Odour Threshold Value for formaldehyde: 0.98 ppm (recognition)

NOTE: Detector tubes for formaldehyde, measuring in excess of 0.2 ppm are available commercially.

Formaldehyde vapour exposure:

Primary irritation is dependent on duration of exposure and individual susceptibility.

The following are typical symptoms encountered at various exposure levels.

0.1 ppm - Lower level of mucous eye, nose and throat irritation
0.8 ppm - Typical threshold of perception
1-2 ppm - Typical threshold of irritation
2-3 ppm - Irritation of eyes, nose and throat
4-5 ppm - Increased irritation, tearing, headache, pungent odour
10-20 ppm - Profuse tearing, severe burning, coughing
50 ppm - Serious bronchial and alveolar damage
100 ppm - Formaldehyde induced chemical pneumonia and death

Despite the intent of the TLV Ceiling recommendation it is believed that 0.3 ppm will not protect that portion of the workforce (up to 20%) reported to be responsive to low ambient concentrations. Because of the dose-related carcinogenic activity for rat and mouse inhalation of formaldehyde, the report of macromolecular adducts in the upper and lower respiratory tracts of nonhuman primates following inhalation of formaldehyde, the human case reports of upper respiratory tract malignant melanoma associated with formaldehyde inhalation and the suggestive epidemiologic data on human cancer risk, the TLV Committee

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recommends that workplace formaldehyde air concentrations be reduced to the lowest possible levels that can be achieved using engineering controls.

Odour Safety Factor(OSF)
OSF=0.36 (FORMALDEHYDE).

METHYLTRIACETOXYSILANE:

■ 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.

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.

ETHYLTRIACETOXYSILANE:

■ No exposure limits set by NOHSC or ACGIH.

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

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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
- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber.

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	BAX- AUS P	-
1000	50	-	BAX- AUS P
5000	50	Airline *	-
5000	100	-	BAX- 2 P
10000	100	-	BAX- 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 site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

■ General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in special circumstances. If risk of overexposure exists, wear approved respirator. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection. Provide adequate ventilation in warehouses and enclosed storage areas. 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, vapours, 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)	0.5- 1 m/s (100- 200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion)	2.5- 10 m/s (500- 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 favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	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 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

APPEARANCE

Translucent, red, black, white, or aluminum paste with acetic acid odour; doesn't mix with water.

PHYSICAL PROPERTIES

Does not mix with water.
Sinks in water.

State	Non Slump Paste	Molecular Weight	Not Applicable
Melting Range (°C)	Not Available	Viscosity	Not Available
Boiling Range (°C)	Not Available	Solubility in water (g/L)	Immiscible
Flash Point (°C)	Not Available	pH (1% solution)	Not Available
Decomposition Temp (°C)	Not Available	pH (as supplied)	Not Available
Autoignition Temp (°C)	Not Available	Vapour Pressure (kPa)	Not Available

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Upper Explosive Limit (%)	Not Available	Specific Gravity (water=1)	1- 1.06
Lower Explosive Limit (%)	Not Available	Relative Vapour Density (air=1)	2.1 (acetic acid)
Volatile Component (%vol)	Not Available	Evaporation Rate	Not Available

formaldehyde	
log Kow (Prager 1995):	0.35
log Kow (Sangster 1997):	0.35
acetic acid glacial	
log Kow (Prager 1995):	- 0.31
log Kow (Sangster 1997):	- 0.17

Section 10 - STABILITY AND REACTIVITY

CONDITIONS CONTRIBUTING TO INSTABILITY

■ Product is considered stable and 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

■ The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (eg. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

EYE

■ There is some evidence to suggest that this material can cause eye irritation and damage in some persons.

