SAFETY DATA SHEET

Section 1. Identification of the material and the supplier

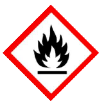
Product:	**5037 White Lithium Grease**
Product Code:	S739
Product Use:	Lubricant grease.
Manufacturer	CRC Industries New Zealand 10 Highbrook Drive East Tamaki, Auckland
New Zealand Supplier:	**Glasscorp Limited**
Address:	**124 Bush Road** **Albany** **Auckland** **New Zealand**
Telephone:	09 415 6338
Fax Number:	09 415 6339
Website	www.glasscorp.co.nz
Emergency Telephone:	**09 415 6338**
CRC date of issue:	11 May 2011 version 4.1.1.1
Glasscorp date of issue:	27 February 2013

Section 2. Hazards Identification

This substance is classified as a dangerous good according to NZS5433: 2012

This substance is hazardous according to the HSNO (Minimum Degrees of Hazard) Regulations 2001

Label pictograms:



HSNO Classification	Hazard Code	Hazard Statement
2.1.2A	H222	Extremely flammable aerosol.
6.3B	H316	Causes mild skin irritation.
6.4A	H319	Causes serious eye irritation.
6.8C	H362	May cause harm to breast-fed children.
6.9	H335	May cause respiratory irritation.

Prevention Code	Prevention Statement
P103	Read label before use.
P104	Read safety data sheet before use
P201	Obtain special instructions before use.
P210	Keep away from heat, sparks or open flames. No smoking.
P211	Do not spray on an open flame or other ignition source.
P251	Pressurized container: Do not pierce or burn, even after use.

P260	Do not breathe fumes or vapours.
P263	Avoid contact during pregnancy/while nursing.
P264	Wash hands thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective clothing

Response code	**Response Statement**
P312	Call a POISON CENTER or doctor/physician if you feel unwell.
P338	Remove contact lenses, if present and easy to do. Continue rinsing.
P304 + P340	IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/attention.

Storage Code	**Storage Statement**
P405	Store locked up.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P410 + P412	Protect from sunlight. Do not expose to temperatures exceeding 50 °C.

Disposal Code	**Disposal Statement**
P501	Aerosol – dispose of according to Local Regulations

Section 3. Composition / Information on Ingredients

Ingredients	**Wt%**	**CAS NUMBER.**
Isohexanes	30-60	73513-42-5
Mineral Oil	1 -10	Not available
Lithium stearate	1-10	4485-12-5
Hydrocarbon propellant	10-30	68476-85-7

Section 4. First Aid Measures

Routes of Exposure:

If in Eyes	If aerosols come in contact with the eyes: Immediately hold the eyelids apart and flush the eye continuously for at least 15 minutes 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. Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
If on Skin	If solids or aerosol mists are deposited upon the skin: Flush skin and hair with running water (and soap if available). Remove any adhering solids with industrial skin cleansing cream. DO NOT use solvents. Seek medical attention in the event of irritation.
If Swallowed	Avoid giving milk or oils. Avoid giving alcohol. Not considered a normal route of entry.

	If spontaneous vomiting appears imminent or occurs, hold patients head down, lower than their hips to help avoid possible aspiration of vomitus.
If Inhaled	If aerosols, fumes or combustion products are inhaled: Remove to fresh air. 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. If breathing is shallow or has stopped, ensure clear airway and apply resuscitation, 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

Primary threat to life, from pure petroleum distillate ingestion and/or inhalation, is respiratory failure.
Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnoea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (p02 50 mm Hg) should be intubated.
Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.

A chest x-ray should be taken immediately after stabilisation of breathing and circulation to document aspiration and detect the presence of pneumothorax.
Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitisation to catecholamines. Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. [Ellenhorn and Barceloux: Medical Toxicology]
Clinical effects of lithium intoxication appear to relate to duration of exposure as well as to level.

Lithium produces a generalised slowing of the electroencephalogram; the anion gap may increase in severe cases. Emesis (or lavage if the patient is obtunded or convulsing) is indicated for ingestions exceeding 40 mg (1_0/Kg. Overdose may delay absorption; decontamination measures may be more effective several hours after cathartics. Charcoal is not useful. No clinical data are available to guide the administration of catharsis. Haemodialysis significantly increases lithium clearance; indications for haemodialysis include patients with serum levels above 4 mEq/L
There are no antidotes.

Section 5. Fire Fighting Measures

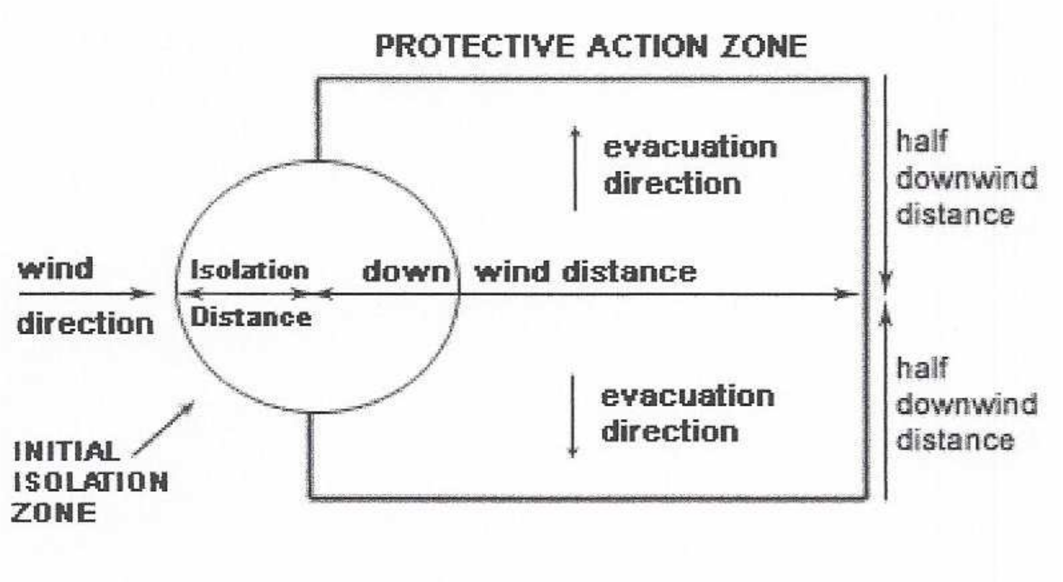
Hazard Type	Flammable Aerosol
Hazards from decomposition products	Severe fire hazard when exposed to heat or flame. Vapour forms an explosive mixture with air. Severe explosion hazard, in the form of vapour, when exposed to flame or spark. Vapour may travel a considerable distance to source of ignition. Heating may cause expansion or decomposition with violent container rupture. Aerosol cans may explode on exposure to naked flames. Rupturing containers may rocket and scatter burning materials. Hazards may not be restricted to pressure effects. May emit acrid, poisonous or corrosive fumes. On combustion, may emit toxic fumes of carbon monoxide (CO). Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), other pyrolysis products typical of burning organic material. Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions. May emit clouds of acrid smoke.
Suitable Extinguishing	Water spray, dry chemical or CO2

media	
Precautions for firefighters and special protective clothing	Alert Fire Brigade and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or water course. If safe, switch off electrical equipment until vapour fire hazard removed. 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. When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 100 metres in all directions.
HAZCHEM CODE	2YE

Section 6. Accidental Release Measures

Minor Spills
Clean up all spills immediately.
Avoid breathing vapours and contact with skin and eyes.
Wear protective clothing, impervious gloves and safety glasses. Shut off all possible sources of ignition and increase ventilation. Wipe up.
If safe, damaged cans should be placed in a container outdoors, away from all ignition sources, until pressure has dissipated.
Undamaged cans should be gathered and stowed safely.

