

SAFETY DATA SHEETS

This SDS packet was issued with item:

076320675

The safety data sheets (SDS) in this packet apply to one or more components included in the items listed below. Items listed below may require one or more SDS. Please refer to invoice for specific item number(s).

076320741

**SAFETY DATA SHEET****Product: LITHIUM ION BATTERY FOR RADII PLUS / RADII CAL****Date / Revised: 26.11.2014****Page 1 of 7****Revision: 1****1.1 Product identifier:**

Product Names: Lithium-ion battery for Radii Plus / Radii Cal.

1.2 Relevant identified use:

Relevant use: Battery to be used with the Radii Plus and Radii Cal Dental Curing Light.

Further information:

Battery System: Lithium-ion (Li-ion) battery pack

Nominal voltage: 7.4V

Rated Capacity: 1550mAh

Wh rating: 11.47 Wh

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2. Hazard Identification

Not classified as hazardous according to the Globally Harmonised System for classification and labelling of chemicals (GHS). No effect on skin contact, skin absorption, eye contact and inhalation under routine handling and use.

Potentially hazardous materials are sealed and contained in equipment. Equipment is packed in strong outer packaging to withstand normal handling and use. Exposure could occur if the equipment has been exposed to high temperatures (>125°C), battery or cells have been opened, crushed, dissembled or burned. Keep away from heat.

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Battery Cell

Components	Content (wt %)	CAS number
Lithium Cobalt Dioxide (LiCoO ₂)	Less than 38 wt %	12190-79-3
Lithium Hexafluorophosphate (LiPF ₆)	Less than 3 wt %	21324-40-3
Ethylene Carbonate (C ₃ H ₄ O ₃)	Less than 6 wt %	96-49-1
Chain carbonate (-)	Less than 8 wt %	
Graphite (C)	Less than 20 wt %	7782-42-5
Lead (Pb)	Less than 0.1 wt % (1000ppm)	
Mercury (Hg)	Less than 0.0005 wt % (5ppm)	

Note: other 25% includes the below materials:

Al (positive Base Film, Cap, Can, Tab)

Cu (Negative film base)

Ni (Tab, Terminal)

Fe (Terminal)

Resin (PP, PE, PET) (Separator, Plastic, Parts, Insulator)

Circuit Module:

Hazardous ingredients	%	CAS number
Lead	< 0.1	7439-92-1
Mercury	0	7439-97-6
Chromium	0	7440-47-3
Cadmium	0	7440-43-9
Plastic case and SiO ₂	0	N/A

Plastic Parts and Paints:

Ingredients	%	CAS number
Polycarbonate	More than 81 wt%	25971-63-5
Flame retardant	Less than 12 wt%	
Elastomer	Less than 7 wt%	

4. First Aid Measures

Intact/undamaged cell(battery pack):

Inhalation, eye contact and skin contact: Not a health hazard.

Ingestion: If swallowed, obtain immediate medical attention.

If exposure to internal materials within cell(pack) due to damaged outer casing, the following actions are recommended:

Ingestion: Drink milk/water and induce vomiting. Seek immediate medical attention.

Skin: Wash skin thoroughly with soap and water and seek medical attention.

Eye: Rinse eyes with water for 15 minutes and seek medical attention.

Inhalation: Leave area immediately and seek medical attention.

Most important effects, acute and delayed:

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The most important known symptoms and effects are described in section 2 and/or in section 11.

Indication of any immediate medical attention and special treatment needed: no data available

5. Fire Fighting Measures

General Hazard:	Cell is not flammable but internal organic material will burn if the cell is incinerated.
Suitable extinguishing media:	Carbon dioxide, foam, dry chemical extinguishing media or water spray.
Unsuitable extinguishing media:	No data available.
Specific hazards arising from the mixture:	This product will burn under fire conditions. Combustion products include but are not limited to hydrogen fluoride, carbon monoxide and carbon dioxide. If possible, remove cells from fire fighting area. If heated above 125°C, cells can explode/vent.
Advice for firefighters:	Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

6. Accidental Release Measures

Personal precautions:	Use personal protective equipment to avoid contact and exposure. Remove all metal objects including jewellery, belts, etc before handling battery. Remove all sources of ignition. Ensure adequate ventilation. For personal protection, see section 8.
Environmental precautions:	Prevent any spillage from entering drains or waterways.
Method for Cleaning and containment of Spills:	For small spills, use paper towel or dry cloth to absorb electrolyte spill. For larger spills, clean up spill using an inert absorbent material such as dry sand or vermiculite. Place in appropriate container for disposal in accordance with local regulations. Clean up area with soap and water, and collect material for subsequent disposal. Do not allow to enter drains or waterways.

Removal of ignition sources, provision of sufficient ventilation, control of dust: Not expected.

7. Handling and storagePrecautions for safe handling:

Do not damage, disassemble or open the battery. Keep away from heat and fire.

Conditions for safe storage, including any biocompatibilities:

Store in a cool, dry, well-ventilated place.



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The packed battery should not be exposed to high temperatures (>60°C or 140°F), opened, crushed, disassembled or burned.

Specific end use: Apart from the use mentioned in section 1.2, there are no other uses for the product.

8. Exposure controls and personal protection

Engineering controls: Keep away from heat and open flame. Store in a cool dry place.

Occupational Exposure Limits: We are not aware of any national exposure limit.

Exposure controls:

Respiratory protection: None required under normal conditions of use. SCBA required in the event of a fire.

Hand protection: Gloves not required for handling of cells.

Eye / face protection: None required under normal conditions of use.

Foot protection: Steel toed shoes recommended for large container handling.

No personal protection is required for the normal handling of the battery. If ingredients within the battery are leaking follow first aid section of this document.

9. Physical and chemical properties

Properties such as pH, boiling point flash points are not applicable as the batteries are solid articles.

State:	Solid
Odour:	Not applicable
pH:	Not applicable
Vapour pressure:	Not applicable
Vapour density:	Not applicable
Boiling point:	Not applicable
Solubility in water:	Insoluble
Specific gravity:	Not applicable
Density:	Not applicable

10. Stability and Reactivity

Stability: Stable under normal conditions.

Reactivity: Stable under normal conditions.

Conditions to avoid: Avoid exposure to heat and open flames, and corrosives. Do not crush, puncture, incinerate, disassemble, or immerse in water.

Materials to avoid: Avoid exposure to heat, open flame, and corrosives.

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Hazardous decomposition products: None under normal conditions. If cells are opened or damaged, hydrogen fluoride and carbon monoxide may be released.

Hazardous reactivity (polymerization): Will not occur.

11. Toxicological information

Acute toxicity: This product does not elicit toxicological properties during routine handling and use.

Contents of broken/leaking battery may be irritating/corrosive to skin and eyes, and if ingested.

Serious eye damage/irritation: Contents of open battery can be eye irritant or corrosive.

Skin corrosion/irritation: Not expected under normal use. Contents of open battery can be a skin irritant or corrosive.

Respiratory or skin sensitisation: Not a skin or respiratory sensitiser.

Inhalation: None expected.

Ingestion: Not expected under normal use. Ingestion of battery contents may cause gastrointestinal tract burns, nausea and vomiting.

Germ cell mutagenicity: No data available

Carcinogenicity:

IARC: Not listed according to IARC.

(IARC: International Agency for Research on Cancer, by the World Health Organisation (WHO)).

Reproductive toxicity: no data available

Specific target organ toxicity – single exposure: May cause irritation/corrosion to eyes, skin, gastrointestinal tract on contact with open battery contents.

Specific target organ toxicity – repeated exposure: None under normal conditions of use. May be skin sensitiser on contact with open battery contents.