SKIN

■ There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.
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

■ There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

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CHRONIC HEALTH EFFECTS

■ Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.
When administered by inhalation, formaldehyde induced squamous cell carcinomas of the nasal cavity in rats of both sexes. Although excess occurrence of a number of cancers has been reported in humans, the evidence for a possible involvement of formaldehyde is strongest for nasal and nasopharangeal cancer. The occurrence of these cancers showed an exposure-response gradient in more than one study, but the numbers of exposed cases were often small and some studies did not show excesses In humans. Formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx and nasal passages.
Several investigations have concluded that specific respiratory sensitisation occurs based on positive bronchial provocation tests amongst formaldehyde-exposed workers. These studies have been criticised for methodological reasons. One large study however revealed that 5% of persons exposed to formaldehyde and had asthma-like symptoms met the study criteria for formaldehyde-induced asthma; this included a positive response on a bronchial provocation test with 2.5 mg/m3 formaldehyde. Although differential individual sensitivity has been established, the mechanism for this increased sensitivity is unknown.
There is limited evidence that formaldehyde has any adverse effect on reproduction or development in humans. An investigation of reproductive function in female workers exposed to formaldehyde in the garment industry, revealed an increased incidence of menstrual disorders, inflammatory disease of the reproductive tract, sterility, anaemia, and low birth weights amongst off-spring.

TOXICITY AND IRRITATION

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

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic 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.

ETHYLTRIACETOXYSILANE:
ACETIC ACID GLACIAL:
FORMALDEHYDE:
■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

ACETIC ACID GLACIAL:
FORMALDEHYDE:
■ The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.

ACETIC ACID GLACIAL:
METHYLTRIACETOXYSILANE:
■ Prolonged or repeated exposure to acetic acid may produce irritation and/or corrosion at the site of contact as well as systemic toxicity. Prolonged inhalation exposure results in muscle imbalance, increase in blood cholinesterase activity, decreases in albumins and decreased growth but no effect on reproductive or

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foetal toxicity.

ETHYLTRIACETOXYSILANE:
METHYLTRIACETOXYSILANE:

- The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.
- The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.

GT PRODUCTS GT-2100:

- Not available. Refer to individual constituents.

METHYLTRIACETOXYSILANE:

- The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The acute toxicity of methyltriacetoxysilane is described by LD50s in the rat (oral) of 1602 (neat) and 2850 (in corn oil vehicle) mg/kg bw. The clinical signs included decreased body weight and food consumption, labored breathing, rales, red stains around the snout and extremities, salivation, lacrimation, lethargy, irregular gait, hunched posture, red urination, black/brown anogenital staining, paleness, chromodacryorrhea and hypothermia. Necropsy findings, mainly involving the stomach were stomach adhesions, thickened walls and abnormal stomach contents. Although acute toxicity data for the inhalation or dermal routes of exposure are not available for methyltriacetoxysilane, these exposures will likely result in local site of contact effects from acetic acid. Methyltriacetoxysilane is severely irritating and corrosive to the skin, and corrosive to the eyes of animals and is likely to be a respiratory irritant based on production of acetic acid following hydrolysis.

In a 7-day oral range-finding study (gavage) rats were treated with undiluted ethyltriacetoxysilane (dose levels of 0, 17 (males), 23 (females), 100, 500 and 1000 mg/kg/d). Ethyltriacetoxysilane rapidly hydrolyzes (in seconds) to acetic acid and a trisilanol (3:1). The silanol generated is insignificant in both quantity and toxicity relative to the production of acetic acid and its associated toxicity. Animals from the 17 (males), 23 (females) and 100 mg/kg/day dose groups survived to day 7. Animals from the 500 and 1000 mg/kg/day dose groups were sacrificed after the third dose as a consequence of two deaths (one from each group), marked body weight loss, and severity of lesions (ulceration and erosion of stomach and esophagus) observed in necropsied animals. The stomach lesions observed resembled irritation from acetic acid production. This 7-day range-finder study indicated that a maximum dose level of less than 17 (males) and 23 (females) mg/kg/day would be required for a longer duration repeated dose study in order to avoid death or obvious suffering due to the corrosivity of the hydrolysis product, acetic acid. NOAELs following repeated exposure to acetic acid and its salts range from 210 mg/kg bw/day (2-4 month acetic acid drinking water study; systemic toxicity) to 3600 mg/kg bw/day (acetic acid, sodium salt, 4 week dietary study; no effects reported). Signs of irritation/corrosion at the site of contact as well as systemic toxicity have been reported.

In vitro, methyltriacetoxysilane was negative in bacterial gene mutations assay and did not induce structural and numerical chromosome aberrations in CHO cells.