Major Spills
DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve.
Clear area of personnel and move upwind.
Alert Fire Brigade and tell them location and nature of hazard.
May be violently or explosively reactive.
Wear breathing apparatus plus protective gloves.
Prevent, by any means available, spillage from entering drains or water courses
No smoking, naked lights or ignition sources.
Increase ventilation.
Stop leak if safe to do so.
Water spray or fog may be used to disperse / absorb vapour.
Absorb or cover spill with sand, earth, inert materials or vermiculite.
If safe, damaged cans should be placed in a container outdoors, away from ignition sources, until pressure has dissipated.
Undamaged cans should be gathered and stowed safely.
Collect residues and seal in labelled drums for disposal.
Remove leaking cylinders to a safe place if possible.
Release pressure under safe, controlled conditions by opening the valve.



Footnotes
1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres 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.

Section 7. Handling and Storage

Precautions for safe 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.
Avoid smoking, naked lights or ignition sources. Avoid contact with incompatible materials. When handling, DO NOT eat, drink or smoke. DO NOT incinerate or puncture aerosol cans.
DO NOT spray directly on humans, exposed food or food utensils.
Avoid physical damage to containers.
Always wash hands with soap and water after handling. Work clothes should be laundered separately.

Storage in bulk quantities:
Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can.
Store in original containers in approved flammable liquid storage area.
DO NOT store in pits, depressions, basements or areas where vapours may be trapped. No smoking, naked lights, heat or ignition sources.
Keep containers securely sealed. Contents under pressure.
Store away from incompatible materials.

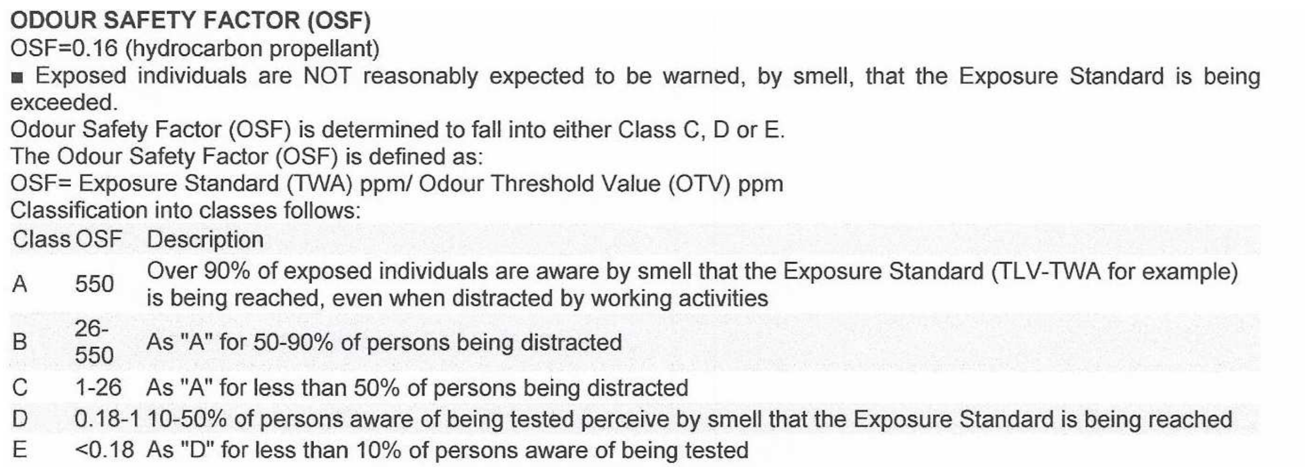
Store in a cool, dry, well ventilated area.
Avoid storage at temperatures higher than 40 deg C.
Store in an upright position.
Protect containers against physical damage.
Check regularly for spills and leaks.
Observe manufacturer's storage and handling recommendations contained within this MSDS**.**

Section 8 Exposure Controls / Personal Protection

WORKPLACE EXPOSURE STANDARDS (provided for guidance only)

		TWA		STEL	
Substance	CAS #	ppm	mg/m3	ppm	mg/m3
White Lithium Grease		800	1900		
Isohexanes	73513-42-5	500	1760	1000	3500
Lithium Stearate	4485-12-5	10			
Hydrocarbon Propellant (LPG)	68476-85-7	1000	1800		

Workplace Exposure Standard – Time Weighted Average (WES-TWA).The time-weighted average exposure standard designed to protect the worker from the effects of long-term exposure. Workplace Exposure Standard – Short-Term Exposure Limit (WESSTEL). The 15-minute average exposure standard. Applies to any 15- Minute period in the working day and is designed to protect the worker against adverse effects of irritation, chronic or irreversible tissue change, or narcosis that may increase the likelihood of accidents. The WES-STEL is not an alternative to the WES-TWA; both the short-term and time-weighted average exposures apply.



ODOUR SAFETY FACTOR (OSF)
OSF=0.16 (hydrocarbon propellant)

■ Exposed individuals are NOT reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.
The Odour Safety Factor (OSF) is defined as:
OSF= Exposure Standard (TWA) ppm/ Odour Threshold Value (OTV) ppm
Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV-TWA for example) is being reached, even when distracted by working activities
B	26-550	As "A" for 50-90% of persons being distracted
C	1-26	As "A" for less than 50% of persons being distracted
D	0.18-1	10-50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	As "D" for less than 10% of persons aware of being tested

