

Safety Data Sheet

Regulation: In accordance with Regulation (EU) 2015/830 (REACH), Annex II, and OSHA 29 CFR 1910.1200

1. PRODUCT AND COMPANY IDENTIFICATION

Important Note: As a solid, manufactured article, exposure to hazardous ingredients is not expected with normal use. This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard requirement. The information contained in this Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Commercial Product Name: PGX Hub + PGX 3-Port Dock + PGX Power Bank + PGX High Capacity Battery Kit

Model Number: PGX1602E-H

Substance name: Lithium-ion batteries

Synonyms: Lithium-ion Battery, Lithium-ion Battery Pack, Li-Ion Battery, Li-Ion Battery Pack

Manufacturer: Nanjing Chervon Industry Co., Ltd.

Address: 159 South Jiang Jun Rd. Jiangning Economic & Technical Development Zone
Nanjing, Jiangsu 211106 P. R. China

Company/undertaking Identification: 1-352-323-3500 international (Account number: 109087)

Further Information:

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

Battery Model: HC2240T

Number of battery packs packed with the product: 1

Nominal Voltage: 56 V

Rated Capacity: 40.0 Ah

Wh Rating: 2240 Wh

2. HAZARDS IDENTIFICATION

※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

2.1 Classification of the substance or mixture

2.1.1. Classification according to Regulation (EC) No. 1272/2008 [CLP] and OSHA 29 CFR 1910.1200 : Not classified

2.1.2 Additional information:

Classification of the substance or mixture.

Preparation Hazards and Classification: The product is a Lithium ion cell or battery and is therefore classified

as an article and is not hazardous when used according to the recommendations of the manufacturer. The hazard is associated with the contents of the cell or battery. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the cell or battery integrity remains and the seals remain intact. The potential for exposure should not exist unless the cell or battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. If the cell or battery is compromised and starts to leak, based upon the battery ingredients, the contents are classified as Hazardous

Hazardous Materials Information Label (HMIS)

Health: Not available

Flammability: Not available

Physical Hazard: Not available

NFPA Hazard Ratings

Health: Not available

Flammability: Not available

Reactivity: Not available

2.2 Label elements

Hazard pictograms : Not applicable

Signal word : Not applicable

Hazard statement : Not applicable

Precautionary statements: Not applicable

Supplemental Hazard information (EU) : Not applicable

2.3 Other hazards :

Appearance, Color and Odor: Solid object with no odor.

Primary Routes(s) of Exposure: These chemicals are contained in a sealed enclosure. Risk of exposure occurs only if the cell or pack is mechanically, thermally, electrically or physically abused to the point of compromising the enclosure.

If this occurs, exposure to the electrolyte solution contained within can occur by inhalation, ingestion, eye contact and skin contact.

Potential Health Effect(s):

Acute (short term): see Section 8 for exposure controls.

In the event that this cell or pack has been ruptured, the electrolyte solution contained within the cell would be corrosive and can cause burns to skin and eyes.

Inhalation: Inhalation of materials from a sealed cell is not an expected route of exposure. Vapors or mists from a ruptured cell may cause respiratory irritation.

Ingestion: Swallowing of materials from a sealed cell is not an expected route of exposure. Swallowing the contents of an open cell can cause serious chemical burns to mouth, esophagus, and gastrointestinal tract.

Skin: Contact between the cell and skin will not cause any harm. Skin contact with the contents of an open cell can cause severe irritation or burns to the skin.

Eye: Contact between the cell and the eye will not cause any harm. Eye contact with the contents of an open cell can cause severe irritation or burns to the eye.

CHRONIC (long term): see Section 11 for additional toxicological data.

Interactions with other chemicals: Immersion in high conductivity liquids may cause corrosion and breaching of the cell or battery enclosure. The electrolyte solution inside of the cells may react with alkaline(basic) materials and present a flammability hazard.

Potential Environmental Effects: Not Available.

3. Composition/information on ingredients

The battery pack contains different quantity battery cells in it depending on the battery pack capacity.

Battery Pack Model Number	Quantity of the Battery Cells
HC2240T	32

Below mass range in the 2nd column represents the content of ingredients of one battery cell.

