

Panasonic Manganese dioxide Lithium Battery- CR (R-15)

Master Instruments Pty Ltd

Chemwatch Hazard Alert Code: 3

Chemwatch: 36-8111

Version No: 4.1

Safety Data Sheet according to WHS Regulations (Hazardous Chemicals) Amendment 2020 and ADG requirements

Issue Date: 01/11/2019

Print Date: 26/05/2022

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SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

Product name	Panasonic Manganese dioxide Lithium Battery- CR (R-15)
Chemical Name	Not Applicable
Synonyms	Not Available
Proper shipping name	LITHIUM METAL BATTERIES (including lithium alloy batteries)
Chemical formula	Not Applicable
Other means of identification	Not Available

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

Relevant identified uses	Battery. NOTE: Chemical materials are stored in sealed metal case. The toxic properties of the electrode materials are hazardous only if the materials are released by damaging the cell or if exposed to fire. The sealed Alkaline battery is not hazardous in normal use. The MSDS Risk codes and the chemical hazards are related to the leaked battery contents.
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Details of the supplier of the safety data sheet

Registered company name	Master Instruments Pty Ltd
Address	13 Sheridan Close Milperra NSW 2214 Australia
Telephone	+61 2 9519 1200
Fax	+612 9519 4604
Website	Not Available
Email	vic@master-instruments.com.au

Emergency telephone number

Association / Organisation	CHEMWATCH EMERGENCY RESPONSE
Emergency telephone numbers	+61 1800 951 288
Other emergency telephone numbers	+61 3 9573 3188

Once connected and if the message is not in your preferred language then please dial 01

SECTION 2 Hazards identification

Classification of the substance or mixture

Poisons Schedule	Not Applicable
Classification [1]	Acute Toxicity (Inhalation) Category 4, Skin Corrosion/Irritation Category 1B, Serious Eye Damage/Eye Irritation Category 1, Reproductive Toxicity Category 1B, Acute Toxicity (Oral) Category 4
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

Label elements

Hazard pictogram(s)	
Signal word	Danger

Hazard statement(s)

H332	Harmful if inhaled.
H314	Causes severe skin burns and eye damage.
H360FD	May damage fertility. May damage the unborn child.
H302	Harmful if swallowed.

Precautionary statement(s) Prevention

P201	Obtain special instructions before use.
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P260	Do not breathe dust/fume.
P264	Wash all exposed external body areas thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves, protective clothing, eye protection and face protection.
P270	Do not eat, drink or smoke when using this product.

Precautionary statement(s) Response

P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313	IF exposed or concerned: Get medical advice/ attention.
P310	Immediately call a POISON CENTER/doctor/physician/first aider.
P363	Wash contaminated clothing before reuse.
P301+P312	IF SWALLOWED: Call a POISON CENTER/doctor/physician/first aider if you feel unwell.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.

Precautionary statement(s) Storage

P405	Store locked up.
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Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
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Not Applicable

SECTION 3 Composition / information on ingredients

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
Not Available		Sealed metal contains
1313-13-9	12-50	<u>manganese dioxide</u>
7439-93-2	0.5-6	<u>lithium</u>
110-71-4	1.5-3.5	<u>1,2-dimethoxyethane</u>
7791-03-9	0.2-0.7	<u>lithium perchlorate</u>
Not Available	2.5-7	organic electrolyte
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 4. Classification drawn from C&L; * EU IOELVs available	

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	<p>If content come in contact with eye, wash away with much water for more than 15 minutes immediately, without rubbing. Seek medical attention.</p> <ul style="list-style-type: none"> ▸ Generally not applicable.
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> ▸ 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	<ul style="list-style-type: none"> ▸ Not considered a normal route of entry. ▸ For advice, contact a Poisons Information Centre or a doctor at once. ▸ Urgent hospital treatment is likely to be needed. ▸ 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. ▸ Transport to hospital or doctor without delay.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

Both dermal and oral toxicity of manganese salts is low because of limited solubility of manganese. No known permanent pulmonary sequelae develop after acute manganese exposure. Treatment is supportive.