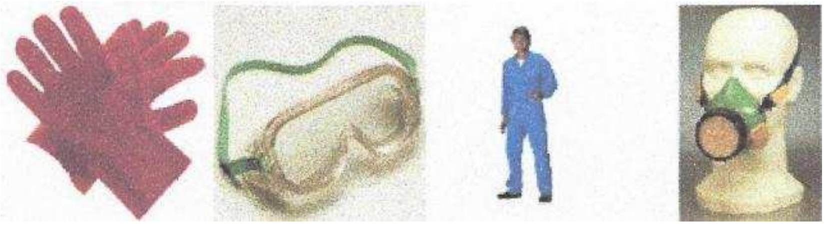
Material Data
CRC (NZ) 5037 WHITE LITHIUM GREASE:
HYDROCARBON PROPELLANT:
For butane:
Odour Threshold Value: 2591 ppm (recognition)
Butane in common with other homologues in the straight chain saturated aliphatic hydrocarbon series is not characterised by its toxicity but by its narcosis-inducing effects at high concentrations. The TLV is based on analogy with pentane by comparing their lower explosive limits in air. It is concluded that this limit will protect workers against the significant risk of drowsiness and other narcotic effects.
Odour Safety Factor(OSF)
OSF=0.22 (n-BUTANE).
CRC (NZ) 5037 WHITE LITHIUM GREASE:
ISOHEXANES:
for: hexane, isomers (excluding n-hexane)
The TLV-TWA is thought to be protective against nausea, headache, upper respiratory tract irritation and CNS depression. The STEL is added to prevent objective depression of the CNS. The lower value ascribed to n-hexane is due to the neurotoxicity of its metabolites, principally 5-hydroxy-2-hexanone and 2,5-hexanedione. It is considered unlikely that other hexanes follow the same metabolic route. It should be noted

however that the n-hexane TLV-TWA also applies to commercial hexane having a concentration of greater than 5% n-hexane.
CRC (NZ) 5037 WHITE LITHIUM GREASE:
For liquefied petroleum gases (LPG):
TLV TWA: 1000 ppm, 1800 mg/m3 (as LPG)
ES TWA: 1000 ppm, 1800 mg/m3 (as LPG)
OES TWA: 1000 ppm, 1750 mg/m3; STEL: 1250 ppm, 2180 mg/m3 (as LPG)
IDLH Level: 2000 ppm (lower explosive limit)
No chronic systemic effects have been reported from occupational exposure to LPG. The TLV-TWA is based on good hygiene practices and is thought to minimise the risk of fire or explosion.
Odour Safety Factor(OSF)
OSF=0.16 (hydrocarbon propellant).
None assigned. Refer to individual constituents.
MINERAL OIL:
for mineral oils (excluding metal working fluids), pure, highly and severely refined:
Human exposure to oil mist alone has not been demonstrated to cause health effects except at levels above 5 mg/m3 (this applies to particulates sampled by a method that does not collect vapour). It is not advisable to apply this standard to oils containing unknown concentrations and types of additive.
LITHIUM STEARATE:
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. 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. The stearates have a low order of acute and chronic toxicity. Intratracheal administration of relatively large doses in rats produce varying degrees of pulmonary damage. Acute, gross inhalation exposure has been associated with clinical pneumonitis. A case of "pneumoconiosis with probable heart failure" has been reported in a rubber worker occupationally exposed to zinc stearate dust for 29 years. Several cases of infants developing respiratory distress and in some instances, acute fatal pneumonitis on aspiration of zinc stearate powder, have been reported.
HYDROCARBON PROPELLANT:
For propane
Odour Safety Factor(OSF)
OSF=0.16 (PROPANE).

Engineering Controls
Use of a quantity of this material in confined space or poorly ventilated area, where rapid build up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear.

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.
General exhaust is adequate under normal conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection.
Provide adequate ventilation in warehouse or closed storage areas.

Personal Protection



Eye
No special equipment for minor exposure i.e. when handling small quantities.
OTHERWISE: For potentially moderate or heavy exposures:
Safety glasses with side shields.
NOTE: Contact lenses pose a special hazard; soft lenses may absorb irritants and ALL lenses concentrate them.

Hands/Feet
No special equipment needed when handling small quantities.
OTHERWISE:
For potentially moderate exposures:
Wear general protective gloves, eg. light weight rubber gloves.
For potentially heavy exposures:
Wear chemical protective gloves, eg. PVC. and safety footwear.

Other
No special equipment needed when handling small quantities.
OTHERWISE:
Overalls.
Skin cleansing cream.
Eyewash unit.
Do not spray on hot surfaces.
The clothing worn by process operators insulated from earth may develop static charges far higher (up to 100 times) than the minimum ignition energies for various flammable gas-air mixtures. This holds true for a wide range of clothing materials including cotton.
Avoid dangerous levels of charge by ensuring a low resistivity of the surface material worn outermost.
BRETHERICK: Handbook of Reactive Chemical Hazards.

Respirator
Type AX Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent) Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content. The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.

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

Section 9 Physical and Chemical Properties

Appearance	Aerosol Liquid Gas
Odour	Solvent
Flash Point	<-5
Boiling Point	59 initial
Volatile Component (%vol)	70
Specific Gravity	0.663
Solubility in Water	Immiscible
Relative Vapour Density (air=1)	>1

Section 10. Stability and Reactivity

Conditions contributing to instability	Elevated temperatures. Presence of open flame. Product is considered stable.
Conditions to Avoid	Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result. Heat
Incompatibility	Avoid reaction with oxidising agents

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.
Large doses of lithium ion have caused dizziness and prostration and can cause kidney damage if sodium intake is limited. Dehydration, weight-loss, dermatological effects and thyroid disturbances have been reported. Central nervous system effects that include slurred speech, blurred vision, sensory loss, impaired concentration, irritability, lethargy, confusion, disorientation, drowsiness, anxiety, spasticity, delirium, stupor, ataxia (loss of muscle coordination), sedation, fine and gross tremor, giddiness, twitching and convulsions may occur. Diarrhoea, vomiting and neuromuscular effects such as tremor, clonus (rapid contraction and relaxation of muscles) and hyperactive reflexes may occur as a result of repeated exposure to lithium.
Acute severe overexposure may affect the kidneys, resulting in renal dysfunction, albuminuria, oliguria and degenerative changes. Cardiovascular effects may also result in cardiac arrhythmias and hypotension.
The primary target organ for lithium toxicity is the central nervous system. Lithium is therefore used therapeutically on membrane transport proteins in the central nervous system when treating manic-depression. Lithium is moderately toxic with lethal dose of LiCl in rats of 526-840 mg/kg body weight. After chronic exposure to 1 mEq/L decreased brain weight was observed in male offspring . Chemically, lithium resembles sodium, but is more toxic: in humans 5 g LiCl can result in fatal poisoning. In therapeutic doses, damages on the central nervous system and the kidneys have been reported.
Not normally a hazard due to physical form of product.
Considered an unlikely route of entry in commercial/industrial environments.
Swallowing of the liquid may cause aspiration of vomit into the lungs with the risk of haemorrhaging, pulmonary oedema, progressing to chemical pneumonitis; serious consequences may result.
Signs and symptoms of chemical (aspiration) pneumonitis may include coughing, gasping, choking, burning of the mouth, difficult breathing, and bluish coloured skin (cyanosis).

EYE

Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.
Direct contact with the eye may not cause irritation because of the extreme volatility of the gas; however concentrated atmospheres may produce irritation after brief exposures.
Direct eye contact with some concentrated anionic surfactants/ hydrotropes produces corneal damage, in some cases severe. Low concentrations may produce immediate discomfort, conjunctival hyperaemia, and oedema of the corneal epithelium. Healing may take several days. Temporary clouding of the cornea may occur.