Aspiration hazard: No data available

This product does not contain any kinds of the following substances and halogen-type flame retardants including Chlorine and Bromide type harmful flame retardants which are listed in Appendix TCO documents and relevant international ECO requirements:

Polybromated Biphenyls (PBB)
Polybromated Diphenylethers (PBDE)
Polychlorinated Biphenyls (PCB)
Polychlorinated Terphenyls (PCT)
Polychlorinated Paphthalene (PCN)
Chlorinated Paraffins (CFC)
Polyvinyl Chloride (PVC)
Carbon Tetrachloride

**SAFETY DATA SHEET****Product: LITHIUM ION BATTERY FOR RADII PLUS / RADII CAL****Date / Revised: 26.11.2014****Page 6 of 7****Revision: 1****12. Ecological information**

Self assessment:

Slightly hazardous for water in the case of a broken/open battery with leakage of the contents. The batteries do not contain mercury, cadmium or other heavy metals. Do not allow large quantities to reach sewage system and waterways.

Ecotoxicity:

No data available.

Persistence and biodegradability:

No data available.

Bioaccumulative potential:

No data available.

Mobility in soil:

No data available.

Results of PBT and VPvB assessment: PBT/VPvB assessment not available as chemical safety assessment not required/not conducted.

Other adverse effects:

No data available.

13. Disposal considerations

Do not dispose in fire. Disposal should be made with consideration to recycling options available in your area. Dispose at permitted waste treatment and/or disposal sites in accordance with local and national regulations.

Batteries do not contain hazardous materials according to EC Directives 91/157/EEC and 93/86/EEC.

14. Transport information**IATA:**

International Air Transport Association (IATA) Dangerous Goods Regulations (55th Edition) – Packing Instruction 965, 966 or 967 Section II is applied.

Lithium ion batteries supplied by SDI Limited are less than 100 Watt-hours and are in compliance with Section II PI 965, 966 or 967.

IMDG:

Transport according to International Maritime Dangerous Goods (IMDG) Code Amendment 35-10, Special Provisions 188, 230, 310 & 957 for UN 3480 / 3481 Lithium Ion Battery, Packing Instruction P903 for lithium ion batteries.

There are no hazards in accordance with the UN recommendations tests (Manual of Tests and Criteria, Part III, sub-section 38.3, 1.2m Drop):

N	Items	Result	Remark
1	Altitude	Pass	
2	Thermal Shock	Pass	
3	Vibration	Pass	
4	Shock	Pass	
5	External Shock	Pass	
6	Impact	Pass	
7	Overcharge	Pass	
8	Forced Discharge	N/A	For cell
9	1.2m Drop Test	Pass	

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15. Regulatory information

Not classified as hazardous according to the Globally Harmonised System of Classification and Labelling of chemicals (GHS). The product is made from materials with no detectable mercury.

This battery is to be used in dental curing lights Radian Cal and Radian Plus regulated by:

TGA
Medical Devices Directive 93/42/EEC
FDA
National regulations.

16. Other information

The information provided herein is given in good faith, but no warranty expressed or implied is made.

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Phone Number:
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Department issuing MSDS: Research and Development
Contact: R&D Director



Lithium-ion battery in equipment – Ralii Plus and Ralii Cal

SDI Limited

Version No: 3.1.1.1

Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Issue Date: 12/01/2016

Print Date: 23/03/2016

Initial Date: Not Available

L.GHS.USA.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	Lithium-ion battery in equipment – Ralii Plus and Ralii Cal
Synonyms	Lithium-ion (Li-ion) battery pack. Nominal voltage: 7.4V, Rated Capacity: 1550mAh, Wh rating: 11.47 Wh
Proper shipping name	LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	Battery in Ralii Plus and Ralii Cal, to be used as dental curing lights. Potentially hazardous materials are sealed and contained in equipment. Equipment is packed in strong outer packaging to withstand normal handling and use. Exposure could occur if the equipment has been exposed to high temperatures (>125°C), battery or cells have been opened, crushed, disassembled or burned.
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Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	SDI Limited	SDI Brazil Industria E Comercio Ltda	SDI Germany GmbH
Address	3-15 Brunson Street VIC Bayswater 3153 Australia	Rua Dr. Virgilio de Carvalho Pinto, 612 São Paulo CEP 05415-020 Brazil	Hansestrasse 85 Cologne D-51149 Germany
Telephone	+61 3 8727 7111 (Business Hours)	+55 11 3092 7100	+49 0 2203 9255 0
Fax	+61 3 8727 7222	+55 11 3092 7101	+49 0 2203 9255 200
Website	www.sdi.com.au	www.sdi.com.au	www.sdi.com.au
Email	info@sdi.com.au	brasil@sdi.com.au	germany@sdi.com.au

Registered company name	SDI (North America) Inc.
Address	1279 Hamilton Parkway IL Itasca 60143 United States
Telephone	+1 630 361 9200 (Business hours)
Fax	Not Available
Website	Not Available
Email	USA.Canada@sdi.com.au

Emergency phone number

Association / Organisation	SDI Limited	Not Available	Not Available
Emergency telephone numbers	+61 3 8727 7111	Not Available	Not Available
Other emergency telephone numbers	ray.cahill@sdi.com.au	Not Available	Not Available

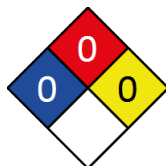
Association / Organisation	Not Available
Emergency telephone numbers	+61 3 8727 7111
Other emergency telephone numbers	Not Available

SECTION 2 HAZARD(S) IDENTIFICATION

Classification of the substance or mixture

Lithium-ion battery in equipment – Raddi Plus and Raddi Cal

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

Classification	Not Applicable
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Label elements

GHS label elements	Not Applicable
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SIGNAL WORD	NOT APPLICABLE
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Hazard statement(s)

Not Applicable

Hazard(s) not otherwise specified

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

Mixtures

CAS No	%[weight]	Name
		Battery Cell contains
12190-79-3	<38	<u>lithium cobaltate</u>
21324-40-3	<3	<u>lithium fluorophosphate</u>
96-49-1	<6	<u>ethylene carbonate</u>
Not Available	<8	chain carbonate
7782-42-5	<20	<u>graphite</u>
7439-92-1	<0.1	<u>lead</u>
7439-97-6	<0.0005	<u>mercury (elemental)</u>
		Note: other 25% includes the below materials:
		Al (Positive Base Film, Cap, Can, Tab)
		Cu (Negative film base)
		Ni (Tab, Terminal)
		Fe (Terminal)
		Resin (PP, PE, PET) (Separator, Plastic, Parts, Insulator)
		Circuit Module contains
7439-92-1	<0.1	<u>lead</u>
7439-97-6		<u>mercury (elemental)</u>
7440-47-3		<u>chromium</u>
7440-43-9		<u>cadmium</u>
		plastic case and SiO ₂
		Plastic Parts and Paints contains
25971-63-5	>81	<u>bisphenol A/ phosgene polymer</u>
Not Available	<12	flame retardant
Not Available	<7	elastomer

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

Continued...

Lithium-ion battery in equipment – Radii Plus and Radii Cal

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▶ Immediately hold eyelids apart and flush the eye continuously with 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. ▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▶ Transport to hospital or doctor without delay. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation.
Inhalation	<ul style="list-style-type: none"> ▶ If fumes or combustion products are inhaled remove from contaminated area. ▶ 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.