[Ellenhorn and Barceloux: Medical Toxicology]

In clinical trials with miners exposed to manganese-containing dusts, L-dopa relieved extrapyramidal symptoms of both hypo kinetic and dystonic patients. For short periods of time

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symptoms could also be controlled with scopolamine and amphetamine. BAL and calcium EDTA prove ineffective.

[Gosselin et al: *Clinical Toxicology of Commercial Products*.]

SECTION 5 Firefighting measures

Extinguishing media

Use dry chemical powder, alcohol-resistant foam, carbon dioxide, or water as a fine spray.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.
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Advice for firefighters

Fire Fighting	<p>Slight hazard when exposed to heat, flame and oxidisers.</p> <ul style="list-style-type: none"> ▶ 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	<ul style="list-style-type: none"> ▶ 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.
HAZCHEM	4Y

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	<p>Clean up all spills immediately.</p> <p>Avoid contact with skin and eyes.</p> <p>Place in suitable containers for disposal.</p>
Major Spills	<p>Control personal contact with the substance, by using protective equipment</p> <p>Collect recoverable product into labelled containers for recycling</p>

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

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	<p>Risk of explosion by fire if batteries are disposed in fire or heated above 100 degrees. Stacking or jumbling batteries may cause external short circuits, heat generation, fire or explosion.</p> <p>Use good occupational work practice. Observe manufacturer's storage and handling recommendations contained within this SDS.</p> <p>Avoid physical damage to containers.</p>
Other information	<ul style="list-style-type: none"> ▶ Store away from incompatible materials. ▶ Keep dry. ▶ Store under cover. ▶ Protect containers against physical damage. ▶ Observe manufacturer's storage and handling recommendations contained within this SDS. <p>Keep out of reach of children.</p> <p>Store out of direct sunlight</p>

Conditions for safe storage, including any incompatibilities

Suitable container	▶ Packaging as recommended by manufacturer.
Storage incompatibility	None known

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	manganese dioxide	Manganese, dust & compounds (as Mn)	1 mg/m3	Not Available	Not Available	Not Available

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3

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Ingredient	TEEL-1	TEEL-2	TEEL-3
manganese dioxide	4.7 mg/m3	7.9 mg/m3	690 mg/m3
manganese dioxide	4.2 mg/m3	6.9 mg/m3	41 mg/m3
lithium	3.3 mg/m3	36 mg/m3	220 mg/m3
1,2-dimethoxyethane	13 ppm	140 ppm	840 ppm
lithium perchlorate	1.2 mg/m3	13 mg/m3	79 mg/m3

Ingredient	Original IDLH	Revised IDLH
manganese dioxide	500 mg/m3	Not Available
lithium	Not Available	Not Available
1,2-dimethoxyethane	Not Available	Not Available
lithium perchlorate	Not Available	Not Available

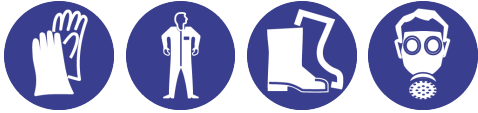
Occupational Exposure Banding

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
lithium	C	> 0.1 to ≤ milligrams per cubic meter of air (mg/m³)
1,2-dimethoxyethane	E	≤ 0.1 ppm
lithium perchlorate	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	None 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	None under normal operating conditions. OTHERWISE: ▸ Overalls. ▸ PVC Apron. ▸ PVC protective suit may be required if exposure severe. ▸ Eyewash unit. ▸ Ensure there is ready access to a safety shower.

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the **computer-generated** selection:

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Material	CPI
BUTYL	A

* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

Respiratory protection

Type A 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	A-AUS P3	-	A-PAPR-AUS / Class 1 P3
up to 50 x ES	-	A-AUS / Class 1 P3	-
up to 100 x ES	-	A-2 P3	A-PAPR-2 P3 ^

^ - 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)

• Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.

• The decision to use respiratory protection should be based on professional judgment

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that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).