Chemical name	Weight-%	REACH registration number	EC No (EU Index No)	Classification according to Regulation (EC) No. 1272/2008 [CLP]	Specific concentration limit (SCL)	M-Factor	M-Factor (long-term)
Ferrous lithiumphosphate 15365-14-7	<= 39.8	No data available	476-700-9	[F]	-	-	-
Graphite 7782-42-5	<= 19.8	No data available	231-955-3	[C]	-	-	-
Other material -	<= 10.3	No data available	No information available	[F]	-	-	-
Copper 7440-50-8	<= 6.2	No data available	231-159-6 (029-024-00-X)	Aquatic Chronic 2	-	-	-
Ethylene carbonate 96-49-1	<= 4	No data available	202-510-0	Acute Tox. 4 (H302) Eye Irrit. 2 (H319) STOT RE 2 (kidney) (oral) (H373)	-	-	-
Dimethyl carbonate 616-38-6	<= 4	No data available	210-478-4 (607-013-00-6)	Flam. Liq. 2 (H225)	-	-	-
Aluminum 7429-90-5	<= 3.8	No data available	231-072-3 (013-002-00-1)	Flam. Sol. 1 (H228) Water-react. 2 (H261)	-	-	-
Aluminum Case -	<= 3.6	No data available	No information available	[F]	-	-	-
Anode cover -	<= 2.5	No data available	No information available	[F]	-	-	-
Cathode cover -	<= 2.1	No data available	No information available	[F]	-	-	-
Phosphate(1-), hexafluoro-, lithium 21324-40-3	<= 1.9	No data available	244-334-7	Acute Tox. 3 (H301) Skin Corr. 1A (H314) Eye Dam. 1 (H318) STOT RE 1 (tooth, bone)	-	-	-

				(H372)			
Styrene-Butadiene polymer 9003-55-8	<= 0.8	No data available	No information available	[F]	-	-	-
1,1-Difluoroethylene polymer 24937-79-9	<= 0.8	No data available	No information available	[F]	-	-	-
Sodium carboxymethyl cellulose 9004-32-4	<= 0.4	No data available	No information available	[A]	-	-	-

Classification according to Regulation (EC) No. 1272/2008 [CLP] - Notes

[C] - Components with occupational exposure limits and/or biological occupational exposure limits requiring monitoring

[F] - Although non-hazardous, the manufacturer chooses to disclose the composition

Full text of H- and EUH-phrases: see section 16

Acute Toxicity Estimate

If LD50/LC50 data is not available or does not correspond to the classification category, then the appropriate conversion value from CLP Annex I, Table 3.1.2, is used to calculate the acute toxicity estimate (ATE_{mix}) for classifying a mixture based on its components

Chemical name	Oral LD50 mg/kg	Dermal LD50 mg/kg	Inhalation LC50 - 4 hour - dust/mist - mg/L	Inhalation LC50 - 4 hour - vapour - mg/L	Inhalation LC50 - 4 hour - gas - ppm
Ferrous lithiumphosphate 15365-14-7	No data available	2000	No data available	No data available	No data available
Graphite 7782-42-5	No data available	No data available	2	No data available	No data available
Copper 7440-50-8	No data available	No data available	5.11	No data available	No data available
Ethylene carbonate 96-49-1	10000	26420	1.46	No data available	No data available
Dimethyl carbonate 616-38-6	13000	5000	No data available	No data available	No data available
Aluminum 7429-90-5	No data available	No data available	0.888	No data available	No data available

This product does not contain candidate substances of very high concern at a concentration $\geq 0.1\%$ (Regulation (EC) No. 1907/2006 (REACH), Article 59)

Because of the cell structure the dangerous ingredients will not be available if used properly.

During charge process a lithium graphite intercalation phase is formed.

4. FIRST-AID MEASURES

4.1. Description of first aid measures

General advice

First aid is upon rupture of sealed battery. Show this safety data sheet to the doctor in attendance.

Inhalation	IF INHALED: Remove to fresh air. Get medical attention immediately if symptoms occur.
Eye contact	IF IN EYES: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Keep eye wide open while rinsing. Do not rub affected area. Get medical attention if irritation develops and persists.
Skin contact	IF ON SKIN: Wash off immediately with soap and plenty of water for at least 15 minutes. Get medical attention if irritation develops and persists.
Ingestion	IF SWALLOWED: Do NOT induce vomiting. Rinse mouth. Never give anything by mouth to an unconscious person. Call a doctor.
Self-protection of the first aider	Avoid contact with skin, eyes or clothing. Wear personal protective clothing (see section 8).