FORMALDEHYDE:

TOXICITY
Oral (woman) LDLo: 108 mg/kg
Oral (man) TDLo: 643 mg/kg
Oral (rat) LD50: 100 mg/kg
Inhalation (man) TCLo: 0.3 mg/m^3
Inhalation (rat) LC50: 203 mg/m^3
Dermal (rabbit) LD50: 270 mg/kg

IRRITATION
Skin (human): 0.15 mg/3d- I Mild
Skin (rabbit): 2 mg/24H SEVERE
Eye (human): 4 ppm/5m
Eye (rabbit): 0.75 mg/24H SEVERE

- Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune

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reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.
WARNING: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS.
Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen
[National Toxicology Program: U.S. Dep. of Health & Human Services 2002].

ETHYLTRIACETOXYSILANE:
■ No data of toxicological significance identified in literature search.

ACETIC ACID GLACIAL:

TOXICITY	IRRITATION
Oral (human) TDLo: 1.47 mg/kg	Skin (human):50mg/24hr - Mild
Unreport (man) LDLo: 308 mg/kg	Skin (rabbit):525mg (open)- SEVERE
Oral (rat) LD50: 3310 mg/kg	Eye (rabbit): 0.05mg (open)- SEVERE
Inhalation (human) TCLo: 816 ppm/3 min	
Inhalation (rat) LCLo: 16000 ppm/4 hr	
Dermal (rabbit) LD50: 1060 mg/kg	

Section 12 - ECOLOGICAL INFORMATION

ETHYLTRIACETOXYSILANE:
ACETIC ACID GLACIAL:
METHYLTRIACETOXYSILANE:

■ Acetic acid and its salts (the acetates) can be grouped together because of their close structural relationships, their natural occurrence in plants and animals, and their fundamental role in cell metabolism, particularly in the tricarboxylic acid cycle (also known as the citric acid or Kreb's cycle), which is where humans get their energy.

- Acetic acid is degraded photochemically in the atmosphere to produce hydroxyl radicals (estimated typical half-life of 22 days). Physical removal of acetates on atmospheric particulates may occur via wet or dry deposition.
- Natural water will neutralise dilute solutions of acetic acid.
- Spills of acetic acid on soil will readily biodegrade - the biodegradation rate for acetic acid after 14 days under aerobic conditions is 74 days.
- In invertebrates the toxicity of acetic acid (EC50 = 50-450 mg/L, depending on test species) -under static conditions, the 48 hour EC50 value for acetic acid is 65 mg/L for aquatic invertebrates (the test media was not neutralised). When the test solutions are neutralised, to form acetates, the static 48 hour EC50 for acetic acid is 6000 mg/L. In renewal systems with aquatic invertebrates, 48 hour EC50s for acetic acid are 100 mg/L and 180 mg/L.
- Fish LC50 (96 h): 75-88 mg/L.
- Acetic acid is not expected to bioconcentrate in the aquatic system.
- Low concentrations of acetic acid are harmful to fish.
- Drinking water standards: none available.
- Soil Guidelines: none available.
- Air Quality Standards: none available.

ETHYLTRIACETOXYSILANE:
ACETIC ACID GLACIAL:
FORMALDEHYDE:

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■ Prevent, by any means available, spillage from entering drains or water courses.

FORMALDEHYDE:
ETHYLTRIACETOXYSILANE:
ACETIC ACID GLACIAL:
METHYLTRIACETOXYSILANE:
■ DO NOT discharge into sewer or waterways.