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

- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.

- Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)

- Use approved positive flow mask if significant quantities of dust becomes airborne.

- Try to avoid creating dust conditions.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Coin shaped batteries. Voltage, 3volts.		
Physical state	Manufactured	Relative density (Water = 1)	Not Available
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water	Immiscible	pH as a solution (Not Available%)	Not Applicable
Vapour density (Air = 1)	Not Available	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	Vapor generated from burning batteries may cause throat irritation. Not normally a hazard due to physical form of product.
Ingestion	Considered an unlikely route of entry in commercial/industrial environments Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual. Poisonings rarely occur after oral administration of manganese salts as they are generally poorly absorbed from the gut (generally less than 4%) and seems to be dependent, in part, on levels of dietary iron and may increase following the consumption of alcohol. A side-effect of oral manganese administration is an increase in losses of calcium in the faeces and a subsequent lowering of calcium blood levels. Absorbed manganese tends to be slowly excreted in the bile. Divalent manganese appears to be 2.5-3 times more toxic than the trivalent form.
Skin Contact	Battery contents cause irritation upon contact with the skin. Not normally a hazard due to physical form of product.
Eye	Eye contact with the content of an open battery can cause severe irritation. Not normally a hazard due to physical form of product.
Chronic	Since chemicals are contained in a sealed can, there are no hazards. Exposure to battery content causes severe eye irritation, skin irritation and harmful effect if swallowed. Not normally a hazard due to physical form of product.

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	Oral (Rat) LD50: >2000 mg/kg ^[2]	Not Available
manganese dioxide	TOXICITY	IRRITATION
	Oral (Rat) LD50; >3478 mg/kg ^[2]	Eye: no adverse effect observed (not irritating) ^[1] Skin: no adverse effect observed (not irritating) ^[1]
lithium	TOXICITY	IRRITATION
	Not Available	Eye: adverse effect observed (irritating) ^[1] Skin: adverse effect observed (corrosive) ^[1]
1,2-dimethoxyethane	TOXICITY	IRRITATION
	dermal (guinea pig) LD50: 5 mg/kg ^[2]	Not Available
	Inhalation(Rat) LC50; 3000 ppm4h ^[2] Oral (Rabbit) LD50; 320 mg/kg ^[2]	
lithium perchlorate	TOXICITY	IRRITATION
	Oral (Rat) LD50; >300<2000 mg/kg ^[1]	Eye: adverse effect observed (irreversible damage) ^[1] Skin: adverse effect observed (corrosive) ^[1]
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	

