SmartBoard Display (ADR)

Gough Group

Chemwatch Hazard Alert Code: **0**

Chemwatch: **94-80508**
Version No: **2.1.1.1**
Safety Data Sheet according to HSNO Regulations

Issue Date: **14/02/2020**
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L.GHS.NZL.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	SmartBoard Display (ADR)
Synonyms	Part Number: 446/192/111/0
Proper shipping name	LITHIUM ION BATTERIES (including lithium ion polymer batteries)
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Lithium-ion battery. 3.6 Volts. Lithium batteries with UN 3480 and batteries packed with equipment, UN 3481 are unregulated for Transport providing the Transport Code special provisions are met. NOTE: Chemical materials are stored in hermetically sealed unit which are not hazardous in normal use. However, battery materials are hazardous only if the materials are released by damaging the cell or if exposed to fire. Use according to manufacturer's directions.

Details of the supplier of the safety data sheet

Registered company name	**Gough Group**
Address	Cnr Ash & Kerrs Road Wiri Auckland New Zealand
Telephone	+64 9 980 7330
Fax	Not Available
Website	www.goughgroup.co.nz
Email	Not Available

Emergency telephone number

Association / Organisation	**Gough Group**
Emergency telephone numbers	NZ Poisons Centre 0800 POISON (0800 764 766)
Other emergency telephone numbers	111 (NZ Emergency Services)

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

Classification [1]	Not Applicable
Determined by Chemwatch using GHS/HSNO criteria	Not Available

Label elements

Hazard pictogram(s)	Not Applicable
SIGNAL WORD	**NOT APPLICABLE**

Hazard statement(s)

Not Applicable

Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

Not Applicable

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

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Mixtures

CAS No	%[weight]	Name
Not Available		sealed metal container contains
Not Available		electrolyte salt and solvents.
7439-93-2	2-6	lithium
7719-09-7	18-47	thionyl chloride
7446-70-0	2-5	aluminium chloride
7447-41-8	1-2	lithium chloride
7440-44-0	2-5	carbon, activated
Not Available	35-73	steel, Nickel plated
Not Available	0-2	glass
9002-86-2	0-1	polyvinyl chloride
9011-14-7	0-1	methyl methacrylate homopolymer
9002-84-0	0-1	polytetrafluoroethylene

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	▸ Generally not applicable. 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 Contact	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.
Inhalation	Remove patient to fresh air and seek medical attention.
Ingestion	▸ Not considered a normal route of entry. ▸ If swallowed do **NOT** induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

Special hazards arising from the substrate or mixture

Fire Incompatibility	Extreme mechanical or electrical stresses might cause heating and bursting of the battery. Water might react with electrolyte and may form highly toxic gaseous hydrogen fluoride. None known.

Advice for firefighters

Fire Fighting	▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear breathing apparatus plus protective gloves in the event of a fire. ▸ Prevent, by any means available, spillage from entering drains or water courses. ▸ Use fire fighting procedures suitable for surrounding area. ▸ **DO NOT** approach containers suspected to be hot. ▸ Cool fire exposed containers with water spray from a protected location. ▸ If safe to do so, remove containers from path of fire. ▸ Equipment should be thoroughly decontaminated after use.
Fire/Explosion Hazard	Lithium ion batteries contain an inflammable electrolyte liquid which might be released at high temperatures (>150 deg C). This electrolyte might ignite if the batteries are mechanically damaged or misused. Burning batteries might ignite batteries which are stored nearby. ▸ Non combustible. ▸ Not considered to be a significant fire risk. ▸ Heating may cause expansion or decomposition leading to violent rupture of containers. ▸ May emit acrid smoke. May emit corrosive and poisonous fumes. Decomposes on heating and produces toxic fumes of: carbon monoxide (CO) carbon dioxide (CO2) hydrogen fluoride

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	metal oxides

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	Clean up all spills immediately. Avoid contact with skin and eyes. Place in suitable containers for disposal.
Major Spills	▸ Clean up all spills immediately. ▸ Wear protective clothing, safety glasses, dust mask, gloves. ▸ Secure load if safe to do so. Bundle/collect recoverable product. ▸ Use dry clean up procedures and avoid generating dust. ▸ Vacuum up (consider explosion-proof machines designed to be grounded during storage and use). ▸ Water may be used to prevent dusting. ▸ Collect remaining material in containers with covers for disposal. ▸ Flush spill area with water.

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

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	Do not wet the battery with water, seawater or acid; or expose to strong oxidizer. Keep the battery away from heat and fire. Do not open the battery. Do not crush, disassemble, drop or solder. Do not give a mechanical shock or deform. Use good occupational work practice. Observe manufacturer's storage and handling recommendations contained within this SDS. Avoid physical damage to containers.
Other information	Storage at room temperature, approx 21C. ▸ Keep dry. ▸ Store under cover. ▸ Protect containers against physical damage. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. Keep out of reach of children. Store out of direct sunlight ▸ Store away from incompatible materials.