SKIN

Repeated exposure may cause skin cracking, flaking or drying following normal handling and use.
Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.
Spray mist may produce discomfort.
Anionic surfactants/ hydrotropes generally produce skin reactions following the removal of natural oils. The skin may appear red and may become sore. Papular dermatitis may also develop. Sensitive individuals may exhibit cracking, scaling and blistering.
Open cuts, abraded or irritated skin should not be exposed to this material.
The material may accentuate any pre-existing dermatitis condition.
Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds 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

Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.
Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.

Common, generalised symptoms associated with toxic gas inhalation include:
central nervous system effects such as depression, headache, confusion, dizziness, progressive stupor, coma and seizures;
respiratory system complications may include acute pulmonary oedema, dyspnoea, stridor, tachypnoea, bronchospasm, wheezing and other reactive airway symptoms, and respiratory arrest;
cardiovascular effects may include cardiovascular collapse, arrhythmias and cardiac arrest;
gastrointestinal effects may also be present and may include mucous membrane irritation, nausea and vomiting (sometimes bloody), and abdominal pain.
Acute effects from inhalation of high concentrations of vapour are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterised by headache and dizziness, increased reaction time, fatigue and loss of co-ordination.
Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.

Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. Vapour is heavier than air and may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.
Symptoms of asphyxia (suffocation) may include headache, dizziness, shortness of breath, muscular weakness, drowsiness and ringing in the ears. If the asphyxia is allowed to progress, there may be nausea and vomiting, further physical weakness and unconsciousness and, finally, convulsions, coma and death.
Significant concentrations of the non-toxic gas reduce the oxygen level in the air. As the amount of oxygen is reduced from 21 to 14 volume %, the pulse rate accelerates and the rate and volume of breathing increase. The ability to maintain attention and think clearly is diminished and muscular coordination is somewhat disturbed. As oxygen decreases from 14-10% judgement becomes faulty; severe injuries may cause no pain. Muscular exertion leads to rapid fatigue. Further reduction to 6% may produce nausea and vomiting and the ability to move may be lost. Permanent brain damage may result even after resuscitation at exposures to this lower oxygen level. Below 6% breathing is in gasps and convulsions may occur. Inhalation of a mixture containing no oxygen may result in unconsciousness from the first breath and death will follow in a few minutes.
VVARNING:Intentional misuse by concentrating/inhaling contents may be lethal.

CHRONIC HEALTH EFFECTS

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
Neuromuscular effects result from chronic over-exposure to lithium compounds. These may include tremor, ataxia, clonus and hyperactive reflexes. Some animal studies have shown that exposure during pregnancy may produce birth defects. Other studies with rats, rabbits and monkeys have not shown teratogenic effects. Human data are ambiguous; it is well established that lithium can cross the human placenta. Of 225 registered pregnancies in which the mothers had received lithium (as a tranquiliser) there were 25 instances of congenital malformation. Although pharmacological doses of lithium cannot be unequivocally designated as a human teratogen, lithium therapy is contraindicated in women of childbearing potential.
Prolonged exposure may produce anorexia, weight loss and emaciation. The kidneys, behavioural/ central nervous system and peripheral nervous system may also show adverse effects.
Various types of dermatitis (psoriasis, alopecia, cutaneous ulcers, acne, follicular papules, xerosis cutis, exfoliative) may also result from chronic skin exposure.
Lithium ion can be an effective treatment for manic depression. It is thought to bind the enzyme IMPase (inositol monophosphatase) and thereby mediates its influence in producing a response to calcium-induced production of neurotransmitters and hormones thought to be responsible for the clinical picture.
In subchronic studies, rats were exposed to 3 milliequivalents Li/kg/day (equivalent to 1450 mg for a 70 kg person) but did not accumulate Li whilst on a high sodium diet. However when sodium was restricted, fatal kidney toxicity developed. Dogs survived daily dose of 50 mg LiCl/kg for 150 days to the termination of the experiment on a normal sodium intake, whereas the same dose was lethal in 12 to 18 days on a low sodium diet: 20 mg LiCl/kg/day resulted in death in 18 to 30 days.
Principal route of occupational exposure to the gas is by inhalation.
Repeated or prolonged exposure to mixed hydrocarbons may produce narcosis with dizziness, weakness, irritability, concentration and/or memory loss, tremor in the fingers and tongue, vertigo, olfactory disorders, constriction of visual field, paraesthesias of the extremities, weight loss and anaemia and degenerative changes in the liver and kidney. Chronic exposure by petroleum workers, to the lighter hydrocarbons, has been associated with visual disturbances, damage to the central nervous system, peripheral neuropathies (including numbness and paraesthesias), psychological and neurophysiological deficits, bone marrow toxicities (including hypoplasia possibly due to benzene) and hepatic and renal involvement. Chronic dermal exposure to petroleum hydrocarbons may result in defatting which produces localised dermatoses. Surface cracking and erosion may also increase susceptibility to infection by microorganisms. One epidemiological study of petroleum refinery workers has reported elevations in standard mortality ratios for skin cancer along with a dose-response relationship indicating an association between routine workplace exposure to petroleum or one of its constituents and skin cancer, particularly melanoma. Other studies have been unable to confirm this finding.

TOXICITY AND IRRITATION

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

ISOHEXANES:
HYDROCARBON PROPELLANT:
CRC (NZ) 5037 WHITE LITHIUM GREASE:

No significant acute toxicological data identified in literature search.
HYDROCARBON PROPELLANT:
CRC (NZ) 5037 WHITE LITHIUM GREASE:
for Petroleum Hydrocarbon Gases:
In many cases, there is more than one potentially toxic constituent in a refinery gas. In those cases, the constituent that is most toxic for a particular endpoint in an individual refinery stream is used to characterize the endpoint hazard for that stream. The hazard potential for each mammalian endpoint for each of the petroleum hydrocarbon gases is dependent upon each petroleum hydrocarbon gas constituent endpoint toxicity values (LC50, LOAEL, etc.) and the relative concentration of the constituent present in that gas. It should also be noted that for an individual petroleum hydrocarbon gas, the constituent characterizing toxicity may be different for different mammalian endpoints, again, being dependent upon the concentration of the different constituents in each, distinct petroleum hydrocarbon gas.
All Hydrocarbon Gases Category members contain primarily hydrocarbons (i.e., alkenes and alkenes) and occasionally asphyxiant gases like hydrogen. The inorganic components of the petroleum hydrocarbon gases are less toxic than the C1 - C4 and C5 - C6 hydrocarbon components to both mammalian and aquatic organisms. Unlike other petroleum product categories (e.g. gasoline, diesel fuel, lubricating oils, etc.), the inorganic and hydrocarbon constituents of hydrocarbon gases can be evaluated for hazard individually to then predict the screening level hazard of the Category members