1,2-DIMETHOXYETHANE	<p>Animal testing shows material is a reproductive effector: For ethylene glycol monoalkyl ethers and their acetates (EGMAEs): Typical members of this category are ethylene glycol propylene ether (EGPE), ethylene glycol butyl ether (EGBE) and ethylene glycol hexyl ether (EGHE) and their acetates. EGMAEs are substrates for alcohol dehydrogenase isozyme ADH-3, which catalyzes the conversion of their terminal alcohols to aldehydes (which are transient metabolites). Further, rapid conversion of the aldehydes by aldehyde dehydrogenase produces alkoxyacetic acids, which are the predominant urinary metabolites of mono substituted glycol ethers. Acute Toxicity: Oral LD50 values in rats for all category members range from 739 (EGHE) to 3089 mg/kg bw (EGPE), with values increasing with decreasing molecular weight. Four to six hour acute inhalation toxicity studies were conducted for these chemicals in rats at the highest vapour concentrations practically achievable. Values range from LC0 > 85 ppm (508 mg/m3) for EGHE, LC50 > 400ppm (2620 mg/m3) for EGBEA to LC50 > 2132 ppm (9061 mg/m3) for EGPE. No lethality was observed for any of these materials under these conditions. Dermal LD50 values in rabbits range from 435 mg/kg bw (EGBE) to 1500 mg/kg bw (EGBEA). Overall these category members can be considered to be of low to moderate acute toxicity. All category members cause reversible irritation to skin and eyes, with EGBEA less irritating and EGHE more irritating than the other category members. EGPE and EGBE are not sensitizers in experimental animals or humans. Signs of acute toxicity in rats, mice and rabbits are consistent with haemolysis (with the exception of EGHE) and non-specific CNS depression typical of organic solvents in general. Alkoxyacetic acid metabolites, propoxyacetic acid (PAA) and butoxyacetic acid (BAA), are responsible for the red blood cell hemolysis. Signs of toxicity in humans deliberately ingesting cleaning fluids containing 9-22% EGBE are similar to those of rats, with the exception of haemolysis. Although decreased blood haemoglobin and/or haemoglobinuria were observed in some of the human cases, it is not clear if this was due to haemolysis or haemodilution as a result of administration of large volumes of fluid. Red blood cells of humans are many-fold more resistant to toxicity from EGPE and EGBE <i>in vitro</i> than those of rats. Repeat dose toxicity: The fact that the NOAEL for repeated dose toxicity of EGBE is less than that of EGPE is consistent with red blood cells being more sensitive to EGBE than EGPE. Blood from mice, rats, hamsters, rabbits and baboons were sensitive to the effects of BAA <i>in vitro</i> and displayed similar responses, which included erythrocyte swelling (increased haematocrit and mean corpuscular hemoglobin), followed by hemolysis. Blood from humans, pigs, dogs, cats, and guinea pigs was less sensitive to haemolysis by BAA <i>in vitro</i>. Mutagenicity: In the absence and presence of metabolic activation, EGBE tested negative for mutagenicity in Ames tests conducted in <i>S. typhimurium</i> strains TA97, TA98, TA100, TA1535 and TA1537 and EGHE tested negative in strains TA98, TA100, TA1535, TA1537 and TA1538. <i>In vitro</i> cytogenetic and sister chromatid exchange assays with EGBE and EGHE in Chinese Hamster Ovary Cells with and without metabolic activation and <i>in vivo</i> micronucleus tests with EGBE in rats and mice were negative, indicating that these glycol ethers are not genotoxic. Carcinogenicity: In a 2-year inhalation chronic toxicity and carcinogenicity study with EGBE in rats and mice a significant increase in the incidence of liver haemangiosarcomas was seen in male mice and forestomach tumours in female mice. It was decided that based on the mode of action data available, there was no significant hazard for human carcinogenicity Reproductive and developmental toxicity. The results of reproductive and developmental toxicity studies indicate that the glycol ethers in this category are not selectively toxic to the reproductive system or developing fetus, developmental toxicity is secondary to maternal toxicity. The repeated dose toxicity studies in which reproductive organs were examined indicate that the members of this category are not associated with toxicity to reproductive organs (including the testes). Results of the developmental toxicity studies conducted via inhalation exposures during gestation periods on EGPE (rabbits -125, 250, 500 ppm or 531, 1062, or 2125 mg/m3 and rats - 100, 200, 300, 400 ppm or 425, 850, 1275, or 1700 mg/m3), EGBE (rat and rabbit - 25, 50, 100, 200 ppm or 121, 241, 483, or 966 mg/m3), and EGHE (rat and rabbit - 20.8, 41.4, 79.2 ppm or 124, 248, or 474 mg/m3) indicate that the members of the category are not teratogenic. The NOAELs for developmental toxicity are greater than 500 ppm or 2125 mg/m3 (rabbit-EGPE), 100 ppm or 425 mg/m3 (rat-EGPE), 50 ppm or 241 mg/m3 (rat EGBE) and 100 ppm or 483 mg/m3 (rabbit EGBE) and greater than 79.2 ppm or 474 mg/m3 (rat and rabbit-EGHE). For 1,2-dimethoxyethane (monoglyme): Monoglyme, an ethylene glycol ether, demonstrates a low order of toxicity with an oral LD50 of greater than 4000 mg/kg in rats. The acute inhalation toxicity of monoglyme was determined in a two-dose study in which the six-hour inhalation LC50 was found to be between 20 and 63 mg/L. The vapors produced some irritation and anesthesia at the high level. All high dose animals survived the exposure but died within 72 hours post-exposure. A great deal of information is available on the repeated-dose toxicity of the biologically indicated metabolite of monoglyme, 2-methoxyethanol (2ME). In one study testicular degeneration was a prominent finding in rats even at the lowest dose tested (750 ppm, about 70 mg/kg/day) and in females, at this level, thymic atrophy was a finding. Thus, a NOEL was not found for rats of either sex. In the case of mice, the NOAEL for testicular degeneration and increased haematopoiesis in the spleen was 2000 ppm in males. A NOAEL was not reached for female mice since adrenal gland hypertrophy and increased haematopoiesis in the spleen occurred at the lowest concentration administered (2000 ppm, about 300 mg/kg/day). Repeated-dose studies Repeated dose exposure in the drinking water was also associated with progressive anemia in rats and mice and increased mortality in rats at the two highest doses. The target organs can be identified as testes, bone marrow, spleen (hematopoiesis), thymus and adrenal. In general, the testes is considered a sensitive, if not the most sensitive, target organ.</p>