Conditions for safe storage, including any incompatibilities

Suitable container	Store in original containers.
Storage incompatibility	▸ Avoid reaction with oxidising agents

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
New Zealand Workplace Exposure Standards (WES)	thionyl chloride	Thionyl chloride	Not Available	Not Available	1 ppm / 4.9 mg/m3	Not Available
New Zealand Workplace Exposure Standards (WES)	aluminium chloride	Aluminium, as Al: Soluble salts	5 mg/m3	Not Available	Not Available	Not Available
New Zealand Workplace Exposure Standards (WES)	carbon, activated	Particulates not otherwise classified	10 mg/m3	Not Available	Not Available	Not Available
New Zealand Workplace Exposure Standards (WES)	carbon, activated	Particulates not otherwise classified respirable dust	3 mg/m3	Not Available	Not Available	Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
lithium	Lithium	3.3 mg/m3	36 mg/m3	220 mg/m3
thionyl chloride	Thionyl chloride	Not Available	Not Available	Not Available
aluminium chloride	Aluminum chloride	30 mg/m3	60 mg/m3	360 mg/m3
lithium chloride	Lithium chloride	2.3 mg/m3	25 mg/m3	150 mg/m3
carbon, activated	Carbon; (Graphite, 7782-42-5)	6 mg/m3	330 mg/m3	2,000 mg/m3
polyvinyl chloride	Polyvinyl chloride	3 mg/m3	33 mg/m3	200 mg/m3
polytetrafluoroethylene	Polytetrafluoroethylene; (Teflon)	12 mg/m3	130 mg/m3	790 mg/m3

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Ingredient	Original IDLH	Revised IDLH
lithium	Not Available	Not Available
thionyl chloride	Not Available	Not Available
aluminium chloride	Not Available	Not Available
lithium chloride	Not Available	Not Available
carbon, activated	Not Available	Not Available
polyvinyl chloride	Not Available	Not Available
methyl methacrylate homopolymer	Not Available	Not Available
polytetrafluoroethylene	Not Available	Not Available

OCCUPATIONAL EXPOSURE BANDING

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
lithium	C	> 0.1 to ≤ milligrams per cubic meter of air (mg/m³)
lithium chloride	E	≤ 0.01 mg/m³
polyvinyl chloride	E	≤ 0.01 mg/m³
methyl methacrylate homopolymer	E	≤ 0.01 mg/m³
Notes:	*Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.*	

MATERIAL DATA

Exposure controls

Appropriate engineering controls	General exhaust is adequate under normal operating conditions.
Personal protection	
Eye and face protection	None under normal operating conditions. **OTHERWISE:** ‣ Safety glasses.
Skin protection	See Hand protection below
Hands/feet protection	None under normal operating conditions. **OTHERWISE:** ‣ Rubber Gloves
Body protection	See Other protection below
Other protection	No special equipment needed when handling small quantities

Respiratory protection

Type AB-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required. Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	AB-AUS P2	-	AB-PAPR-AUS / Class 1 P2
up to 50 x ES	-	AB-AUS / Class 1 P2	-
up to 100 x ES	-	AB-2 P2	AB-PAPR-2 P2 ^

^ - Full-face
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Solid shape article with no odour.

Physical state	Manufactured	**Relative density (Water = 1)**	Not Applicable
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Applicable
pH (as supplied)	Not Applicable	**Decomposition temperature**	Not Available
Melting point / freezing point (°C)	Not Applicable	**Viscosity (cSt)**	Not Applicable

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Initial boiling point and boiling range (°C)	Not Applicable	**Molecular weight (g/mol)**	Not Applicable
Flash point (°C)	Not Applicable	**Taste**	Not Available
Evaporation rate	Not Applicable	**Explosive properties**	Not Available
Flammability	Not Applicable	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	Not Applicable	**Surface Tension (dyn/cm or mN/m)**	Not Applicable
Lower Explosive Limit (%)	Not Applicable	**Volatile Component (%vol)**	Not Applicable
Vapour pressure (kPa)	Not Applicable	**Gas group**	Not Available
Solubility in water	Immiscible	**pH as a solution (1%)**	Not Applicable
Vapour density (Air = 1)	Not Applicable	**VOC g/L**	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	Product is considered stable and hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	Vapors or fumes cause respiratory tract irritation. Not normally a hazard due to physical form of product.
Ingestion	Not normally a hazard due to physical form of product.
Skin Contact	The electrolyte may cause skin corrosion. Not normally a hazard due to physical form of product.
Eye	The electrolyte may cause eye damage. Not normally a hazard due to physical form of product.
Chronic	The chemicals in this product are contained in a sealed case and exposure does not occur during normal handling and use. Not normally a hazard due to physical form of product.