Most important symptoms and effects, both acute and delayed

See Section 11

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 FIRE-FIGHTING 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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Special protective equipment and precautions for fire-fighters

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"> ▶ The material is not readily combustible under normal conditions. ▶ However, it will break down under fire conditions and the organic component may burn. ▶ Not considered to be a significant fire risk. ▶ Heat may cause expansion or decomposition with violent rupture of containers. ▶ Decomposes on heating and may produce toxic fumes of carbon monoxide (CO). ▶ May emit acrid smoke.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

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	<ul style="list-style-type: none"> ▶ 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

Lithium-ion battery in equipment – Raddi Plus and Raddi Cal

Safe handling	Use good occupational work practice. Observe manufacturer's storage and handling recommendations contained within this SDS. Avoid physical damage to containers.
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. Store out of direct sunlight Keep away from heat and naked flames.

Conditions for safe storage, including any incompatibilities

Suitable container	▶ DO NOT repack. Use containers supplied by manufacturer only.
Storage incompatibility	▶ Avoid strong acids, acid chlorides, acid anhydrides and chloroformates.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US ACGIH Threshold Limit Values (TLV)	lithium cobaltate	Cobalt and inorganic compounds, as Co	0.02 mg/m ³	Not Available	Not Available	TLV® Basis: Asthma; pulm tunc; myocardial eff; BEI
US OSHA Permissible Exposure Levels (PELs) - Table Z1	graphite	Graphite, natural, respirable dust	Not Available	Not Available	Not Available	See Table Z-3
US OSHA Permissible Exposure Levels (PELs) - Table Z3	graphite	Graphite (Natural)	15 mppcf	Not Available	Not Available	(Natural)
US ACGIH Threshold Limit Values (TLV)	graphite	Graphite (all forms except graphite fibers)	2 mg/m ³	Not Available	Not Available	TLV® Basis: Pneumoconiosis
US NIOSH Recommended Exposure Limits (RELs)	graphite	Black lead, Mineral carbon, Plumbago, Silver graphite, Stove black [Note: Also see specific listing for Graphite (synthetic).]	2.5 (resp) mg/m ³	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Levels (PELs) - Table Z1	lead	Lead, inorganic	0.05 mg/m ³	Not Available	Not Available	(as Pb);see 1910.1025;If an employee is exposed to lead for more than 8 hours in any work day, the permissible exposure limit, as a time weighted average (TWA) for that day, shall be reduced according to the following formula: Maximum permissible limit (in µg/m ³)=400÷hours worked in the day.
US OSHA Permissible Exposure Levels (PELs) - Table Z2	lead	Cadmium fume / Cadmium dust	0.1 mg/m ³ / 0.2 mg/m ³	Not Available	0.3 mg/m ³ / 0.6 mg/m ³	(Z37.5–1970);This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect
US ACGIH Threshold Limit Values (TLV)	lead	Lead and inorganic compounds, as Pb	0.05 mg/m ³	Not Available	Not Available	TLV® Basis: CNS & PNS impair; hematologic eff; BEI
US ACGIH Threshold Limit Values (TLV)	lead	Cadmium and compounds, as Cd	0.002 mg/m ³	Not Available	Not Available	TLV® Basis: Kidney dam; BEI
US NIOSH Recommended Exposure Limits (RELs)	lead	Lead metal, Plumbum	0.050 mg/m ³	Not Available	Not Available	See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]
US OSHA Permissible Exposure Levels (PELs) - Table Z1	mercury (elemental)	Mercury (vapor)	Not Available	Not Available	Not Available	See Table Z-2;(as Hg)
US OSHA Permissible Exposure Levels (PELs) - Table Z2	mercury (elemental)	Mercury	Not Available	Not Available	0.1 mg/m ³	(Z37.8–1971)
US ACGIH Threshold Limit Values (TLV)	mercury (elemental)	Silver, and compounds - Metal, dust and fume	0.1 mg/m ³	Not Available	Not Available	TLV® Basis: Argyria
US ACGIH Threshold Limit Values (TLV)	mercury (elemental)	Mercury, all forms except alkyl, as Hg - Elemental and inorganic forms	0.025 mg/m ³	Not Available	Not Available	TLV® Basis: CNS impair; kidney dam; BEI
US NIOSH Recommended Exposure Limits (RELs)	mercury (elemental)	Mercury metal: Colloidal mercury, Metallic mercury, Quicksilver	Hg Vapor: 0.05 mg/m ³	Not Available	Other:0.1 mg/m ³	Not Available
US OSHA Permissible Exposure Levels (PELs) - Table Z1	lead	Lead, inorganic	0.05 mg/m ³	Not Available	Not Available	(as Pb);see 1910.1025;If an employee is exposed to lead for more than 8 hours in any work day, the permissible exposure limit, as a time weighted average (TWA) for that day, shall be reduced according to the following formula: Maximum permissible limit (in µg/m ³)=400÷hours worked in the day.
US OSHA Permissible Exposure Levels (PELs) - Table Z2	lead	Cadmium fume / Cadmium dust	0.1 mg/m ³ / 0.2 mg/m ³	Not Available	0.3 mg/m ³ / 0.6 mg/m ³	(Z37.5–1970);This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect
US ACGIH Threshold Limit Values (TLV)	lead	Lead and inorganic compounds, as Pb	0.05 mg/m ³	Not Available	Not Available	TLV® Basis: CNS & PNS impair; hematologic eff; BEI

Lithium-ion battery in equipment – Raddi Plus and Raddi Cal

US ACGIH Threshold Limit Values (TLV)	lead	Cadmium and compounds, as Cd	0.002 mg/m3	Not Available	Not Available	TLV® Basis: Kidney dam; BEI
US NIOSH Recommended Exposure Limits (RELs)	lead	Lead metal, Plumbum	0.050 mg/m3	Not Available	Not Available	See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]
US OSHA Permissible Exposure Levels (PELs) - Table Z1	mercury (elemental)	Mercury (vapor)	Not Available	Not Available	Not Available	See Table Z-2;(as Hg)
US OSHA Permissible Exposure Levels (PELs) - Table Z2	mercury (elemental)	Mercury	Not Available	Not Available	0.1 mg/m3	(Z37.8–1971)
US ACGIH Threshold Limit Values (TLV)	mercury (elemental)	Silver, and compounds - Metal, dust and fume	0.1 mg/m3	Not Available	Not Available	TLV® Basis: Argyria
US ACGIH Threshold Limit Values (TLV)	mercury (elemental)	Mercury, all forms except alkyl, as Hg - Elemental and inorganic forms	0.025 mg/m3	Not Available	Not Available	TLV® Basis: CNS impair; kidney dam; BEI
US NIOSH Recommended Exposure Limits (RELs)	mercury (elemental)	Mercury metal: Colloidal mercury, Metallic mercury, Quicksilver	Hg Vapor: 0.05 mg/m3	Not Available	Other:0.1 mg/m3	Not Available
US OSHA Permissible Exposure Levels (PELs) - Table Z1	chromium	Chromium metal and insol. salts	1 mg/m3	Not Available	Not Available	(as Cr)
US ACGIH Threshold Limit Values (TLV)	chromium	Chromium, and inorganic compounds, as Cr - Metal and Cr III compounds	0.5 mg/m3	Not Available	Not Available	TLV® Basis: URT & skin irr
US NIOSH Recommended Exposure Limits (RELs)	chromium	Chrome, Chromium	0.5 mg/m3	Not Available	Not Available	See Appendix C
US OSHA Permissible Exposure Levels (PELs) - Table Z1	cadmium	Cadmium	0.005 mg/m3	Not Available	Not Available	see 1910.1027;(as Cd)
US OSHA Permissible Exposure Levels (PELs) - Table Z2	cadmium	Cadmium fume / Cadmium dust	0.1 mg/m3 / 0.2 mg/m3	Not Available	0.3 mg/m3 / 0.6 mg/m3	(Z37.5–1970);This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect
US ACGIH Threshold Limit Values (TLV)	cadmium	Cadmium	0.01 mg/m3	Not Available	Not Available	TLV® Basis: Kidney dam; BEI
US NIOSH Recommended Exposure Limits (RELs)	cadmium	Cadmium metal: Cadmium	Not Available	Not Available	Not Available	Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ethylene carbonate	Glycol carbonate; (Ethylene carbonate)	30 mg/m3	330 mg/m3	2000 mg/m3
graphite	Graphite; (Mineral carbon)	2 mg/m3	2 mg/m3	95 mg/m3
lead	Lead	0.15 mg/m3	120 mg/m3	700 mg/m3
mercury (elemental)	Mercury vapor	0.15 mg/m3	Not Available	Not Available
lead	Lead	0.15 mg/m3	120 mg/m3	700 mg/m3
mercury (elemental)	Mercury vapor	0.15 mg/m3	Not Available	Not Available
chromium	Chromium	1.5 mg/m3	17 mg/m3	99 mg/m3
cadmium	Cadmium	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
lithium cobaltate	Not Available	Not Available
lithium fluorophosphate	Not Available	Not Available
ethylene carbonate	Not Available	Not Available
chain carbonate	Not Available	Not Available
graphite	N.E. mg/m3 / N.E. ppm	1,250 mg/m3
lead	700 mg/m3	100 mg/m3
mercury (elemental)	10 mg/m3 / 28 mg/m3	2 mg/m3 / 10 mg/m3
lead	700 mg/m3	100 mg/m3
mercury (elemental)	10 mg/m3 / 28 mg/m3	2 mg/m3 / 10 mg/m3
chromium	N.E. mg/m3 / N.E. ppm	250 mg/m3
cadmium	50 mg/m3 / 9 mg/m3	9 mg/m3 / 9 [Unch] mg/m3
bisphenol A/ phosgene polymer	Not Available	Not Available
flame retardant	Not Available	Not Available
elastomer	Not Available	Not Available