Acute toxicity: No acute toxicity LC50 values have been derived for the Cl -C4 and C5- C6 hydrocarbon (HC) fractions because no mortality was observed at the highest exposure levels tested (— 5 mg/l) for these petroleum hydrocarbon gas constituents. The order of acute toxicity of petroleum hydrocarbon gas constituents from most to least toxic is: C5-C6 HCs (LC50 > 1063 ppm) > C1-C4 HCs (LC50 > 10,000 ppm) > benzene (LC50 = 13,700 ppm) > butadiene (LC50 = 129,000 ppm) > asphyxiant gases (hydrogen, carbon dioxide, nitrogen).
Repeat dose toxicity: With the exception of the asphyxiant gases, repeated dose toxicity has been observed in individual selected petroleum hydrocarbon gas constituents. Based upon LOAEL values, the order of order of repeated-dose toxicity of these constituents from most toxic to the least toxic is:
Benzene (LOAEL .>=10 ppm) >C1-C4 HCs (LOAEL = 5,000 ppm; assumed to be 100% 2-butene) > C5-C6 HCs (LOAEL = 6,625 ppm) > butadiene (LOAEL = 8,000 ppm) > asphyxiant gases (hydrogen, carbon dioxide, nitrogen).
Gen °toxicity:
In vitro: The majority of the Petroleum Hydrocarbon Gases Category components are negative for in vitro genotoxicity.
The exceptions are: benzene and 1,3-butadiene, which are genotoxic in bacterial and mammalian in vitro test systems. In vivo: The majority of the Petroleum Hydrocarbon Gases Category components are negative for in vivo genotoxicity.
The exceptions are benzene and 1,3-butadiene, which are genotoxic in in vivo test systems
Developmental toxicity: Developmental effects were induced by two of the petroleum hydrocarbon gas constituents, benzene and the C5 -C6 hydrocarbon fraction. No developmental toxicity was observed at the highest exposure levels tested for the other petroleum hydrocarbon gas constituents tested for this effect. The asphyxiant gases have not been tested for developmental toxicity. Based on LOAEL and NOAEL values, the order of acute toxicity of these constituents from most to least toxic is:
Benzene (LOAEL = 20 ppm) > butadiene (NOAEL .>=1,000 ppm) > C5-C6 HCs (LOAEL = 3,463 ppm) > C1-C4 HCs (NOAEL >=5,000 ppm; assumed to be 100% 2-butene) > asphyxiant gases (hydrogen, carbon dioxide, nitrogen). Reproductive toxicity: Reproductive effects were induced by only two petroleum hydrocarbon gas constituents, benzene and isobutane (a constituent of the the C1-C4 hydrocarbon fraction). No reproductive toxicity was observed at the highest exposure levels tested for the other petroleum hydrocarbon gas constituents tested for this effect. The asphyxiant gases have not been tested for reproductive toxicity. Based on LOAEL and NOAEL values, the order of reproductive toxicity of these constituents from most to least toxic is:
Benzene (LOAEL = 300 ppm) > butadiene (NOAEL .>=6,000 ppm) > C5-C6 HCs (NOAEL .>=6,521 ppm) > C1-C4 HCs (LOAEL = 9,000 ppm; assumed to be 100% isobutane) > asphyxiant gases (hydrogen, carbon dioxide, nitrogen).

ISOHEXANES:
MINERAL OIL:
Toxicity and Irritation data for petroleum-based mineral oils are related to chemical components and vary as does the composition and source of the original crude.

A small but definite risk of occupational skin cancer occurs in workers exposed to persistent skin contamination by oils over a period of years. This risk has been attributed to the presence of certain polycyclic aromatic hydrocarbons (PAH) (typified by benz[a]pyrene).
Petroleum oils which are solvent refined/extracted or severely hydrotreated, contain very low concentrations of both.

LITHIUM STEARATE:

TOXICITY	IRRITATION
Oral (rat) LD50:15000 mg/kg	Nil Reported

Fatty acid salts are of low acute toxicity. Their skin and eye irritation potential is chain length dependent and decreases with increasing chain length - they are poorly absorbed through the skin nor are they skin sensitisers. The available repeated dose toxicity data demonstrate the low toxicity of the fatty acids and their salts. Also, they are not considered to be mutagenic, genotoxic or carcinogenic, and are not reproductive or developmental toxicants. Accidental ingestion of fatty acid salt containing detergent products is not expected to result in any significant adverse health effects. This assessment is based on toxicological data demonstrating the low acute oral toxicity of fatty acid salts and the fact that not a single fatality has been reported in the UK following accidental ingestion of detergents containing fatty acid salts. Also in a report published by the German Federal Institute for Health Protection of Consumers and Veterinary Medicine, detergent products were not mentioned as dangerous products with a high incidence if poisoning. The estimated total human exposure to fatty acid salts, from the different exposure scenarios for the handling and use of detergent products containing fatty acid salts, showed a margin of exposure (MOE) of 258,620. This extremely large MOE is large enough to be reassuring with regard to the relatively small variability of the hazard data on which it is based. Also, in the UK, the recommended dietary fatty acid intake by the Department of Health is about 100 g of fatty acids per day or 1.7 g (1700 mg) of fatty acids per kilogram body weight per day. This exposure is several orders of magnitude above that resulting from exposure to fatty acid salts in household cleaning products. Based on the available data, the use of fatty acid salts in household detergent and cleaning products does not raise any safety concerns with regard to consumer.
Somnolence and changes in motor activity recorded.

Section 12. Ecotoxicological Information

LITHIUM STEARATE
HYDROCARBON PROPELLANT
MINERAL OIL
DO NOT discharge into sewer or waterways.
ISOHEXANES
For n-hexane
log Kow 3.17-3.94
BOD 5 if unstated 2.21
COD 0.04
ThOD 3.52
Environmental fate
Transport and Partitioning The physical properties of n-hexane that affect its transport and partitioning in the environment are water solubility of 9.5 mg/L; log[Kow] (octanol/water partition coefficient), estimated as 3.29; Henry's law constant, 1.69 atm-m3 mol; vapor pressure, 150 mm Hg at 25 C; and log[Koc] in the range of 2.90 to 3.61. As with many alkanes, experimental methods for the estimation of the Koc parameter are lacking, so that estimates must be made based on theoretical considerations.
The dominant transport process from water is volatilization. Based on mathematical models the half-life for n-hexane in bodies of water with any degree of turbulent mixing (e.g., rivers) would be less than 3 hours. For standing bodies of water (e.g. small ponds), a half-life no longer than one week (6.8 days) is estimated Based on the log octanol/water partition coefficient (i.e. log[Koc]) and the estimated log sorption coefficient (i.e. log[Koc]) n-hexane is not expected to become concentrated in biota. A calculated bioconcentration factor (BCF) of 453 for a fathead minnow further suggests a low potential for n-hexane to bioconcentrate or bioaccumulate in trophic food chains.
In soil, the dominant transport mechanism for n-hexane present near the surface probably is volatilisation (based on its Henry's law constant, water solubility, vapor pressure, and Koc). While its estimated Koc values suggest a moderate ability to sorb to soil particles, n-hexane has a density (0.6603 g/mL at 20 C) well below that of water and a very low water solubility of 9.5 mg/L. n-Hexane would, therefore, be viewed as a light nonaqueous phase liquid (LNAPL), which would suggest a low potential for leaching into the lower soil depths

since the n-hexane would tend to float on the top of the saturated zone of the water table. n-Hexane would generally stay near the soil surface and, if not appreciably sorbed into the soil matrix, would be expected eventually to volatilise to the atmosphere. Exceptions would involve locations with shallow groundwater tables where there were large spills of hexane products. In such cases, the n-hexane could spread out to contaminant a large volume of soil materials.