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	<p>A complete spectrum of toxicity can be confidently predicted from monoglyme s metabolism and studies on related compounds by all routes of exposure. Toxic responses include thymic atrophy, bone marrow suppression and testicular degeneration. Although direct chemical evidence identifying the primary and secondary metabolites of monoglyme was not found, the metabolic pathways for this class of chemicals are well known. Additionally, there is very strong biological evidence linking adverse effects of monoglyme with a common active metabolite of methoxy glycol ethers.</p> <p>It has been demonstrated that most of the toxic effects of the monoalkyl glycol ethers arise as a result of the metabolic conversion of the glycol ether into a substituted acetic acid derivative. In humans it is established that 2-methoxyacetic acid is the defining toxic metabolite and studies have shown that the level of 2-methoxyacetic acid in urine is an excellent marker for exposure. Demethylation by mixed-function oxidases, a relatively slow reaction, accounts for some metabolic conversion to ethylene glycol which is converted to oxalate. Dehydrogenase enzymes initially convert the free alcohol to the aldehyde and then the carboxylic acid. This is a very rapid conversion and it is known that a teratogenic dose of 2-methoxyethanol is completely oxidised, to 2-methoxyacetic acid, in a period of one-hour in rats. The competing reaction, demethylation of 2-methoxyethanol to ethylene glycol is comparatively slow as it is accomplished by the mixed-function oxidase system.</p> <p>There is general agreement that 2-methoxyacetic acid is the proximate toxin. It is also established the clearance of 2-methoxyacetic acid is relatively slow as compared to its formation and the clearance in man may be much longer than in rats.</p> <p>Genotoxicity has been evaluated using multiple <i>in vitro</i> experimental procedures covering both mutation and chromosomal aberration. Results of genotoxicity studies are mixed.</p> <p>In <i>in vitro</i> studies, positive results are cited for the A. S. <i>typhimurium</i> reverse mutation assay. Monoglyme is known to be cytotoxic to Salmonella typhimurium (30) at concentrations as low as 500 microliters per plate.</p> <p>Monoglyme produced no evidence of genotoxicity in the presence or absence of S9 metabolic activation in mammalian cell point mutation tests using the HGPRT assay in CHO cells</p> <p>Clastogenic activity was assessed <i>in vitro</i> using the Sister Chromatid Exchange in Chinese Hamster Ovary Cells Test (SCE). In this test, the material produced numerous indications of statistically significant effects on the frequency of SCE over the range of concentrations tested with and without addition of an active S9 metabolic system. A high number of cells were also observed with significant types of chromosomal aberrations suggesting that material was a clastogenic agent, especially in the presence of S9 activation</p> <p>DNA damage was assessed using an <i>in vitro</i> unscheduled DNA synthesis (UDS) Assay. rat hepatocytes were treated with a wide concentration range of monoglyme up to concentrations demonstrating cytotoxicity in the assay system. Treatment did not produce either statistically significant or dose-related increases in the amount of UDS activity as measured by radioactive thymidine uptake</p> <p>Reproductive toxicity: Adverse effects to reproduction are based on metabolism of monoglyme to 2-methoxy acetic acid, a compound that is known to interfere with sperm production. Adverse effects on the conceptus, including embryo lethality are also caused by this metabolite. Direct specific effects on female reproduction are not known to result from 2-methoxyacetic acid and thus are not expected from monoglyme exposure</p> <p>Developmental toxicity: Monoglyme appears to be a specific developmental toxin in rats and mice. Results in rats show that 120 mg/kg/day or more was associated with 100% foetal death and doses of 30 or 60 mg/kg were foetotoxic but did not produce major malformations. This suggests that monoglyme is a specific developmental toxin as would be anticipated based on its metabolism to 2-methoxy acetic acid.</p> <p>Studies with some ethylene glycol ethers and their esters indicate reproductive changes, testicular atrophy, infertility and kidney function changes. The metabolic acetic acid derivatives of the glycol ethers (alkoxyacetic acids), not the ether itself, have been found to be the proximal reproductive toxin in animals. The potency of these metabolites decrease significantly as the chain length of the ether increases. Consequently glycol ethers with longer substituents (e.g diethylene glycols, triethylene glycols) have not generally been associated with reproductive effects.</p> <p>One of the most sensitive indicators of toxic effects observed from many of the glycol ethers is an increase in the erythrocytic osmotic fragility in rats. This appears to be related to the development of haemoglobinuria (blood in the urine) at higher exposure levels or as a result of chronic exposure. Ethylene glycol ethers and acetates are mainly metabolised to alkoxyacetic acids but there is also a minor pathway through ethylene glycol to oxalic acid. The main pathway of ethylene glycol ethers is associated with significant clinical or experimental health effects, but the minor pathway is also interesting because formation of urinary stones depends principally upon urinary concentration of oxalate and calcium. In one study (1) the tendency to form urinary stones was 2.4 times higher amongst silk-screen printers exposed to ethylene glycol ethers, than among office workers. (1) Laitinen J., et al: Occupational Environmental Medicine 1996, 53 595-600</p>
MANGANESE DIOXIDE & LITHIUM & LITHIUM PERCHLORATE	No significant acute toxicological data identified in literature search.
LITHIUM & LITHIUM PERCHLORATE	Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. 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. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.