METHYLTRIACETOXYSILANE:
■ For methyltriacetoxysilane:
Environmental fate:
The melting point of methyltriacetoxysilane is 41 deg C and the boiling point is 220 deg C at 1013 hPa. The vapor pressure is 0.26 hPa at 20 deg C. The estimated water solubility of methyltriacetoxysilane is 91 g/L; the estimated log Kow is 0.25. The water solubility and log Kow values may not be reliable because the chemical is hydrolytically unstable. The atmospheric half-life based only on photodegradation (i.e., reaction with hydroxyl radical) is 58 days. The atmospheric half-life based on photodegradation and hydrolysis is <2 min. However, photodegradation as a mode of removal is unlikely because methyltriacetoxysilane is highly reactive and hydrolytically unstable, such that acetic acid and methylsilanetriol are rapidly generated upon contact with water or water vapor. Consequently, reaction with water vapor is likely the predominant degradation process for methyltriacetoxysilane in air. The vapor pressure indicates that methyltriacetoxysilane resides in the atmosphere and may undergo photodegradation due to ozone and/or hydroxyl radicals. Due to the very fast hydrolysis, the substance is not expected to reside in air and vapor pressure of the substance may not be relevant.
Methyltriacetoxysilane is hydrolytically unstable over a range of environmentally relevant pH and temperature conditions. At pH 7, the half-life is = <12 seconds. Rapid hydrolysis of this material produces acetic acid and trisilanols.
Methyltriacetoxysilane is likely to be readily biodegradable based on results with a close structural analog, ethyltriacetoxysilane; however these materials rapidly hydrolyse and generate 3 moles of acetic acid for every mole of parent material. Thus, the biodegradation observed is likely reflective of the hydrolysis product, acetic acid. The biodegradation rate for acetic acid after 14 days under aerobic conditions is 74%.
Bioaccumulation is not anticipated since this material is hydrolytically unstable.
Ecotoxicity:
Acute aquatic toxicity studies are available from two structural analogs, ethyltriacetoxysilane, and vinyltriacetoxysilane, as well as the primary hydrolysis product, acetic acid. The 96-hour LC50 of ethyltriacetoxysilane for Brachydanio rerio is 251 mg/L (the test media was not neutralized). The 96-hour LC50 of vinyltriacetoxysilane for Oncorhyncus mykiss is 51 mg/L and for Lepomis macrochirus is 68 mg/L (in both cases the test media was not neutralised). The 72 hour LC50s for acetic acid are 75, 79-88 (pH <5.9) and 251 mg/L (several species of fish). The 48 hour EC50 of ethyltriacetoxysilane is 62 mg/L for Daphnia magna. The 48 hour EC50 of vinyltriacetoxysilane is 100 mg/L for Daphnia magna (the test media was not neutralised). Under static conditions, the 48 hour EC50 value for acetic acid is 65 mg/L for aquatic invertebrates (the test media was not neutralised). When the test solutions are neutralised, the static 48 hour EC50 for acetic acid is 6000 mg/L. In renewal systems with aquatic invertebrates, 48 hour EC50s for acetic acid are 100 mg/L and 180 mg/L. Ethyltriacetoxysilane toxicity to Scenedesmus subspicatus provided a 72 hour EC50 of 73 and 76 mg/L for biomass and growth rate, respectively (the test media was not neutralized). When results are expressed on the basis of the amount of acetic acid generated from the hydrolysis reaction, the toxicity of the parent material is comparable to the reported toxicity of acetic acid (EC50 = 50-450 mg/L, depending on test species). Studies have been performed with a silanol monomer, trimethylsilanol (CAS No. 1066-40-6). Although this silanol is not expected to be produced following hydrolysis of methyltriacetoxysilane. A semistatic 96h study with trimethylsilanol and rainbow trout (Oncorhynchus mykiss) resulted in a No Observed Effect Concentration (NOEC) of 128 mg/L and an LC50 of 271 mg/L.
Methyltriacetoxysilane undergoes rapid hydrolysis in moist/aqueous environments (t1/2 is less than 12 seconds) to acetic acid and the corresponding trisilanols, thus observed toxicity is likely due primarily to acetic acid. Abiotic hydrolysis products undergo continuous, condensation reactions to produce higher molecular weight cyclic and linear siloxanes (the number-average and weight-average molecular weights (MW)

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were determined to be 1247 and 6208, respectively, with 69% of the chromatogram represented by a MW range higher than 1000 at the 1-hr reaction time; at the 4-hr reaction time, the number-average and weight-average molecular weights increased to 1629 and 152600 with 77% of the chromatogram higher than 1000 molecular weight, respectively). The polymerisation products are not volatile and are in a molecular weight range large enough to be considered biologically unavailable.