SmartBoard Display (ADR)	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
lithium	**TOXICITY**	**IRRITATION**
	dermal (rat) LD50: >2000 mg/kg[1]	Eye: adverse effect observed (irritating)[1]
		Skin: adverse effect observed (corrosive)[1]
thionyl chloride	**TOXICITY**	**IRRITATION**
	Inhalation (rat) LC50: 124.857375 mg/l/1hd[2]	Not Available
	Oral (rat) LD50: 270 mg/kg[1]	
aluminium chloride	**TOXICITY**	**IRRITATION**
	Dermal (rabbit) LD50: >2000 mg/kg[2]	Not Available
	Oral (rat) LD50: ~380-380 mg/kg[2]	
lithium chloride	**TOXICITY**	**IRRITATION**
	dermal (rat) LD50: 1488 mg/kg[2]	Eye (rabbit): 100 mg/24h
	Oral (rat) LD50: 526 mg/kg[2]	Skin (rabbit): 500 mg/24h
carbon, activated	**TOXICITY**	**IRRITATION**
	Oral (rat) LD50: >2000 mg/kg[1]	Eye: no adverse effect observed (not irritating)[1]
		Skin: no adverse effect observed (not irritating)[1]
polyvinyl chloride	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
methyl methacrylate homopolymer	**TOXICITY**	**IRRITATION**
	Not Available	Not Available

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polytetrafluoroethylene	**TOXICITY**	**IRRITATION**
	Oral (rat) LD50: 1250 mg/kg[2]	Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