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

Panasonic Manganese dioxide Lithium Battery- CR (R-15)	Endpoint	Test Duration (hr)	Species	Value	Source
manganese dioxide	Not Available	Not Available	Not Available	Not Available	Not Available
	EC50(ECx)	48h	Crustacea	>0.022mg/l	2
	EC50	48h	Crustacea	>0.022mg/l	2

Panasonic Manganese dioxide Lithium Battery- CR (R-15)

	Endpoint	Test Duration (hr)	Species	Value	Source
	lithium	NOEC(ECx)	72h	Algae or other aquatic plants	1.65mg/l
LC50		96h	Fish	18mg/l	2
EC50		72h	Algae or other aquatic plants	25.6mg/l	2
EC50		48h	Crustacea	19.1mg/l	2
	Endpoint	Test Duration (hr)	Species	Value	Source
	1,2-dimethoxyethane	NOEC(ECx)	504h	Crustacea	320mg/l
EC50		72h	Algae or other aquatic plants	9120mg/l	2
LC50		96h	Fish	>500mg/l	2
EC50		48h	Crustacea	4000mg/l	2
	Endpoint	Test Duration (hr)	Species	Value	Source
	lithium perchlorate	EC50(ECx)	48h	Crustacea	>100mg/l
EC50		72h	Algae or other aquatic plants	>120mg/l	2
EC50		48h	Crustacea	>100mg/l	2
Legend: <i>Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 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</i>					