MATERIAL DATA

Exposure controls

Appropriate engineering	None under normal operating conditions.
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Continued...

Lithium-ion battery in equipment – Radii Plus and Radii Cal

controls	Provide adequate ventilation in warehouse or closed storage areas.
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.
Thermal hazards	Not Available

Respiratory protection

Type AHG-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	AHG-AUS P2	-	AHG-PAPR-AUS / Class 1 P2
up to 50 x ES	-	AHG-AUS / Class 1 P2	-
up to 100 x ES	-	AHG-2 P2	AHG-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 articles, insoluble in water.		
Physical state	Solid	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 Available	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 (g/L)	Immiscible	pH as a solution (1%)	Not Available
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

Lithium-ion battery in equipment – Ralii Plus and Ralii Cal

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	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. Ingestion may result in nausea, abdominal irritation, pain and vomiting	
Skin Contact	Not normally a hazard due to physical form of product.	
Eye	Not normally a hazard due to physical form of product.	
Chronic	Not normally a hazard due to physical form of product.	
Lithium-ion battery in equipment – Ralii Plus and Ralii Cal	TOXICITY	IRRITATION
	Not Available	Not Available
lithium cobaltate	TOXICITY	IRRITATION
	Not Available	Not Available
lithium fluorophosphate	TOXICITY	IRRITATION
	Oral (rat) LD50: 50-300 mg/kg ^[1]	Not Available
ethylene carbonate	TOXICITY	IRRITATION
	dermal (rat) LD50: >2000 mg/kg ^[1]	[CCInfo]*
	Oral (rat) LD50: >2000 mg/kg ^[1]	Eye (rabbit): 20 mg - mild Skin (rabbit): 660 mg - moderate
graphite	TOXICITY	IRRITATION
	Inhalation (rat) LC50: >2 mg/L4 h ^[1]	Not Available
	Oral (rat) LD50: >2000 mg/kg ^[2]	
lead	TOXICITY	IRRITATION
	dermal (rat) LD50: >2000 mg/kg ^[1]	Nil Reported
	Inhalation (rat) LC50: >5.05 mg/L4 h ^[1]	
	Oral (rat) LD50: >2000 mg/kg ^[1]	
mercury (elemental)	TOXICITY	IRRITATION
	Oral (rat) LD50: >9.2 mg/kg ^[1]	(Source: RTECS)
		Nil reported
lead	TOXICITY	IRRITATION
	dermal (rat) LD50: >2000 mg/kg ^[1]	Nil Reported
	Inhalation (rat) LC50: >5.05 mg/L4 h ^[1]	
	Oral (rat) LD50: >2000 mg/kg ^[1]	
mercury (elemental)	TOXICITY	IRRITATION
	Oral (rat) LD50: >9.2 mg/kg ^[1]	(Source: RTECS)
		Nil reported
chromium	TOXICITY	IRRITATION
	Not Available	Not Available
cadmium	TOXICITY	IRRITATION
	Inhalation (monkey) LC50: 0.03 mg/L15 min ^[1]	Nil reported
	Inhalation (monkey) LC50: 0.0467 mg/L15 min ^[1]	
	Inhalation (monkey) LC50: 0.204 mg/L15 min ^[1]	
	Inhalation (monkey) LC50: 0.23 mg/L15 min ^[1]	

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	Inhalation (monkey) LC50: 0.94 mg/L15 min ^[1]	
	Inhalation (mouse) LC50: >0.00902 mg/L15 min ^[1]	
	Inhalation (rabbit) LC50: >0.0224 mg/L15 min ^[1]	
	Inhalation (rat) LC50: 0.025 mg/L30m ^[2]	
	Oral (rat) LD50: >63-<259 mg/kg ^[1]	
bisphenol A/ phosgene polymer	TOXICITY	IRRITATION
	Not Available	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	