THIONYL CHLORIDE	The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
ALUMINIUM CHLORIDE	for acid mists, aerosols, vapours Data from assays for genotoxic activity in vitro suggest that eukaryotic cells are susceptible to genetic damage when the pH falls to about 6.5. Cells from the respiratory tract have not been examined in this respect. Mucous secretion may protect the cells of the airways from direct exposure to inhaled acidic mists, just as mucous plays an important role in protecting the gastric epithelium from its auto-secreted hydrochloric acid. In considering whether pH itself induces genotoxic events in vivo in the respiratory system, comparison should be made with the human stomach, in which gastric juice may be at pH 1-2 under fasting or nocturnal conditions, and with the human urinary bladder, in which the pH of urine can range from <5 to > 7 and normally averages 6.2. Furthermore, exposures to low pH in vivo differ from exposures *in vitro* in that, *in vivo*, only a portion of the cell surface is subjected to the adverse conditions, so that perturbation of intracellular homeostasis may be maintained more readily than in vitro. For aluminium compounds: Aluminium present in food and drinking water is poorly absorbed through the gastrointestinal tract. The bioavailability of aluminium is dependent on the form in which it is ingested and the presence of dietary constituents with which the metal cation can complex Ligands in food can have a marked effect on absorption of aluminium, as they can either enhance uptake by forming absorbable (usually water soluble) complexes (e.g., with carboxylic acids such as citric and lactic), or reduce it by forming insoluble compounds (e.g., with phosphate or dissolved silicate). Considering the available human and animal data it is likely that the oral absorption of aluminium can vary 10-fold based on chemical form alone. Although bioavailability appears to generally parallel water solubility, insufficient data are available to directly extrapolate from solubility in water to bioavailability. For oral intake from food, the European Food Safety Authority (EFSA) has derived a tolerable weekly intake (TWI) of 1 milligram (mg) of aluminium per kilogram of bodyweight. In its health assessment, the EFSA states a medium bioavailability of 0.1 % for all aluminium compounds which are ingested with food. This corresponds to a systemically available tolerable daily dose of 0.143 microgrammes (µg) per kilogramme (kg) of body weight. This means that for an adult weighing 60 kg, a systemically available dose of 8.6 µg per day is considered safe. Based on a neuro-developmental toxicity study of aluminium citrate administered via drinking water to rats, the Joint FAO/WHO Expert Committee on Food Additives (JECFA) established a Provisional Tolerable Weekly Intake (PTWI) of 2 mg/kg bw (expressed as aluminium) for all aluminium compounds in food, including food additives. The Committee on Toxicity of chemicals in food, consumer products and the environment (COT) considers that the derivation of this PTWI was sound and that it should be used in assessing potential risks from dietary exposure to aluminium. The Federal Institute for Risk Assessment (BfR) of Germany has assessed the estimated aluminium absorption from antiperspirants. For this purpose, the data, derived from experimental studies, on dermal absorption of aluminium from antiperspirants for healthy and damaged skin was used as a basis. At about 10.5 µg, the calculated systemic intake values for healthy skin are above the 8.6 µg per day that are considered safe for an adult weighing 60 kg. If aluminium -containing antiperspirants are used on a daily basis, the tolerable weekly intake determined by the EFSA is therefore exceeded. The values for damaged skin, for example injuries from shaving, are many times higher. This means that in case of daily use of an aluminium-containing antiperspirant alone, the TWI may be completely exhausted. In addition, further aluminium absorption sources such as food, cooking utensils and other cosmetic products must be taken into account Systemic toxicity after repeated exposure No studies were located regarding dermal effects in animals following intermediate or chronic-duration dermal exposure to various forms of aluminium. When orally administered to rats, aluminium compounds (including aluminium nitrate, aluminium sulfate and potassium aluminium sulfate) have produced various effects, including decreased gain in body weight and mild histopathological changes in the spleen, kidney and liver of rats (104 mg Al/kg bw/day) and dogs (88-93 mg Al/kg bw/day) during subchronic oral exposure. Effects on nerve cells, testes, bone and stomach have been reported at higher doses. Severity of effects increased with dose. The main toxic effects of aluminium that have been observed in experimental animals are neurotoxicity and nephrotoxicity. Neurotoxicity has also been described in patients dialysed with water containing high concentrations of aluminium, but epidemiological data on possible adverse effects in humans at lower exposures are inconsistent Reproductive and developmental toxicity: Studies of reproductive toxicity in male mice (intraperitoneal or subcutaneous administration of aluminium nitrate or chloride) and rabbits (administration of aluminium chloride by gavage) have demonstrated the ability of aluminium to cause testicular toxicity, decreased sperm quality in mice and rabbits and reduced fertility in mice. No reproductive toxicity was seen in females given aluminium nitrate by gavage or dissolved in drinking water. Multi-generation reproductive studies in which aluminium sulfate and aluminium ammonium sulfate were administered to rats in drinking water, showed no evidence of reproductive toxicity High doses of aluminium compounds given by gavage have induced signs of embryotoxicity in mice and rats in particular, reduced fetal body weight or pup weight at birth and delayed ossification. Developmental toxicity studies in which aluminium chloride was administered by gavage to pregnant rats showed evidence of foetotoxicity, but it was unclear whether the findings were secondary to maternal toxicity. A twelve-month neuro-development with aluminium citrate administered via the drinking water to Sprague-Dawley rats, was conducted according to Good Laboratory Practice (GLP). Aluminium citrate was selected for the study since it is the most soluble and bioavailable aluminium salt. Pregnant rats were exposed to aluminium citrate from gestational day 6 through lactation, and then the offspring were exposed post-weaning until postnatal day 364. An extensive functional observational battery of tests was performed at various times. Evidence of aluminium toxicity was demonstrated in the high (300 mg/kg bw/day of aluminium) and to a lesser extent, the mid-dose groups (100 mg/kg bw/day of aluminium). In the high-dose group, the main effect was renal damage, resulting in high mortality in the male offspring. No major neurological pathology or neurobehavioural effects were observed, other than in the neuromuscular subdomain (reduced grip strength and increased foot splay). Thus, the lowest observed adverse effect level (LOAEL) was 100 mg/kg bw/day and the no observed adverse effect level (NOAEL) was 30 mg/kg bw/day. Bioavailability of aluminium chloride, sulfate and nitrate and aluminium hydroxide was much lower than that of aluminium citrate This study was used by JECFA as key study to derive the PTWI. Genotoxicity Aluminium compounds were non-mutagenic in bacterial and mammalian cell systems, but some produced DNA damage and effects on chromosome integrity and segregation in vitro. Clastogenic effects were also observed in vivo when aluminium sulfate was administered at high doses by gavage or by the intraperitoneal route. Several indirect mechanisms have been proposed to explain the variety of genotoxic effects elicited by aluminium salts in experimental systems. Cross-linking of DNA with chromosomal proteins, interaction with microtubule assembly and mitotic spindle functioning, induction of oxidative damage, damage of lysosomal membranes with liberation of DNAase, have been suggested to explain the induction of structural chromosomal aberrations, sister chromatid exchanges, chromosome loss and formation of oxidized bases in experimental systems. The EFSA Panel noted that these indirect mechanisms of genotoxicity, occurring at relatively high levels of exposure, are unlikely to be of relevance for humans exposed to aluminium via the diet. Aluminium compounds do not cause gene mutations in either bacteria or mammalian cells. Exposure to aluminium compounds does result in both structural and numerical chromosome aberrations both in in-vitro and in-vivo mutagenicity tests. DNA damage is probably the result of indirect mechanisms. The DNA damage was observed only at high exposure levels.