FORMALDEHYDE:
■ Harmful to aquatic organisms.
For formaldehyde:
Environmental fate:
Formaldehyde is ubiquitous in the environment as a contaminant of smoke and as photochemical smog.
In the atmosphere, formaldehyde both photolyses and reacts with reactive free radicals (primarily hydroxyl radicals); half-lives in the sunlit tropospheres are 1.25 to 6 hours for photolysis, and 7.13-71.3 hours for reaction with hydroxyl radicals).
Reaction with nitrate radicals, insignificant during the day, may be an important removal process at night.
Due to its solubility, formaldehyde will efficiently transfer to rain and surface water; one model predicts dry deposition and wet removal half-lives of 19 and 50 hours, respectively.
In water, formaldehyde will biodegrade to low concentrations within days; adsorption to sediment and volatilisation are not expected to be significant routes.
In soil, aqueous solutions of formaldehyde leach through the soil; at high concentrations adsorption to clay minerals may occur. Although biodegradable under both aerobic and anaerobic conditions the fate of formaldehyde in soil is unclear.
It does not bioconcentrate in the food chain.
Concentrated solutions containing formaldehyde are unstable, both oxidising slowly to form formic acid and polymerising. In the presence of air and moisture, polymerisation takes place readily in concentrated solutions at room temperature to form paraformaldehyde, a solid mixture of linear polyoxymethylene glycols containing 90-99% formaldehyde.
Drinking Water Standards:
hydrocarbon total: 10 ug/l (UK max.)
pesticide: 0.1 ug/l (UK max.)
formaldehyde: 900 ug/l (WHO guideline)
Air Quality Standards:
<0.1 mg/m3 as a 30 min. average, indoor air, non-industrial buildings (WHO guideline).
The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l
* Classification of Substances as Ecotoxic (Dangerous to the Environment)
Appendix 8, Table 1
Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.
log Kow: 0-0.35
Half-life (hr) air: 19-50
Henry's atm m^3 /mol: 3.27E-07
BOD 5 if unstated: 0-1.1,60%
COD: 1.06,100%
ThOD: 1.068

ETHYLTRIACETOXYSILANE:

ACETIC ACID GLACIAL:
■ Ecotoxicity:
The tolerance of water organisms towards pH margin and variation is diverse. Recommended pH values for test species listed in OECD guidelines are between 6.0 and almost 9. Acute testing with fish showed 96h-LC50 at about pH 3.5.

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Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
methyltriacetoxysilane	HIGH		LOW	HIGH
formaldehyde	LOW	LOW	LOW	HIGH
ethyltriacetoxysilane	HIGH		LOW	HIGH
acetic acid glacial	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

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

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM:
None (ADG7)

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

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE None

REGULATIONS

Regulations for ingredients

methyltriacetoxysilane (CAS: 4253-34-3) is found on the following regulatory lists;
"Australia Inventory of Chemical Substances (AICS)","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals"

formaldehyde (CAS: 50-00-0,8005-38-7,8006-07-3,8013-13-6,112068-71-0) is found on the following regulatory lists;
"Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (Domestic water supply - disinfection by-products)","Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Domestic water quality","Australia - Queensland Hazardous Materials and Prescribed Quantities for Major Hazard Facilities","Australia Dangerous Goods Code (ADG Code) - Goods Too Dangerous To Be Transported","Australia Exposure Standards","Australia Exposure Standards Currently Under Review","Australia Hazardous Substances","Australia High Volume Industrial Chemical List (HVICL)","Australia Illicit Drug Precursors/Reagents - Category II","Australia Inventory of Chemical Substances (AICS)","Australia National Pollutant Inventory","Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 6","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix C","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix F (Part 3)","Australia Standard for the Uniform Scheduling of Medicines and

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Poisons (SUSMP) - Schedule 2","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk","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","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals","WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

ethyltriacetoxysilane (CAS: 17689-77-9) is found on the following regulatory lists;
"Australia Inventory of Chemical Substances (AICS)","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals"

acetic acid glacial (CAS: 64-19-7) is found on the following regulatory lists;
"Australia Exposure Standards","Australia Hazardous Substances","Australia High Volume Industrial Chemical List (HVICL)","Australia Illicit Drug Reagents/Essential Chemicals - Category III","Australia Inventory of Chemical Substances (AICS)","Australia National Pollutant Inventory","Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 6","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix E (Part 2)","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix F (Part 3)","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 2","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5","CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk","International Council of Chemical Associations (ICCA) - High Production Volume List","International Fragrance Association (IFRA) Survey: Transparency List","OECD Representative List of High Production Volume (HPV) Chemicals"

No data for GT Products GT-2100 (CW: 18-2521)

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS				
formaldehyde	50-00-0,	8005-38-7,	8006-07-3,	8013-13-6,	112068-71-0

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ 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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This is the end of the MSDS.