4.2. Most important symptoms and effects, both acute and delayed

Symptoms	May cause redness and tearing of the eyes. Burning sensation.
Effects of Exposure	May cause damage to organs through prolonged or repeated exposure. See Section 11 for additional Toxicological Information.

4.3. Indication of any immediate medical attention and special treatment

<u>needed</u> Note to doctors	Treat symptomatically.
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5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

- When the scale of the fire is small, use a HFC (hydrofluorocarbon) clean-agent fire extinguisher or alcohol resistant foam fire extinguishers. (In case of battery overheating, wear protective gear and immerse heated battery in water)
- In case of large fire, use large amount of water to extinguish.

5.2 Special hazards arising from the substance or mixture

- Flammable gas leaks before ignition and then the product ignites.

5.3 Advice for firefighters

- The ignited battery has a high temperature, so there is a risk of additional ignition even if the fire is extinguished at early stage. Sprinkle a large amount of water until the battery temperature drops to normal temperature.
- If the battery is ignited in multi-stacked condition, multi-stack should be disassembled and then extinguished so that heat is not transferred between batteries
- In the event of a battery fire, cool it by spraying water directly on the battery.
- When handling a overheated battery, wear heat-resistant protective equipment.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Protective equipment: Use personal protective equipment, see Section 8

Emergency procedures:

- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- Eliminate all ignition sources.
- Please note that materials and conditions to avoid.
- Battery may emit electrolyte if charging or discharging rates exceed manufacturer's recommendations or if pack has been breached.
- Move battery to well ventilated area to prevent gas accumulation.

For emergency responders

- Eliminate all ignition sources.
- Please note that materials and conditions to avoid.
- Move battery to well ventilated area to prevent gas accumulation.

6.2 Environmental precautions:

- Avoid release to the environment.
- Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and material for containment and cleaning up

For containment: Not available

For cleaning up:

- Cover with Dry earth, DRY sand or other non-combustible material and put on the plastic sheet to minimize spreading or contact with rain.
- Move battery to well ventilated area to prevent gas accumulation.
- Dispose in accordance with applicable local, state and federal regulations.

Other information: Not available

6.4 Reference to other sections

- See also sections 8 and 13 of the Safety Data Sheet.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- The battery stores electrical energy and is capable of rapid energy discharge.
- Battery cell contents are under pressure.
- Handle battery carefully to avoid puncturing case or electrically shorting terminals.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions: Not available

Packaging materials: Not available

Requirements for storage rooms and vessels:

- Storage at room temperature (approx. 20°C) at approx. 40% of the nominal capacity
- Keep in closed original container.