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	Carcinogenicity. The available epidemiological studies provide limited evidence that certain exposures in the aluminium production industry are carcinogenic to humans, giving rise to cancer of the lung and bladder. However, the aluminium exposure was confounded by exposure to other agents including polycyclic aromatic hydrocarbons, aromatic amines, nitro compounds and asbestos. There is no evidence of increased cancer risk in non-occupationally exposed persons. Neurodegenerative diseases. Following the observation that high levels of aluminium in dialysis fluid could cause a form of dementia in dialysis patients, a number of studies were carried out to determine if aluminium could cause dementia or cognitive impairment as a consequence of environmental exposure over long periods. Aluminium was identified, along with other elements, in the amyloid plaques that are one of the diagnostic lesions in the brain for Alzheimer disease, a common form of senile and pre-senile dementia. some of the epidemiology studies suggest the possibility of an association of Alzheimer disease with aluminium in water, but other studies do not confirm this association. All studies lack information on ingestion of aluminium from food and how concentrations of aluminium in food affect the association between aluminium in water and Alzheimer disease." There are suggestions that persons with some genetic variants may absorb more aluminium than others, but there is a need for more analytical research to determine whether aluminium from various sources has a significant causal association with Alzheimer disease and other neurodegenerative diseases.Aluminium is a neurotoxicant in experimental animals. However, most of the animal studies performed have several limitations and therefore cannot be used for quantitative risk assessment. Contact sensitivity: It has been suggested that the body burden of aluminium may be linked to different iseases. Macrophagic myofasciitis and chronic fatigue syndrome can be caused by aluminium-containing adjuvants in vaccines. Macrophagic myofasciitis (MMF) has been described as a disease in adults presenting with ascending myalgia and severe fatigue following exposure to aluminium hydroxide-containing vaccines The corresponding histological findings include aluminium-containing macrophages infiltrating muscle tissue at the injection site. The hypothesis is that the long-lasting granuloma triggers the development of the systemic syndrome. Aluminium acts not only as an adjuvant,stimulating the immune system either to fend off infections or to tolerate antigens, it also acts as a sensitisers causing contact allergy and allergic contact dermatitis. In general, metal allergies are very common and aluminium is considered to be a weak allergen. A metal must be ionised to be able to act as a contact allergen, then it has to undergo haptenisation to be immunogenic and to initiate an immune response.Once inside the skin, the metal ions must bind to proteins to become immunologically reactive.The most important routes of exposure and sensitisation to aluminium are through aluminium-containing vaccines. One Swedish study showed a statistically significant association between contact allergy to aluminium and persistent itching nodules in children treated with allergen-specific immunotherapy (ASIT) Nodules were overrepresented in patients with contact allergy to aluminium Other routes of sensitisation reported in the literature are the prolonged use of aluminium-containing antiperspirants, topical medication, and tattooing of the skin with aluminium-containing pigments. Most of the patients experienced eczematous reactions whereas tattooing caused granulomas. Even though aluminium is used extensively in industry, only a low number of cases of occupational skin sensitisation to aluminium have been reported Systemic allergic contact dermatitis in the form of flare-up reactions after re-exposure to aluminium has been documented: pruritic nodules at present and previous injection sites, eczema at the site of vaccination as well as at typically atopic localisations after vaccination with aluminium-containing vaccines and/or patch testing with aluminium, and also after use of aluminium-containing toothpaste The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Rat cell mutagen Reproductive effector in rats
LITHIUM CHLORIDE	Exposure to the material for prolonged periods may cause physical defects in the developing embryo (teratogenesis). Neoplastic by RTECS criteria. Ptosis, altered sleep times, tremor, muscle weakness, antipyschotic behaviour, nausea, vomiting, androgenicity, changes in spermatogenesis, Hodgkins lymphoma, abortion, foetal death, specific development abnormalities recorded.
METHYL METHACRYLATE HOMOPOLYMER	Polymethyl methacrylate (PMMA) and related cosmetic ingredients methyl methacrylate crosspolymer and methyl methacrylate/glycol dimethacrylate crosspolymer are polymers that function as film formers and viscosity-increasing agents in cosmetics. The Food and Drug Administration (FDA) determination of safety of PMMA use in several medical devices, which included human and animal safety data, was used as the basis of safety of PMMA and related polymers in cosmetics by the Cosmetic Ingredient Review (CIR) Expert Panel. The PMMA used in cosmetics is substantially the same as in medical devices. The Panel concluded that these ingredients are safe as cosmetic ingredients in the practices of use and concentrations as described in this safety assessment J Toxicol. 2011 May;30(3 Suppl):54S-65S. doi: 10.1177/1091581811407352. After the polymerization process, there is the possibility of extra monomer being present within and on the final product. MMA is the residual monomer from polymerization of PMMA. MMA was found to be sensitizing at 25% in guinea pigs. The minimum induction concentration in a guinea pig maximization test was 1 M (1 g MW/L; 88,000 ppm). In a local lymph node assay, methyl methacrylate had an EC3 (stimulation index [SI] of 3 relative to concurrent vehicle treated controls) of 60% w/v in acetone and 90% w/v in olive oil. The author rated methyl methacrylate as a weak contact allergen. Sensitization data also were reviewed in the safety assessment of ethyl methacrylate used in the formulation of nail products. Ethyl methacrylate was found to be "...safe as used when application is accompanied by directions to avoid skin contact because of the sensitizing potential of ethyl methacrylate". The frequency of positive reactions among all patients tested with ethyl methacrylate was 14/22 (64%). The frequency of positive reactions among patients with artificial nails was 7/11 (64%), suggesting that use of artificial nails presented no additional risk. More to the point of considering the potential sensitization of the methyl methacrylate monomer, the frequency of positive reactions among all patients to methyl methacrylate was 7/22 (32%) and among patients with artificial nails was 1/10 (10%). Combining the low frequency of sensitization to methyl methacrylate with the low level of the monomer in PMMA, the risk of sensitization may be considered low. Cross- or co-reactivity of ethyl methacrylate and methyl methacrylate was another concern addressed in the safety assessment of ethyl methacrylate, specifically because of the use of methyl methacrylate in PMMA bone cements and the possibility that an individual sensitized to ethyl methacrylate might then have an allergic reaction to the bone cement in a necessary medical procedure. The Panel concluded that there were no data supporting any sensitization reactions in patients receiving implants cemented with methyl methacrylate and that adverse consequences of cross-reactivity of ethyl methacrylate and methyl methacrylate are not a concern
POLYTETRAFLUOROETHYLENE	For perfluorinated carbons (PFCs): PFCs are inert fluids composed of a complex combination of organic compounds resulting from the distillation of electrochemically fluorinated (ECF) compounds. This class consists of branched, linear and cyclic perfluorinated hydrocarbons having carbon numbers predominantly in the range of C5-Cl8 and boiling in the range of approximately 25 C-255 C (77 F-491 F). Perfluorinated amine and ether compounds may also be present Acute oral and inhalation toxicity tests with perfluoroalkanes show no toxicity at any dose tested, and even extremely high-dose intraperitoneal injection resulted in no lethality. In contrast, perfluoroalkenes (such as octafluorocyclopentene, perfluoroisobutylene, hexafluoropropene) have shown evidence of inhalation toxicity, in some cases, extreme. PFCs are among the least toxic of all known organic chemicals. PFCs don't oxidise or hydrolyse. They have no functional reactive groups. PFCs owe their low toxicity to the combination of the following properties: ▸ Chemical inertness ▸ Low solubility in biological media (blood, cell membranes, etc.) ▸ High volatility ▸ Resistance to biological activation (reductive and oxidative metabolism) Because PFCs are chemically inert, if inhaled and absorbed they do not react chemically with any biological molecules; they simply partition between blood and various organs and tissues. As PFCs have limited ability to dissolve in biological media, they do not reach appreciable concentrations in the tissues of air-exposed animals. As PFCs are highly volatile chemicals and have high air-blood partition coefficients, any fluorochemical remaining after exposure will be rapidly