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
1,2-dimethoxyethane	LOW	LOW
lithium perchlorate	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
1,2-dimethoxyethane	LOW (LogKOW = -0.21)
lithium perchlorate	LOW (LogKOW = -4.6296)

Mobility in soil

Ingredient	Mobility
1,2-dimethoxyethane	HIGH (KOC = 1)
lithium perchlorate	LOW (KOC = 48.64)

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	Consult manufacturer for recycling options. Consult State Land Waste Management Authority for disposal.
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SECTION 14 Transport information

Labels Required

	
Marine Pollutant	NO
HAZCHEM	4Y

Land transport (ADG)

UN number	3090
UN proper shipping name	LITHIUM METAL BATTERIES (including lithium alloy batteries)
Transport hazard class(es)	Class 9
	Subrisk Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable

Panasonic Manganese dioxide Lithium Battery- CR (R-15)

Special precautions for user	Special provisions	188 230 310 376 377 384 387
	Limited quantity	0

Air transport (ICAO-IATA / DGR)

UN number	3090	
UN proper shipping name	Lithium metal batteries (including lithium alloy 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 A334 A802
	Cargo Only Packing Instructions	See 968
	Cargo Only Maximum Qty / Pack	See 968
	Passenger and Cargo Packing Instructions	Forbidden
	Passenger and Cargo Maximum Qty / Pack	Forbidden
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	3090	
UN proper shipping name	LITHIUM METAL BATTERIES (including lithium alloy 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	188 230 310 376 377 384 387
	Limited Quantities	0

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

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
manganese dioxide	Not Available
lithium	Not Available
1,2-dimethoxyethane	Not Available
lithium perchlorate	Not Available

Transport in bulk in accordance with the ICG Code

Product name	Ship Type
manganese dioxide	Not Available
lithium	Not Available
1,2-dimethoxyethane	Not Available
lithium perchlorate	Not Available

SECTION 15 Regulatory information

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

manganese dioxide is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
 Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for
 Manufactured Nanomaterials (MNMS)

lithium is found on the following regulatory lists

Panasonic Manganese dioxide Lithium Battery- CR (R-15)

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 2
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4
 Australian Inventory of Industrial Chemicals (AIIC)

FEI Equine Prohibited Substances List - Banned Substances
 FEI Equine Prohibited Substances List (EPSL)
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

1,2-dimethoxyethane is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
 Australian Inventory of Industrial Chemicals (AIIC)

Chemical Footprint Project - Chemicals of High Concern List

lithium perchlorate is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (manganese dioxide; lithium; 1,2-dimethoxyethane; lithium perchlorate)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (lithium)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	No (lithium perchlorate)
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	No (lithium perchlorate)
Vietnam - NCI	Yes
Russia - FBEPH	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. These ingredients may be exempt or will require registration.

SECTION 16 Other information

Revision Date	01/11/2019
Initial Date	30/08/2013

SDS Version Summary

Version	Date of Update	Sections Updated
2.1	30/08/2013	Personal Protection (other), Personal Protection (Respirator), Personal Protection (eye), Personal Protection (hands/feet), Storage (storage requirement), Use
4.1	01/11/2019	One-off system update. NOTE: This may or may not change the GHS classification

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
 ES: Exposure Standard
 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
 AIIC: Australian Inventory of Industrial Chemicals
 DSL: Domestic Substances List
 NDSL: Non-Domestic Substances List

Panasonic Manganese dioxide Lithium Battery- CR (R-15)

IECSC: Inventory of Existing Chemical Substance in China
EINECS: European INventory of Existing Commercial chemical Substances
ELINCS: European List of Notified Chemical Substances
NLP: No-Longer Polymers
ENCS: Existing and New Chemical Substances Inventory
KECI: Korea Existing Chemicals Inventory
NZIoC: New Zealand Inventory of Chemicals
PICCS: Philippine Inventory of Chemicals and Chemical Substances
TSCA: Toxic Substances Control Act
TCSI: Taiwan Chemical Substance Inventory
INSQ: Inventario Nacional de Sustancias Químicas
NCI: National Chemical Inventory
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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