Air n-Hexane does not absorb ultraviolet (UV) light at 290 nm and is thus not expected to undergo direct photolysis reactions. The dominant tropospheric removal mechanism for n-hexane is generally regarded to be decomposition by hydroxyl radicals. Calculations assuming typical hydroxyl radical concentrations suggest a half-life of approximately 2.9 days. While n-hexane can react with nitrogen oxides to produce ozone precursors under controlled laboratory conditions, the smog-producing potential of n-hexane is very low compared to that of other alkanes or chlorinated VOCs. Hydroxyl ion reactions in the upper troposphere, therefore, are probably the primary mechanisms for n-hexane degradation in the atmosphere. As with most alkanes, n-hexane is resistant to hydrolysis

Water Although few data are available dealing explicitly with the biodegradation of n-hexane in water, neither hydrolysis nor biodegradation in surface waters appears to be rapid compared with volatilization. In surface waters, as in the atmosphere, alkanes such as n-hexane would be resistant to hydrolysis. Biodegradation is probably the most significant degradation mechanism in groundwater. The ability of Pseudomonas mendocina bacteria to metabolise n-hexane in laboratory microcosms simulating groundwater conditions has been documented. Mixed bacterial cultures as well as pure cultures are documented as capable of metabolizing n-hexane under aerobic conditions. In general, linear alkanes (such as n-hexane) are viewed as the most readily biodegradable fractions in petroleum , particularly when oxygen is present in solution. Once introduced into groundwater, n-hexane may be fairly persistent since its degradation by chemical hydrolysis is slow and opportunities for biodegradation may be limited under anoxic conditions or where nutrients such as nitrogen or phosphorus are in limited supply.

Sediment and Soil The most important biodegradation processes involve the conversion of the n-hexane to primary alcohols, aldehydes and, ultimately, into fatty acids. Similar processes are encountered with other light hydrocarbons such as heptane. In general, unless the n-hexane is buried at some depth within a soil or sediment, volatilisation is generally assumed to occur at a much more rapid rate than chemical or biochemical degradation processes. Once introduced into deeper sediments, n-hexane may be fairly persistent.

Ecotoxicity

Fish LC50 (96 h) Oncorhyncus mykiss 4.14 mg/l; Pimephales promelus 2.5 mg/l (flow through); Lepomis macrochirus 4.12 mg/l

Daphnia EC50 (48 h) 3.87 mg/l.

LITHIUM STEARATE

for greases and grease thickeners based on fatty acid soaps.

Substances in the grease thickeners category are composed of calcium or lithium salts of fatty acids. These fatty acids range in size from 9 to 22 carbon atoms in length and represent substances of plant and animal origin

Greases are formed through a chemical reaction of a mineral oil, a fatty acid, and a metal caustic (typically calcium or lithium hydroxide). This reaction occurs in the mineral oil matrix when a fatty acid or its methyl ester is dissolved in the mineral oil followed by the addition of the caustic. Because the thickener is synthesized in situ during the manufacture of the finished grease, secondary interactions between the fatty acid salt and the mineral oil matrix also result, creating the physical consistency of grease. When fatty acids are reacted with caustic outside of a mineral oil matrix, the resulting compounds are called soaps. Computer predictions for melting point, boiling point, vapour pressure, partition coefficient, and water solubility are made for the salts as if they existed outside the grease matrix. However, the endpoint values should be qualified with the understanding that the thickening agent is created by a chemical reaction in situ and does not exist as a separate entity outside of the grease matrix.

Environmental fate

Due to the extremely low vapor pressure of these substances plus the fact that these compounds are made within a mineral oil matrix, there is essentially no opportunity for these substances to enter the atmosphere. However, the modeling results show that if any vapours entered the atmosphere, these molecules would undergo indirect photolysis reactions and not persist.

Because fatty acids are ionisable compounds, Kow measurements can vary greatly with pH. The variation depends upon pH and the pKa of the compound. In general, Kow values of a compound are lower when it exists predominantly in the ionised form as compared to existing primarily in the non-ionized form. Estimates for log Kow range from -3.56-6.10 for lithium greases to 11.7-14.3 for calcium greases. Many fatty acids have pKa values circumneutral, and they would exist predominantly in the molecular form at environmentally relevant pHs.Therefore, the estimates given are potentially lower than what would be expected for the salt form at typical environmental pHs.

Solubility

The members of the grease thickeners category are composed of various salts of fatty acids containing hydrocarbon chains of 9 to 22 carbon atoms. Solubility in water decreases with molecular weight.

Biodegradation The soaps of fatty acids are generally readily biodegradable.

When greases and grease thickeners are formed individual components are combined in their proper proportions, the mineral oil thickens due to formation of the thickener (i.e., calcium or lithium salts of the fatty acids) and the affinity of the thickener for the base oil. Proportions of the different reactants vary, but thickeners typically contribute 1% to 14% by weight, with the balance being made up of mineral oil and performance additives. Some residual water is generally present (approximately 10% of the thickener, or 0.1% to 1.4%) and indeed necessary for uniform dispersion of the thickener in the oil.

Studies find essentially no difference in biodegradation of vegetable oil greases prepared with the inorganic thickener, in situ (75% biodegradation) to those thickened with the organic fatty acid soap (75% and >85% biodegradation).

Mineral base oils would not be classified as readily biodegradable, but since they consist primarily of hydrocarbons, which are ultimately assimilated by micro-organisms, they are considered to be inherently biodegradable. In ready biodegradation testing, these substances degraded from 1.5% to 29% when tested by the OECD 301B procedure and 31% to 50% when tested by the OECD 301F method

Persistence The thickeners in and of themselves would not be expected to persist in the environment except as part of the grease matrix. This is because they are preparations of fatty acids that are derived from edible animal fats or vegetable oils. Included in this category are stearic acid (C18), 12-hydroxystearic acid (C18), docosanoic acid (C22), hydrogenated castor oil (comprised of ricinoleic and similar acids, C18), and methyl esters of oxidized hydrocarbon waxes (=C18).

Fatty acids undergo aerobic biodegradation by the process of beta-oxidation. Beta-oxidation of the parent fatty acid forms acetate and a new fatty acid of two less carbon atoms. This process repeats itself until the compound is completely broken down. The hydrocarbon will eventually be degraded to CO2 and H2O. For this reason, the length of the fatty acid chain does not preclude biodegradation, but it may take longer to achieve complete mineralization. The beta-oxidation sequence does not necessarily require the presence of molecular oxygen, and fatty acid biodegradation may proceed under anaerobic conditions.