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	eliminated in the breath. Consequently, all such PFCs have: ▸ Very high rodent LC50s (very low acute toxicity) ▸ Very high cardiac sensitisation EC50s (very low toxicity) In fact, most PFCs do not induce narcosis (sleep) or cardiac sensitisation at maximum achievable concentration (saturation). Inhalation exposure at levels up to 50,000 ppm for thirteen weeks produced no effects in rats, nor did oral exposure for thirty days at 2,000 mg/kg/day. All PFCs that have undergone evaluation by the ACGIH or WEEL committees in the US have been granted an exposure guideline of 1000 ppm (8-hr TWA). NASA has evaluated the toxicity information associated with PFCs including those that can be used as heat transfer agents and fire extinguishing agents in spacecraft and has established a Space Maximum Allowable Concentration (SMAC) of 11,000 ppm for up to 180 days (24 hours/day) PFCs are neutral molecules and because they are maximally fluorinated, they cannot undergo biological oxidation-reduction reactions to form reactive aldehydes, acid fluorides, radicals or acids that have been associated with several types of toxicity. **Genetic toxicity:** As PFCs are not reactive directly with biological tissue and PFCs cannot form reactive metabolites, these fluorochemicals have tested negative in bacterial mutagenicity assays. Ames testing showed no genotoxicity. Hydrofluoroethers and hydrofluoropolyethers are highly fluorinated ethers having properties intermediate between the perfluoroethers and hydrocarbon ethers. They are low in toxicity, nonflammable, with densities of 1.4-1.7 g/cm3, surface tensions of 13-16 dyn/cm and low kinematic viscosity. The hydrofluoropolyethers are used as heat-transfer fluids. The hydrofluoroethers are used as heat-transfer fluids as well as precision cleaning solvents and solvents for specialty applications such as coating deposition. Perfluorinated compounds are potent peroxisome proliferators and were found to induce 8-hydroxydeoxyguanosine in the liver of treated rats. The material may produce peroxisome proliferation. Peroxisomes are single, membrane limited, cytoplasmic organelles that are found in the cells of animals, plants, fungi and protozoa. Peroxisome proliferators include certain hypolipidaemic drugs, phthalate ester plasticisers, industrial solvents, herbicides, food flavours, leukotriene D4 antagonists and hormones. Numerous studies in rats and mice have demonstrated the hepatocarcinogenic effects of peroxisome proliferators, and these compounds have been unequivocally established as carcinogens. However it is generally conceded that compounds inducing proliferation in rats and mice have little, if any, effect on human liver except at very high doses or extreme conditions of exposure.
LITHIUM & THIONYL CHLORIDE & ALUMINIUM CHLORIDE & LITHIUM CHLORIDE & POLYVINYL CHLORIDE & METHYL METHACRYLATE HOMOPOLYMER	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.
LITHIUM & ALUMINIUM CHLORIDE & CARBON, ACTIVATED & POLYVINYL CHLORIDE & METHYL METHACRYLATE HOMOPOLYMER	No significant acute toxicological data identified in literature search.
THIONYL CHLORIDE & ALUMINIUM CHLORIDE	The material may produce respiratory tract irritation. Symptoms of pulmonary irritation may include coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and a burning sensation. Unlike most organs, the lung can respond to a chemical insult or a chemical agent, by first removing or neutralising the irritant and then repairing the damage (inflammation of the lungs may be a consequence). The repair process (which initially developed to protect mammalian lungs from foreign matter and antigens) may, however, cause further damage to the lungs (fibrosis for example) when activated by hazardous chemicals. Often, this results in an impairment of gas exchange, the primary function of the lungs. Therefore prolonged exposure to respiratory irritants may cause sustained breathing difficulties.
THIONYL CHLORIDE & LITHIUM CHLORIDE	The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.
ALUMINIUM CHLORIDE & LITHIUM CHLORIDE	The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
CARBON, ACTIVATED & POLYVINYL CHLORIDE & METHYL METHACRYLATE HOMOPOLYMER & POLYTETRAFLUOROETHYLENE	The substance is classified by IARC as Group 3: **NOT** classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing.