LITHIUM COBALTATE	No significant acute toxicological data identified in literature search.
ETHYLENE CARBONATE	<p>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.</p> <p>The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p> <p>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 epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.</p> <p>for ethylene carbonate</p> <p>Mammalian toxicity: Reliable acute toxicity tests are available on ethylene carbonate. Ethylene carbonate is practically nontoxic following acute oral exposure in a test that meets OECD and EPA test guidelines; the LD50 is >5000 mg/kg. The dermal LD50 is >2000 mg/kg, in a test that meets OECD and EPA test guidelines.</p> <p>Ethylene carbonate is rapidly metabolized to ethylene glycol. Following gavage administration to rats, ethylene carbonate is rapidly converted into ethylene glycol; the half-life for disappearance of ethylene carbonate from blood was 0.25 hours. As a result, the mammalian toxicity of ethylene carbonate is nearly identical to that of ethylene glycol for endpoints where both have been tested</p> <p>Ethylene carbonate was mixed in the diet of 26 male and 26 female Crl: CD(SD) rats for 18 months at concentrations of 25,000 ppm for males and females and 50,000 ppm for females; males were also fed 50,000 ppm for 42 weeks, and 40,000 ppm for 16 weeks. Survivors were observed to 24 months. Compound intake (mg/kg/day) was not reported, but is estimated to be approximately 250 and 500 mg/kg/day. No toxic effects were found in females, but increased mortality was seen in males at both dose levels. No high-dose males survived week 60 and only 10 low-dose males survived to week 78. Males had severe nephrotoxicity, characteristic of ethylene glycol toxicity.</p> <p>The following <i>in vitro</i> genotoxicity tests were conducted on ethylene carbonate, without indications of genotoxicity: an Ames mutagenicity assay, an unscheduled DNA synthesis assay using rat hepatocytes, and a cell transformation assay using BALB/3T3 cells. No <i>in vivo</i> genotoxicity studies on ethylene carbonate were found; however, ethylene glycol has been tested and was negative in a rat dominant lethal assay.</p> <p>Gavage administration of ethylene carbonate to pregnant rats days 6-15 of gestation resulted in systemic toxicity at doses of 3000 mg/kg/day, including post-dose salivation. The NOAEL for maternal toxicity was 1500 mg/kg/day. Similar to ethylene glycol, there were increased soft tissue (hydrocephalus, umbilical herniation, gastroschisis, cleft palate, misshapen and compressed stomach) and skeletal malformations at 3000 mg/kg/day, but not at 1500 mg/kg/day.</p> <p>For ethylene glycol:</p> <p>Ethylene glycol is quickly and extensively absorbed through the gastrointestinal tract. Limited information suggests that it is also absorbed through the respiratory tract; dermal absorption is apparently slow. Following absorption, ethylene glycol is distributed throughout the body according to total body water. In most mammalian species, including humans, ethylene glycol is initially metabolised by alcohol.</p> <p>dehydrogenase to form glycolaldehyde, which is rapidly converted to glycolic acid and glyoxal by aldehyde oxidase and aldehyde dehydrogenase. These metabolites are oxidised to glyoxylate; glyoxylate may be further metabolised to formic acid, oxalic acid, and glycine. Breakdown of both glycine and formic acid can generate CO₂, which is one of the major elimination products of ethylene glycol. In addition to exhaled CO₂, ethylene glycol is eliminated in the urine as both the parent compound and glycolic acid. Elimination of ethylene glycol from the plasma in both humans and laboratory animals is rapid after oral exposure; elimination half-lives are in the range of 1-4 hours in most species tested.</p> <p>Respiratory Effects. Respiratory system involvement occurs 12-24 hours after ingestion of sufficient amounts of ethylene glycol and is considered to be part of a second stage in ethylene glycol poisoning. The symptoms include hyperventilation, shallow rapid breathing, and generalized pulmonary edema with calcium oxalate crystals occasionally present in the lung parenchyma. Respiratory system involvement appears to be dose-dependent and occurs concomitantly with cardiovascular changes. Pulmonary infiltrates and other changes compatible with adult respiratory distress syndrome (ARDS) may characterise the second stage of ethylene glycol poisoning. Pulmonary oedema can be secondary to cardiac failure, ARDS, or aspiration of gastric contents. Symptoms related to acidosis such as hyperpnea and tachypnea are frequently observed; however, major respiratory morbidities such as pulmonary edema and bronchopneumonia are relatively rare and usually only observed with extreme poisoning (e.g., in only 5 of 36 severely poisoned cases).</p> <p>Cardiovascular Effects. Cardiovascular system involvement in humans occurs at the same time as respiratory system involvement, during the second phase of oral ethylene glycol poisoning, which is 12- 24 hours after acute exposure. The symptoms of cardiac involvement include tachycardia, ventricular gallop and cardiac enlargement. Ingestion of ethylene glycol may also cause hypertension or hypotension, which may progress to cardiogenic shock. Myocarditis has been observed at autopsy in cases of people who died following acute ingestion of ethylene glycol. As in the case of respiratory effects, cardiovascular involvement occurs with ingestion of relatively high doses of ethylene glycol.</p> <p>Nevertheless, circulatory disturbances are a rare occurrence, having been reported in only 8 of 36 severely poisoned cases. Therefore, it appears that acute exposure to high levels of ethylene glycol can cause serious cardiovascular effects in humans. The effects of a long-term, low-dose exposure are unknown.</p> <p>Gastrointestinal Effects. Nausea, vomiting with or without blood, pyrosis, and abdominal cramping and pain are common early effects of acute ethylene glycol ingestion. Acute effects of ethylene glycol ingestion in one patient included intermittent diarrhea and abdominal pain, which were attributed to mild colonic ischaemia; severe abdominal pain secondary to colonic stricture and perforation developed 3 months after ingestion, and histology of the resected colon showed birefringent crystals highly suggestive of oxalate deposition.</p> <p>Musculoskeletal Effects. Reported musculoskeletal effects in cases of acute ethylene glycol poisoning have included diffuse muscle tenderness and myalgias associated with elevated serum creatinine phosphokinase levels, and myoclonic jerks and tetanic contractions associated with hypocalcaemia.</p> <p>Hepatic Effects. Central hydropic or fatty degeneration, parenchymal necrosis, and calcium oxalate crystals in the liver have been observed at autopsy in cases of people who died following acute ingestion of ethylene glycol.</p> <p>Renal Effects. Adverse renal effects after ethylene glycol ingestion in humans can be observed during the third stage of ethylene glycol toxicity 24-72 hours after acute exposure. The hallmark of renal toxicity is the presence of birefringent calcium oxalate monohydrate crystals deposited in renal tubules and their presence in urine after ingestion of relatively high amounts of ethylene glycol. Other signs of nephrotoxicity can include tubular cell degeneration and necrosis and tubular interstitial inflammation. If untreated, the degree of renal damage caused by high doses of ethylene glycol progresses and leads to haematuria,</p>











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Lithium-ion battery in equipment – Radii Plus and Radii Cal