Ecotoxicity

The physical consistency of grease thickeners, the manner in which they are produced and their low solubility all contribute to a low risk of exposure to aquatic organisms. When aquatic organisms were tested against whole grease thickened with calcium soap, calcium 12-hydroxystearate, or mixed tallow and calcium 12-hydroxystearate, either no toxicity was observed, or effects were in the 100 to 1000 mg/l range. Lithium salts of fatty acids C9 (nonanedioic dilithium salt) and C22 (docosanoic lithium salt) would be expected to show no toxicity at the limit of these compound's water solubility.

12-Hydroxy-octadecanoic lithium salt is expected to show only slight toxicity.

Although it is not likely that aquatic exposure to dissociation products of grease thickeners will occur, if such instances arise, the toxicity of the fatty acid moiety is expected to be low.

For fatty acid salts

Fatty acid soaps are widely used in household cleaning products, cosmetics, lubricants (and other miscellaneous industrial applications) and coatings. Uses in household cleaning include fabric washing products, fabric conditioners, laundry additives, and surface and toilet cleaners. These uses cover chain lengths of C10-22 predominantly with counter-ions of sodium and potassium.

Environmental fate

Several tests concerning biodegradation are available. All tests showed that fatty acids and lipids are readily biodegradable .

No experimental bioaccumulation data appear to be available but log Kow data from various sources are higher than 4, which indicates that fatty acids and natural lipids have a potential for bioaccumulating in aquatic organisms

Fatty acids undergo aerobic biodegradation by the process of beta-oxidation. Beta-oxidation of the parent fatty acid forms acetate and a new fatty acid of two less carbon atoms. This process repeats itself until the compound is completely broken down. The hydrocarbon will eventually be degraded to CO2 and H2O. For this reason, the length of the fatty acid chain does not preclude biodegradation, but it may take longer to achieve complete mineralisation. The beta-oxidation sequence does not necessarily require the presence of molecular oxygen, and fatty acid biodegradation may proceed under anaerobic conditions

Ecotoxicity

There are a number of acute data for fatty acids and fatty acid salts to aquatic organisms although there is a predominance of data for fatty acid. There are few toxicity values for terrestrial organisms. Data availability / quality covering all the taxonomic groups for specific fatty acid salt chain lengths is poor. The chronic data set is very limited. For chain lengths >C12, solubility decreases to a degree where an adverse effect would not be expected in the environment due to reduced biovailability. Data for longer chain lengths have been generated using solvents which makes interpretation more difficult.

The most of few available data indicate low toxicity towards aquatic organisms with EC/LC50 values above 1000 mg/l. However, EC/LC50 values below 100 mg/l are not unusual either.

For lithium (anion)

Environmental fate

Experiments with experimental animals have shown that lithium can have reprotoxic effects, and increasing consumption might therefore result in adverse effects on health and environment. Lithium has significant bioavailability only when administered as a partially soluble salt such as lithium carbonate. Lithium is not a dietary mineral for plants but it does stimulate plant growth.

Ecotoxicity

Fish LC50 (28, 35 days) rainbow trout 9.28, 1.4 mg/l (salt)
Fish LC50 (96 h) fathead minnow 42 mg/l; NOEC 13 mg/l (salt)
Daphnia magna EC50 (48 h) 24 mg/l; NOEC 11 mg/l

Lithium is not expected to bioaccumulate in mammals and its human and environmental toxicity are low. Lithium does accumulate in several species of fish, molluscs and crustaceans where it stored in the digestive tract and exoskeleton Methanogenesis of granular anaerobic sludge (initial COD 5750 mg/l 02, pH 7.2) was stimulated at lithium ion concentration 10-20 mg/l, slightly inhibited at lithium ion concentration 350 mg/l and seriously inhibited at lithium ion concentration > 500 mg/].

Microinjection of lithium chloride into prospective ventral blastomeres of a 32-cell Xenopus larvis embryo gives rise to duplication of dorsoanterior structures such as the notochord, neural tube and eyes.

HYDROCARBON PROPELLANT

for Petroleum Hydrocarbon Gases

Environmental fate

The environmental fate characteristics of petroleum hydrocarbon gases are governed by these physical-chemical attributes. All components of these gases will partition to the air where interaction with hydroxyl radicals is an important fate process. Hydrocarbons having molecular weights represented in these streams are inherently biodegradable, but their tendency to partition to the atmosphere would prevent their biotic degradation in water and soils. However, if higher molecular weight fractions of these streams enter the aquatic or terrestrial environment, biodegradation may be an important fate mechanism.

The majority of components making up hydrocarbon gases typically have low melting and boiling points. They also have high vapor pressures and low octanol/water partition coefficients. The aqueous solubilities of these substances vary, and range from approximately 22 parts per million to several hundred parts per million. The environmental fate characteristics of refinery gases are governed by these physical-chemical attributes. Components of the hydrocarbon gas streams will partition to the air, and photodegradation reactions will be an important fate process for many of the hydrocarbon components. The hydrocarbons in these mixtures are inherently biodegradable, but due to their tendency to partition to the atmosphere, biodegradation is not anticipated to be an important fate mechanisms. However, if released to water or soil, some of the higher molecular weight fractions may become available for microbial attack. The inorganic gases are chemically stable and may be lost to the atmosphere or simply become involved in the environmental recycling of their atoms. Some show substantial water solubility, but their volatility eventually causes these gases to enter the atmosphere.

Substances in Refinery Gases that volatilise to air may undergo a gas-phase oxidation reaction with photochemically

produced hydroxyl radicals (OH-). Atmospheric oxidation as a result of hydroxyl radical attack is not direct photochemical degradation, but rather indirect degradation Indirect photodegradation of the hydrocarbon components in Refinery Gases can be an important fate process for these constituents. In general. half lives decrease with increasing carbon chain length. Half lives for this fraction of Refinery Gases ranged from 960 days (methane) to 0.16 days (butadiene). The constituents of the C5- C6 hydrocarbon fraction have photodegradation half-lives of approximately two days.

The hydrocarbon and non-hydrocarbon constituents in Refinery Gases do not contain the functional groups or chemical linkages known to undergo hydrolysis reactions. Therefore hydrolysis will not play an important role in the environmental fate for the components in Refinery Gas streams.

Biodegradation of the hydrocarbon components in refinery gases may occur in soil and water. Gaseous hydrocarbons are widespread in nature and numerous types of microbes have evolved which are capable of oxidizing these substances as their sole energy source . Although volatilization is the predominant behavior for these gases, sufficient aqueous solubility and bioavailability is exhibited by these compounds. The use of gaseous carbon sources for cell growth is common among autotrophic organisms . Higher chain length hydrocarbons typical of naphtha streams also are known to inherently biodegrade in the environment

Ecotoxicity

Acute LC/EC50 values for the hydrocarbon components of these gas streams ranged roughly from 1 to 100 mg/L. Although the LC/EC50 data for the individual gases illustrate the potential toxicity to aquatic organisms, aqueous concentrations from releases of these gases would likely not persist in the aquatic environment for a sufficient duration to elicit toxicity. Based on a simple conceptual exposure model analysis, emissions of petroleum hydrocarbon gases to the atmosphere would not likely result in acutely toxic concentrations in adjacent water bodies because such emissions will tend to remain in the atmosphere.