Acute Toxicity	✗	**Carcinogenicity**	✗
Skin Irritation/Corrosion	✗	**Reproductivity**	✗
Serious Eye Damage/Irritation	✗	**STOT - Single Exposure**	✗
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✗
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✗ *– Data either not available or does not fill the criteria for classification*
✔ *– Data available to make classification*

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
SmartBoard Display (ADR)					

Continued...

	Not Available	Not Available	Not Available	Not Available	Not Available

lithium

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	18mg/L	2
EC50	48	Crustacea	6.24mg/L	2
EC50	72	Algae or other aquatic plants	25.6mg/L	2
NOEC	72	Algae or other aquatic plants	1.65mg/L	2

thionyl chloride

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	119.251mg/L	3
EC0	24	Crustacea	1-150mg/L	2

aluminium chloride

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	0.001-0.134mg/L	2
EC50	48	Crustacea	1.5mg/L	2
EC50	96	Algae or other aquatic plants	0.46mg/L	4
BCF	24	Crustacea	1.02mg/L	4
NOEC	48	Crustacea	>0.005mg/L	2

lithium chloride

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	17mg/L	4
EC50	48	Crustacea	249mg/L	2
EC50	72	Algae or other aquatic plants	112mg/L	2
NOEC	624	Fish	0.2mg/L	4

carbon, activated

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Available	Not Available	Not Available	Not Available	Not Available

polyvinyl chloride

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	2.315mg/L	3
EC50	96	Algae or other aquatic plants	25.141mg/L	3

methyl methacrylate homopolymer

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	43.382mg/L	3

polytetrafluoroethylene

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	64.087mg/L	3
EC50	96	Algae or other aquatic plants	248.438mg/L	3

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
thionyl chloride	HIGH	HIGH
aluminium chloride	HIGH	HIGH
lithium chloride	LOW	LOW
polyvinyl chloride	LOW	LOW
methyl methacrylate homopolymer	LOW (Half-life = 56 days)	LOW (Half-life = 0.4 days)
polytetrafluoroethylene	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
thionyl chloride	LOW (LogKOW = 0.9191)
aluminium chloride	LOW (LogKOW = 1.2596)
lithium chloride	LOW (LogKOW = -0.4608)
polyvinyl chloride	LOW (LogKOW = 1.6233)
methyl methacrylate homopolymer	LOW (LogKOW = 1.2751)