	<p>proteinuria, decreased renal function, oliguria, anuria, and ultimately renal failure. These changes in the kidney are linked to acute tubular necrosis but normal or near normal renal function can return with adequate supportive therapy.</p> <p>Metabolic Effects: One of the major adverse effects following acute oral exposure of humans to ethylene glycol involves metabolic changes. These changes occur as early as 12 hours after ethylene glycol exposure. Ethylene glycol intoxication is accompanied by metabolic acidosis which is manifested by decreased pH and bicarbonate content of serum and other bodily fluids caused by accumulation of excess glycolic acid. Other characteristic metabolic effects of ethylene glycol poisoning are increased serum anion gap, increased osmolal gap, and hypocalcaemia. Serum anion gap is calculated from concentrations of sodium, chloride, and bicarbonate, is normally 12-16 mM, and is typically elevated after ethylene glycol ingestion due to increases in unmeasured metabolite anions (mainly glycolate).</p> <p>Neurological Effects: Adverse neurological reactions are among the first symptoms to appear in humans after ethylene glycol ingestion. These early neurotoxic effects are also the only symptoms attributed to unmetabolised ethylene glycol. Together with metabolic changes, they occur during the period of 30 minutes to 12 hours after exposure and are considered to be part of the first stage in ethylene glycol intoxication. In cases of acute intoxication, in which a large amount of ethylene glycol is ingested over a very short time period, there is a progression of neurological manifestations which, if not treated, may lead to generalized seizures and coma. Ataxia, slurred speech, confusion, and somnolence are common during the initial phase of ethylene glycol intoxication as are irritation, restlessness, and disorientation. Cerebral edema and crystalline deposits of calcium oxalate in the walls of small blood vessels in the brain were found at autopsy in people who died after acute ethylene glycol ingestion.</p> <p>Effects on cranial nerves appear late (generally 5-20 days post-ingestion), are relatively rare, and according to some investigators constitute a fourth, late cerebral phase in ethylene glycol intoxication. Clinical manifestations of the cranial neuropathy commonly involve lower motor neurons of the facial and bulbar nerves and are reversible over many months.</p> <p>Reproductive Effects: Reproductive function after intermediate-duration oral exposure to ethylene glycol has been tested in three multi-generation studies (one in rats and two in mice) and several shorter studies (15-20 days in rats and mice). In these studies, effects on fertility, foetal viability, and male reproductive organs were observed in mice, while the only effect in rats was an increase in gestational duration.</p> <p>Developmental Effects: The developmental toxicity of ethylene glycol has been assessed in several acute-duration studies using mice, rats, and rabbits. Available studies indicate that malformations, especially skeletal malformations occur in both mice and rats exposed during gestation; mice are apparently more sensitive to the developmental effects of ethylene glycol. Other evidence of embryotoxicity in laboratory animals exposed to ethylene glycol exposure includes reduction in foetal body weight.</p> <p>Cancer: No studies were located regarding cancer effects in humans or animals after dermal exposure to ethylene glycol.</p> <p>Genotoxic Effects: Studies in humans have not addressed the genotoxic effects of ethylene glycol. However, available <i>in vivo</i> and <i>in vitro</i> laboratory studies provide consistently negative genotoxicity results for ethylene glycol.</p>
CHROMIUM	<p>For chrome(III) and other valence states (except hexavalent):</p> <p>For inhalation exposure, all trivalent and other chromium compounds are treated as particulates, not gases.</p> <p>The mechanisms of chromium toxicity are very complex, and although many studies on chromium are available, there is a great deal of uncertainty about how chromium exerts its toxic influence. Much more is known about the mechanisms of hexavalent chromium toxicity than trivalent chromium toxicity. There is an abundance of information available on the carcinogenic potential of chromium compounds and on the genotoxicity and mutagenicity of chromium compounds in experimental systems. The consensus from various reviews and agencies is that evidence of carcinogenicity of elemental, divalent, or trivalent chromium compounds is lacking. Epidemiological studies of workers in a number of industries (chromate production, chromate pigment production and use, and chrome plating) conclude that while occupational exposure to hexavalent chromium compounds is associated with an increased risk of respiratory system cancers (primarily bronchogenic and nasal), results from occupational exposure studies to mixtures that were mainly elemental and trivalent (ferrochromium alloy worker) were inconclusive. Studies in leather tanners, who were exposed to trivalent chromium were consistently negative. In addition to the lack of direct evidence of carcinogenicity of trivalent or elemental chromium and its compounds, the genotoxic evidence is overwhelmingly negative.</p> <p>The lesser potency of trivalent chromium relative to hexavalent chromium is likely related to the higher redox potential of hexavalent chromium and its greater ability to enter cells.</p> <p>The general inability of trivalent chromium to traverse membranes and thus be absorbed or reach peripheral tissue in significant amounts is generally accepted as a probable explanation for the overall absence of systemic trivalent chromium toxicity. Elemental and divalent forms of chromium are not able to traverse membranes readily either. This is not to say that elemental, divalent, or trivalent chromium compounds cannot traverse membranes and reach peripheral tissue, the mechanism of absorption is simply less efficient in comparison to absorption of hexavalent chromium compounds. Hexavalent chromium compounds exist as tetrahedral chromate anions, resembling the forms of other natural anions like sulfate and phosphate which are permeable across nonselective membranes.</p> <p>Trivalent chromium forms octahedral complexes which cannot easily enter through these channels, instead being absorbed via passive diffusion and phagocytosis. Although trivalent chromium is less well absorbed than hexavalent chromium, workers exposed to trivalent compounds have had detectable levels of chromium in the urine at the end of a workday. Absorbed chromium is widely distributed throughout the body via the bloodstream, and can reach the foetus.</p> <p>Although there is ample <i>in vivo</i> evidence that hexavalent chromium is efficiently reduced to trivalent chromium in the gastrointestinal tract and can be reduced to the trivalent form by ascorbate and glutathione in the lungs, there is no evidence that trivalent chromium is converted to hexavalent chromium in biological systems. In general, trivalent chromium compounds are cleared rapidly from the blood and more slowly from the tissues. Although not fully characterized, the biologically active trivalent chromium molecule appears to be chromodulin, also referred to as (GTF). Chromodulin is an oligopeptide complex containing four chromic ions. Chromodulin may facilitate interactions of insulin with its receptor site, influencing protein, glucose, and lipid metabolism. Inorganic trivalent chromium compounds, which do not appear to have insulin-potentiating properties, are capable of being converted into biologically active forms by humans and animals.</p> <p>Chromium can be a potent sensitiser in a small minority of humans, both from dermal and inhalation exposures.</p> <p>The most sensitive endpoint identified in animal studies of acute exposure to trivalent chromium appears to involve the respiratory system. Specifically, acute exposure to trivalent chromium is associated with impaired lung function and lung damage.</p> <p>Based on what is known about absorption of chromium in the human body, its potential mechanism of action in cells, and occupational data indicating that valence states other than hexavalent exhibit a relative lack of toxicity the toxicity of elemental and divalent chromium compounds is expected to be similar to or less than common trivalent forms.</p> <p>No significant acute toxicological data identified in literature search.</p> <p>The substance is classified by IARC as Group 3:</p> <p>NOT classifiable as to its carcinogenicity to humans.</p> <p>Evidence of carcinogenicity may be inadequate or limited in animal testing.</p> <p>Tenth Annual Report on Carcinogens: Substance known to be Carcinogenic</p> <p>[National Toxicology Program: U.S. Dep. of Health and Human Services 2002]</p> <p>Gastrointestinal tumours, lymphoma, musculoskeletal tumours and tumours at site of application recorded.</p>
BISPHENOL A/ PHOSGENE POLYMER	<p>No significant acute toxicological data identified in literature search.</p> <p>The chemical structure of hydroxylated diphenylalkanes or bisphenols consists of two phenolic rings joined together through a bridging carbon. This class of endocrine disruptors that mimic oestrogens is widely used in industry, particularly in plastics.</p> <p>Bisphenol A (BPA) and some related compounds exhibit oestrogenic activity in human breast cancer cell line MCF-7, but there were remarkable differences in activity. Several derivatives of BPA exhibited significant thyroid hormonal activity towards rat pituitary cell line GH3, which releases growth hormone in a thyroid hormone-dependent manner. However, BPA and several other derivatives did not show such activity. Results suggest that the 4-hydroxyl group of the A-phenyl ring and the B-phenyl ring of BPA derivatives are required for these hormonal activities, and substituents at the 3,5-positions of the phenyl rings and the bridging alkyl moiety markedly influence the activities.</p> <p>Bisphenols promoted cell proliferation and increased the synthesis and secretion of cell type-specific proteins. When ranked by proliferative potency, the longer the alkyl substituent at the bridging carbon, the lower the concentration needed for maximal cell yield; the most active compound contained two propyl chains at the bridging carbon. Bisphenols with two hydroxyl groups in the para position and an angular configuration are suitable for appropriate hydrogen bonding to the acceptor site of the oestrogen receptor.</p>
LITHIUM FLUOROPHOSPHATE & GRAPHITE	<p>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</p>

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	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. No significant acute toxicological data identified in literature search.		
LEAD	WARNING: Lead is a cumulative poison and has the potential to cause		
LEAD	abortion and intellectual impairment to unborn children of		
LEAD	pregnant workers.		
MERCURY (ELEMENTAL)	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.		
MERCURY (ELEMENTAL)	Animal studies have shown that mercury may be a reproductive effector.		