Several of the constituents in refinery gases were shown to be highly hazardous to aquatic organisms in laboratory toxicity tests where exposure concentrations can be maintained over time. Hydrogen sulfide was shown to be the most toxic constituent to fish (LC50 ranged 0.007 to 0.2 mg/L) and invertebrates (EC50 ranged 0.022 to 1.07 mg/L), although several LC/EC50 values for ammonia also were below 1 mg/l for these organisms (0.083 to 4.6 mg/L and 0.53 to 22.8 mg/L, respectively).

For isobutane

Refrigerant Gas Saturated Hydrocarbons have zero ozone depletion potential (ODP) and will photodegrade under atmospheric conditions. [Calor Gas]

Environmental Fate

Terrestrial fate An estimated Koc value of 35 suggests that isobutane will have very high mobility in soil. Its very high Henry's Law constant, 4.08 atm-cu m/mole, (calculated from its vapor pressure and water solubility, high vapor pressure, 2611 mm Hg at 25 deg C, and low adsorptivity to soil indicate that volatilisation will be an important fate process from both moist and dry soil surfaces. Isobutane is biodegradable, especially under acclimated conditions, and may biodegrade in soil.

Aquatic fate The estimated Koc value suggests that isobutane would not adsorb to sediment and particulate matter in the water column. Additional evidence that isobutane is not removed to sediment has been obtained from microcosm experiments. Isobutane will readily volatilise from water based on its estimated Henry's Law constant of 4.08 atm-cu m/mole. Estimated half-lives for a model river and model lake are 2.2 hr and 3.0 days, respectively. An estimated BCF value of 74 based on the log Kow suggests that isobutane will not bioconcentrate in aquatic organisms.

Results indicate that gas exchange is the dominant removal mechanism for isobutane gases from the water column following a hypothetical input. The volatilisation half-lives for isobutane from the water columns in natural estuaries are estimated to be 4.4 and 6.8 days at 20 and 10 deg C, respectively.

Isobutane also biodegrades in the microcosm at a rate that is slower than for n-butane and falls between propane and ethane in susceptibility. Biodegradation of isobutane initially occurs with a half-lives of 16-26 days at 20 deg C and 33¬139 days at 10 deg C, significantly slower than the loss predicted by gas exchange from typical natural estuaries. However, after a lag of 2-4 weeks, the biodegradation rate increases markedly so that in the case of chronic inputs, biodegradation can become the dominant removal mechanism.

Atmospheric fate Isobutane is a gas at ordinary temperatures. It is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is 6.9 days, assuming a hydroxyl radical concn of 5x105 radicals per cubic cm. When isobutane was exposed to sunlight for 6 hr in a tedlar bag filled with Los Angeles air, 6% of the isobutane degraded The air contained 4529 ppb-C hydrocarbons and 870 ppb of NOX. The tropospheric loss of volatile hydrocarbons such as isobutane by wet and dry deposition are believed to be of minor importance. Indeed, isobutane assimilated into precipitation may evaporate during transport as well as being reemitted into the atmosphere after deposition. Isobutane is a contributor to the production of PAN (peroxyacyl nitrates) under photochemical smog conditions.

For propane

Environmental Fate

Terrestrial fate An estimated Koc value of 460 determined from a log Kow of 2.36 indicates that propane is expected to have moderate mobility in soil. Volatilisation of propane from moist soil surfaces is expected to be an important fate process given an estimated Henry's Law constant of 7.07x10-1 atm-cu mirnole, derived from its vapor pressure, 7150 mm Hg, and water solubility, 62.4 mg/L. Propane is expected to volatilise from dry soil surfaces based upon its vapor pressure. Using cell suspensions of microorganisms isolated from soil and water, propane was oxidised to acetone within 24 hours, suggesting that biodegradation may be an important fate process in soil and sediment.

Aquatic fate

The estimated Koc value indicates that propane is expected to adsorb to suspended solids and sediment. Volatilisation from water surfaces is expected based upon an estimated Henry's Law constant. Using this Henry's Law constant volatilisation half-lives for a model river and model lake are estimated to be 41 minutes and 2.6 days, respectively. An estimated BCF of 13.1 using log Kow suggests the potential for bioconcentration in aquatic organisms is low. After 192 hr, the trace concentration of propane contained in gasoline remained unchanged for both a sterile control and a mixed culture sample collected from ground water contaminated with gasoline. This indicates that biodegradation may not be an important fate process in water.

Atmospheric fate

According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere and vapour pressure, propane is expected to exist solely as a gas in the ambient atmosphere. Gas-phase propane is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 14 days, calculated from its rate constant of 1.15x10-12 cu cm/molecule-sec at 25 deg C. Propane does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight.

Section 13. Disposal Considerations

Dispose of in accordance with relevant local legislation. Discharge contents of damaged aerosol cans at an approved site. Allow small quantities to evaporate.
DO NOT incinerate or puncture aerosol cans.
Bury residues and emptied aerosol cans at an approved site.

Section 14 Transport Information

This product is classified as a Dangerous Good for transport in NZ; NZS 5433:2012

Road and Rail Transport

UN No:	1950
Class-primary	2.1
Packing Group	None Allocated
Proper Shipping Name:	AEROSOLS

Air Transport

UN No:	1950
Class-primary	2.1
Packing Group	None Allocated
Proper Shipping Name:	AEROSOLS

Marine Transport

UN No:	1950
Class-primary	2.1
Packing Group	None Allocated
Proper Shipping Name:	AEROSOLS

Section 15 Regulatory Information

EPA Approval number
This substance is to be managed in accordance with the classification and controls specified in the Hazardous Substances Transfer Notice, 2004, (see table below).
This substance may alternatively be managed under the conditions imposed by an applicable Group Standard.
HSR002515 Aerosols (Flammable) Group Standard 2006
HSR002552 Cosmetic Products Group Standard 2006

HSNO Classification: 2.1.2A, 6.3B, 6.4A, 6.8C, 6.9

HSNO Controls:

Trigger quantities for this substance:

	Trigger Quantity
Approved Handler	3000 L awc
Location Certificate	3000 L awc
Tracking Trigger Quantities	Not required
Signage Trigger Quantities	3000 L awc
Emergency Response Plan trigger Quantities	300 L awc

Section 16 Other Information

1. Hazardous Substances Data Bank (HSDB), a database of the National Library of Medicine's TOXNET system (http://toxnet.nlm.nih.gov).

2. HSNO Approved Code of Practice: Preparation of Safety Data Sheets, September 2006.

Disclaimer

This document has been issued by Glasscorp Limited and serves as the product Safety Data Sheet ('SDS'). It is based on information concerning the product which has been provided to Glasscorp Limited by the Manufacturer and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer. While Glasscorp Limited have taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, Glasscorp Limited accept no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS

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Please contact Glasscorp Limited, if further information is required.

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