Continued...

polytetrafluoroethylene	LOW (LogKOW = 1.2142)

Mobility in soil

Ingredient	Mobility
thionyl chloride	LOW (KOC = 4.411)
aluminium chloride	LOW (KOC = 35.04)
lithium chloride	LOW (KOC = 14.3)
polyvinyl chloride	LOW (KOC = 23.74)
methyl methacrylate homopolymer	LOW (KOC = 10.14)
polytetrafluoroethylene	LOW (KOC = 106.8)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	▸ Recycle wherever possible or consult manufacturer for recycling options. ▸ Consult State Land Waste Management Authority for disposal. ▸ Bury residue in an authorised landfill. ▸ Recycle containers if possible, or dispose of in an authorised landfill.

Ensure that the hazardous substance is disposed in accordance with the Hazardous Substances (Disposal) Notice 2017

Disposal Requirements

Not applicable as substance/ material is non hazardous.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	4W

Land transport (UN)

UN number	3480
UN proper shipping name	LITHIUM ION BATTERIES (including lithium ion polymer batteries)
Transport hazard class(es)	Class: 9 Subrisk: Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: 188; 230; 310; 348; 376; 377; 384; 387 Limited quantity: 0

Air transport (ICAO-IATA / DGR)

UN number	3480
UN proper shipping name	Lithium ion batteries (including lithium ion polymer batteries)
Transport hazard class(es)	ICAO/IATA Class: 9 ICAO / IATA Subrisk: Not Applicable ERG Code: 12FZ
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: A88 A99 A154 A164 A183 A201 A206 A213 A331 A334 A802 Cargo Only Packing Instructions: See 965 Cargo Only Maximum Qty / Pack: See 965 Passenger and Cargo Packing Instructions: Forbidden Passenger and Cargo Maximum Qty / Pack: Forbidden

Continued...

	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	3480
UN proper shipping name	LITHIUM ION BATTERIES (including lithium ion polymer batteries)
Transport hazard class(es)	IMDG Class: 9 IMDG Subrisk: Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	EMS Number: F-A , S-I Special provisions: 188 230 310 348 376 377 384 387 Limited Quantities: 0

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

This substance is to be managed using the conditions specified in an applicable Group Standard

HSR Number	Group Standard
Not Applicable	Not Applicable

LITHIUM IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Approved Hazardous Substances with controls
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data
New Zealand Inventory of Chemicals (NZIoC)

THIONYL CHLORIDE IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Approved Hazardous Substances with controls
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Workplace Exposure Standards (WES)

ALUMINIUM CHLORIDE IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Approved Hazardous Substances with controls
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Workplace Exposure Standards (WES)

LITHIUM CHLORIDE IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Approved Hazardous Substances with controls
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data
New Zealand Inventory of Chemicals (NZIoC)

CARBON, ACTIVATED IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Approved Hazardous Substances with controls
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Workplace Exposure Standards (WES)

POLYVINYL CHLORIDE IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
New Zealand Inventory of Chemicals (NZIoC)

METHYL METHACRYLATE HOMOPOLYMER IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
New Zealand Inventory of Chemicals (NZIoC)

POLYTETRAFLUOROETHYLENE IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
New Zealand Inventory of Chemicals (NZIoC)

Hazardous Substance Location

Subject to the Health and Safety at Work (Hazardous Substances) Regulations 2017.

Hazard Class	Quantity beyond which controls apply for closed	Quantity beyond which controls apply when use occurring in open

Continued...

	containers	containers
Not Applicable	Not Applicable	Not Applicable

Certified Handler

Subject to Part 4 of the Health and Safety at Work (Hazardous Substances) Regulations 2017.

Class of substance	Quantities
Not Applicable	Not Applicable

Refer Group Standards for further information

Tracking Requirements

Not Applicable

National Inventory Status

National Inventory	Status
Australia - AICS	Yes
Canada - DSL	Yes
Canada - NDSL	No (aluminium chloride; polytetrafluoroethylene; thionyl chloride; polyvinyl chloride; lithium; lithium chloride; carbon, activated; methyl methacrylate homopolymer)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	No (polytetrafluoroethylene; polyvinyl chloride; methyl methacrylate homopolymer)
Japan - ENCS	No (lithium; carbon, activated)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - ARIPS	Yes
Legend:	*Yes = All CAS declared ingredients are on the inventory* *No = One or more of the CAS listed ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)*

SECTION 16 OTHER INFORMATION

Revision Date	14/02/2020
Initial Date	14/02/2020

Other information

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.

The 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.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index