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 available but does not fill the criteria for classification

✔ – Data required to make classification available

☐ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
lithium cobaltate	LC50	96	Fish	1.406mg/L	2
lithium cobaltate	EC50	48	Crustacea	2.618mg/L	2
lithium cobaltate	EC50	504	Crustacea	0.012mg/L	2
lithium cobaltate	EC50	72	Algae or other aquatic plants	0.144mg/L	2
lithium cobaltate	NOEC	168	Algae or other aquatic plants	0.0018mg/L	2
lithium fluorophosphate	LC50	96	Fish	42mg/L	2
lithium fluorophosphate	EC50	528	Fish	1mg/L	2
lithium fluorophosphate	NOEC	528	Fish	0.2mg/L	2
lithium fluorophosphate	EC50	48	Crustacea	98mg/L	2
lithium fluorophosphate	EC50	96	Algae or other aquatic plants	43mg/L	2
ethylene carbonate	EC50	96	Algae or other aquatic plants	17.388mg/L	3
ethylene carbonate	LC50	96	Fish	238.065mg/L	3
graphite	LC50	96	Fish	>100mg/L	2
graphite	EC50	48	Crustacea	>=38.4- <=67.6mg/L	2
graphite	NOEC	672	Crustacea	>=0.58- <=10mg/L	2
graphite	EC50	72	Algae or other aquatic plants	19mg/L	2
graphite	EC50	72	Algae or other aquatic plants	7.2mg/L	2
lead	BCFD	8	Fish	4.324mg/L	4
lead	NOEC	672	Fish	0.00003mg/L	4
lead	LC50	96	Fish	0.0079mg/L	2
lead	EC50	48	Crustacea	0.029mg/L	2
lead	EC50	48	Algae or other aquatic plants	0.0217mg/L	2
lead	EC50	72	Algae or other aquatic plants	0.0205mg/L	2
mercury (elemental)	BCF	720	Fish	0.001mg/L	4
mercury (elemental)	EC50	72	Algae or other aquatic plants	0.0025mg/L	4
mercury (elemental)	LC50	96	Fish	0.004mg/L	4
mercury (elemental)	EC50	240	Fish	0.0003mg/L	5
mercury (elemental)	EC50	48	Crustacea	0.0003mg/L	2
mercury (elemental)	NOEC	2688	Crustacea	0.00025mg/L	2
lead	BCFD	8	Fish	4.324mg/L	4
lead	NOEC	672	Fish	0.00003mg/L	4

Continued...

Lithium-ion battery in equipment – Radd Plus and Radd Cal

lead	LC50	96	Fish	0.0079mg/L	2
lead	EC50	48	Crustacea	0.029mg/L	2
lead	EC50	48	Algae or other aquatic plants	0.0217mg/L	2
lead	EC50	72	Algae or other aquatic plants	0.0205mg/L	2
mercury (elemental)	BCF	720	Fish	0.001mg/L	4
mercury (elemental)	EC50	72	Algae or other aquatic plants	0.0025mg/L	4
mercury (elemental)	LC50	96	Fish	0.004mg/L	4
mercury (elemental)	EC50	240	Fish	0.0003mg/L	5
mercury (elemental)	EC50	48	Crustacea	0.0003mg/L	2
mercury (elemental)	NOEC	2688	Crustacea	0.00025mg/L	2
chromium	BCF	1440	Algae or other aquatic plants	0.0495mg/L	4
chromium	EC50	72	Algae or other aquatic plants	0.104mg/L	4
chromium	LC50	96	Fish	13.9mg/L	4
chromium	NOEC	672	Fish	0.00019mg/L	4
chromium	EC50	48	Crustacea	0.0225mg/L	5
chromium	EC50	48	Crustacea	0.0245mg/L	5
cadmium	BCF	960	Fish	500mg/L	4
cadmium	LC50	96	Fish	0.001mg/L	4
cadmium	NOEC	168	Fish	0.00001821mg/L	4
cadmium	EC50	336	Crustacea	0.00065mg/L	5
cadmium	EC50	48	Crustacea	0.0033mg/L	5
cadmium	EC50	72	Algae or other aquatic plants	0.018mg/L	2

Legend:

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - 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
ethylene carbonate	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
ethylene carbonate	LOW (LogKOW = -0.3388)


Mobility in soil

Ingredient	Mobility
ethylene carbonate	LOW (KOC = 9.168)

SECTION 13 DISPOSAL CONSIDERATIONS**Waste treatment methods**

Product / Packaging disposal	Consult State Land Waste Management Authority for disposal. Bury residue in an authorised landfill.
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SECTION 14 TRANSPORT INFORMATION**Labels Required**

	
Marine Pollutant	NO

Land transport (DOT): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee)

UN number	3481
Packing group	II

Lithium-ion battery in equipment – Radii Plus and Radii Cal

UN proper shipping name	LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)		
Environmental hazard	Not Applicable		
Transport hazard class(es)	IMDG Class	9	
	IMDG Subrisk	Not Applicable	
Special precautions for user	EMS Number	F-A, S-I	
	Special provisions	188 230 348 360 376 377	
	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

LITHIUM COBALTE(12190-79-3) IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
 US - Washington Permissible exposure limits of air contaminants
 US ACGIH Threshold Limit Values (TLV)

US ACGIH Threshold Limit Values (TLV) - Carcinogens
 US EPCRA Section 313 Chemical List
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

LITHIUM FLUOROPHOSPHATE(21324-40-3) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US - Hawaii Air Contaminant Limits

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

ETHYLENE CARBONATE(96-49-1) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

GRAPHITE(7782-42-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US - Alaska Limits for Air Contaminants
 US - California Permissible Exposure Limits for Chemical Contaminants
 US - Hawaii Air Contaminant Limits
 US - Idaho - Limits for Air Contaminants
 US - Michigan Exposure Limits for Air Contaminants
 US - Minnesota Permissible Exposure Limits (PELs)
 US - Oregon Permissible Exposure Limits (Z-1)
 US - Oregon Permissible Exposure Limits (Z-3)
 US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants
 US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants

US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants
 US - Washington Permissible exposure limits of air contaminants
 US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants
 US - Wyoming Toxic and Hazardous Substances Table Z-3 Mineral Dusts
 US ACGIH Threshold Limit Values (TLV)
 US EPCRA Section 313 Chemical List
 US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Levels (PELs) - Table Z1
 US OSHA Permissible Exposure Levels (PELs) - Table Z3
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

LEAD(7439-92-1) IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
 US - Alaska Limits for Air Contaminants
 US - California - Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity
 US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)
 US - California Permissible Exposure Limits for Chemical Contaminants
 US - California Proposition 65 - Carcinogens
 US - California Proposition 65 - Maximum Allowable Dose Levels (MADLs) for Chemicals Causing Reproductive Toxicity
 US - California Proposition 65 - No Significant Risk Levels (NSRLs) for Carcinogens
 US - California Proposition 65 - Reproductive Toxicity
 US - Hawaii Air Contaminant Limits
 US - Idaho - Acceptable Maximum Peak Concentrations
 US - Idaho - Limits for Air Contaminants
 US - Minnesota Permissible Exposure Limits (PELs)
 US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Carcinogens
 US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants

US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants
 US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants
 US - Washington Permissible exposure limits of air contaminants
 US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values
 US ACGIH Threshold Limit Values (TLV)
 US ACGIH Threshold Limit Values (TLV) - Carcinogens
 US EPA Carcinogens Listing
 US EPCRA Section 313 Chemical List
 US National Toxicology Program (NTP) 13th Report Part A Known to be Human Carcinogens
 US National Toxicology Program (NTP) 13th Report Part B. Reasonably Anticipated to be a Human Carcinogen
 US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Levels (PELs) - Table Z1
 US OSHA Permissible Exposure Levels (PELs) - Table Z2
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

MERCURY (ELEMENTAL)(7439-97-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Lithium-ion battery in equipment – Radium Plus and Radium Cal

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
 US - Alaska Limits for Air Contaminants
 US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)
 US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)
 US - California Permissible Exposure Limits for Chemical Contaminants
 US - California Proposition 65 - Reproductive Toxicity
 US - Hawaii Air Contaminant Limits
 US - Idaho - Acceptable Maximum Peak Concentrations
 US - Idaho - Limits for Air Contaminants
 US - Michigan Exposure Limits for Air Contaminants
 US - Minnesota Permissible Exposure Limits (PELs)
 US - Oregon Permissible Exposure Limits (Z-2)
 US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants
 US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants
 US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants

LEAD(7439-92-1) IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
 US - Alaska Limits for Air Contaminants
 US - California - Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity
 US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)
 US - California Permissible Exposure Limits for Chemical Contaminants
 US - California Proposition 65 - Carcinogens
 US - California Proposition 65 - Maximum Allowable Dose Levels (MADLs) for Chemicals Causing Reproductive Toxicity
 US - California Proposition 65 - No Significant Risk Levels (NSRLs) for Carcinogens
 US - California Proposition 65 - Reproductive Toxicity
 US - Hawaii Air Contaminant Limits
 US - Idaho - Acceptable Maximum Peak Concentrations
 US - Idaho - Limits for Air Contaminants
 US - Minnesota Permissible Exposure Limits (PELs)
 US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Carcinogens
 US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants

MERCURY (ELEMENTAL)(7439-97-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
 US - Alaska Limits for Air Contaminants
 US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)
 US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)
 US - California Permissible Exposure Limits for Chemical Contaminants
 US - California Proposition 65 - Reproductive Toxicity
 US - Hawaii Air Contaminant Limits
 US - Idaho - Acceptable Maximum Peak Concentrations
 US - Idaho - Limits for Air Contaminants
 US - Michigan Exposure Limits for Air Contaminants
 US - Minnesota Permissible Exposure Limits (PELs)
 US - Oregon Permissible Exposure Limits (Z-2)
 US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants
 US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants
 US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants

CHROMIUM(7440-47-3) IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
 US - Alaska Limits for Air Contaminants
 US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)
 US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)
 US - California Permissible Exposure Limits for Chemical Contaminants
 US - California Proposition 65 - Carcinogens
 US - Hawaii Air Contaminant Limits
 US - Idaho - Limits for Air Contaminants
 US - Michigan Exposure Limits for Air Contaminants
 US - Oregon Permissible Exposure Limits (Z-1)
 US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants
 US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants

CADMIUM(7440-43-9) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US - Washington Permissible exposure limits of air contaminants
 US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values
 US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants
 US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
 US ACGIH Threshold Limit Values (TLV)
 US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
 US EPA Carcinogens Listing
 US EPCRA Section 313 Chemical List
 US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Levels (PELs) - Table Z1
 US OSHA Permissible Exposure Levels (PELs) - Table Z2
 US Priority List for the Development of Proposition 65 Safe Harbor Levels - No Significant Risk Levels (NSRLs) for Carcinogens and Maximum Allowable Dose Levels (MADLs) for Chemicals Causing Reproductive Toxicity
 US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants
 US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants
 US - Washington Permissible exposure limits of air contaminants
 US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values
 US ACGIH Threshold Limit Values (TLV)
 US ACGIH Threshold Limit Values (TLV) - Carcinogens
 US EPA Carcinogens Listing
 US EPCRA Section 313 Chemical List
 US National Toxicology Program (NTP) 13th Report Part A Known to be Human Carcinogens
 US National Toxicology Program (NTP) 13th Report Part B. Reasonably Anticipated to be a Human Carcinogen
 US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Levels (PELs) - Table Z1
 US OSHA Permissible Exposure Levels (PELs) - Table Z2
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US - Washington Permissible exposure limits of air contaminants
 US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values
 US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants
 US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
 US ACGIH Threshold Limit Values (TLV)
 US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
 US EPA Carcinogens Listing
 US EPCRA Section 313 Chemical List
 US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Levels (PELs) - Table Z1
 US OSHA Permissible Exposure Levels (PELs) - Table Z2
 US Priority List for the Development of Proposition 65 Safe Harbor Levels - No Significant Risk Levels (NSRLs) for Carcinogens and Maximum Allowable Dose Levels (MADLs) for Chemicals Causing Reproductive Toxicity
 US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants
 US - Washington Permissible exposure limits of air contaminants
 US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants
 US ACGIH Threshold Limit Values (TLV)
 US ACGIH Threshold Limit Values (TLV) - Carcinogens
 US EPCRA Section 313 Chemical List
 US National Toxicology Program (NTP) 13th Report Part A Known to be Human Carcinogens
 US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Levels (PELs) - Table Z1
 US Priority List for the Development of Proposition 65 Safe Harbor Levels - No Significant Risk Levels (NSRLs) for Carcinogens and Maximum Allowable Dose Levels (MADLs) for Chemicals Causing Reproductive Toxicity
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

Lithium-ion battery in equipment – Radii Plus and Radii Cal

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants
US - Alaska Limits for Air Contaminants	US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants
US - California - Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity	US - Washington Permissible exposure limits of air contaminants
US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)	US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values
US - California Permissible Exposure Limits for Chemical Contaminants	US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants
US - California Proposition 65 - Carcinogens	US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
US - California Proposition 65 - Maximum Allowable Dose Levels (MADLs) for Chemicals Causing Reproductive Toxicity	US ACGIH Threshold Limit Values (TLV)
US - California Proposition 65 - No Significant Risk Levels (NSRLs) for Carcinogens	US ACGIH Threshold Limit Values (TLV) - Carcinogens
US - California Proposition 65 - Reproductive Toxicity	US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
US - Hawaii Air Contaminant Limits	US EPA Carcinogens Listing
US - Idaho - Acceptable Maximum Peak Concentrations	US EPCRA Section 313 Chemical List
US - Idaho - Limits for Air Contaminants	US National Toxicology Program (NTP) 13th Report Part A Known to be Human Carcinogens
US - Michigan Exposure Limits for Air Contaminants	US NIOSH Recommended Exposure Limits (RELs)
US - Minnesota Permissible Exposure Limits (PELs)	US OSHA Carcinogens Listing
US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Carcinogens	US OSHA Permissible Exposure Levels (PELs) - Table Z1
US - Oregon Permissible Exposure Limits (Z-1)	US OSHA Permissible Exposure Levels (PELs) - Table Z2
US - Oregon Permissible Exposure Limits (Z-2)	US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	

BISPHENOL A/ PHOSGENE POLYMER(25971-63-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

Federal Regulations**Superfund Amendments and Reauthorization Act of 1986 (SARA)****SECTION 311/312 HAZARD CATEGORIES**

Immediate (acute) health hazard	NO
Delayed (chronic) health hazard	NO
Fire hazard	NO
Pressure hazard	NO
Reactivity hazard	NO

US. EPA CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES (40 CFR 302.4)

Name	Reportable Quantity in Pounds (lb)	Reportable Quantity in kg
Lead	10	4.54
Mercury	1	0.454
Lead	10	4.54
Mercury	1	0.454
Chromium	5000	2270
Cadmium	10	4.54

State Regulations**US. CALIFORNIA PROPOSITION 65**

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm

US - CALIFORNIA PREPOSITION 65 - CARCINOGENS & REPRODUCTIVE TOXICITY (CRT): LISTED SUBSTANCE

Lead and lead compounds: Lead, Mercury and mercury compounds, Nickel compounds, Cadmium and cadmium compounds: Cadmium Listed

National Inventory	Status
Australia - AICS	Y
Canada - DSL	N (lithium fluorophosphate)
Canada - NDSL	N (lead; graphite; bisphenol A/ phosgene polymer; ethylene carbonate; mercury (elemental); lithium cobaltate; chromium; cadmium)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	N (bisphenol A/ phosgene polymer)
Japan - ENCS	N (graphite; mercury (elemental); chromium; lithium fluorophosphate; cadmium)
Korea - KECI	Y
New Zealand - NZIoC	N (lithium fluorophosphate)
Philippines - PICCS	N (lithium cobaltate)
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Lithium-ion battery in equipment – Raddi Plus and Raddi Cal**Other information**

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by SDI Limited 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

The information contained in the Safety Data Sheet is based on data considered to be accurate, however, no warranty is expressed or implied regarding the accuracy of the data or the results to be obtained from the use thereof.

Other information:

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Department issuing SDS: Research and Development

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