7.3 Specific end use(s)

Recommendations: Not available

Industrial sector specific solutions: Not available

8. Exposure controls/personal protection Exposure limit values Exposure limits

8.1. Control parameters**Exposure Limits**

Chemical name	European Union	Austria	Belgium	Bulgaria	Croatia
Graphite 7782-42-5	-	TWA: 5 mg/m ³ STEL 10 mg/m ³	TWA: 2 mg/m ³	TWA: 5.0 mg/m ³	TWA: 4 mg/m ³ TWA: 10 mg/m ³
Copper 7440-50-8	-	TWA: 1 mg/m ³ TWA: 0.1 mg/m ³ STEL 4 mg/m ³ STEL 0.4 mg/m ³	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³	TWA: 0.1 mg/m ³	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³ STEL: 2 mg/m ³
Aluminum 7429-90-5	-	TWA: 10 mg/m ³ STEL 20 mg/m ³	TWA: 1 mg/m ³	TWA: 10.0 mg/m ³ TWA: 1.5 mg/m ³	TWA: 10 mg/m ³ TWA: 4 mg/m ³
Chemical name	Cyprus	Czech Republic	Denmark	Estonia	Finland
Graphite 7782-42-5	-	TWA: 2.0 mg/m ³	TWA: 2.5 mg/m ³ STEL: 5 mg/m ³ natural	TWA: 5 mg/m ³	TWA: 2 mg/m ³
Copper 7440-50-8	-	TWA: 1 mg/m ³ TWA: 0.1 mg/m ³ Ceiling: 2 mg/m ³ Ceiling: 0.2 mg/m ³	TWA: 1.0 mg/m ³ TWA: 0.1 mg/m ³ STEL: 2 mg/m ³ STEL: 0.2 mg/m ³	TWA: 1 mg/m ³ TWA: 0.2 mg/m ³	TWA: 0.02 mg/m ³
Aluminum 7429-90-5	-	TWA: 10.0 mg/m ³	TWA: 5 mg/m ³ TWA: 2 mg/m ³ STEL: 10 mg/m ³ STEL: 4 mg/m ³	TWA: 10 mg/m ³ TWA: 4 mg/m ³	TWA: 1.5 mg/m ³
Phosphate(1-), hexafluoro-, lithium 21324-40-3	-	-	TWA: 2.5 mg/m ³ STEL: 5 mg/m ³ except those mentioned elsewhere in the list	TWA: 2.5 mg/m ³	-
Chemical name	France	Germany TRGS	Germany DFG	Greece	Hungary
Graphite 7782-42-5	TWA: 2 mg/m ³	TWA: 1.25 mg/m ³ TWA: 10 mg/m ³	TWA: 0.3 mg/m ³ TWA: 4 mg/m ³ Peak: 2.4 mg/m ³	TWA: 10 mg/m ³ TWA: 5 mg/m ³	TWA: 5 mg/m ³ TWA: 2 mg/m ³
Copper 7440-50-8	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³ STEL: 2 mg/m ³	-	TWA: 0.01 mg/m ³ Peak: 0.02 mg/m ³	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³ STEL: 2 mg/m ³	TWA: 0.1 mg/m ³ TWA: 0.01 mg/m ³ STEL: 0.2 mg/m ³
Aluminum 7429-90-5	TWA: 10 mg/m ³ TWA: 5 mg/m ³	TWA: 1.25 mg/m ³ TWA: 10 mg/m ³	TWA: 4 mg/m ³ TWA: 1.5 mg/m ³	TWA: 10 mg/m ³ TWA: 5 mg/m ³	TWA: 1 mg/m ³
Phosphate(1-), hexafluoro-, lithium 21324-40-3	-	TWA: 1 mg/m ³	TWA: 1 mg/m ³ Sk*	TWA: 2.5 mg/m ³	TWA: 2.5 mg/m ³ Sk*
Chemical name	Ireland	Italy MDLPS	Italy AIDII	Latvia	Lithuania
Graphite 7782- 42-5	TWA: 2 mg/m ³ STEL: 6 mg/m ³	-	TWA: 2 mg/m ³	TWA: 2 mg/m ³	TWA: 5 mg/m ³
Copper 7440-50- 8	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³ STEL: 2 mg/m ³ STEL: 0.6 mg/m ³	-	TWA: 0.2 mg/m ³	TWA: 0.5 mg/m ³ STEL: 1 mg/m ³	TWA: 1 mg/m ³ TWA: 0.2 mg/m ³
Aluminum 7429- 90-5	TWA: 1 mg/m ³ STEL: 3 mg/m ³	-	TWA: 1 mg/m ³	TWA: 2 mg/m ³	TWA: 5 mg/m ³ TWA: 2 mg/m ³ TWA: 1 mg/m ³
Phosphate(1-), hexafluoro-, lithium 21324-40-3	TWA: 2.5 mg/m ³ STEL: 7.5 mg/m ³	-	TWA: 2.5 mg/m ³	-	TWA: 2.5 mg/m ³
Chemical name	Luxembourg	Malta	Netherlands	Norway	Poland
Graphite 7782- 42-5	-	-	-	TWA: 5 mg/m ³ TWA: 2 mg/m ³ TWA: 10 mg/m ³ TWA: 4 mg/m ³ STEL: 10 mg/m ³ STEL: 4 mg/m ³	TWA: 4.0 mg/m ³ TWA: 1.0 mg/m ³ TWA: 6 mg/m ³

				STEL: 20 mg/m ³ STEL: 8 mg/m ³	
Copper 7440-50-8	-	-	TWA: 0.1 mg/m ³	TWA: 0.1 mg/m ³ TWA: 1 mg/m ³ STEL: 3 mg/m ³ STEL: 0.3 mg/m ³	TWA: 0.2 mg/m ³
Aluminum 7429-90-5	-	-	-	TWA: 5 mg/m ³ STEL: 10 mg/m ³	TWA: 2.5 mg/m ³ TWA: 1.2 mg/m ³
Phosphate(1-), hexafluoro-, lithium 21324-40-3	-	-	-	-	TWA: 2 mg/m ³
Chemical name	Portugal	Romania	Slovakia	Slovenia	Spain
Graphite 7782-42-5	TWA: 2 mg/m ³	TWA: 2 mg/m ³	TWA: 10 mg/m ³ TWA: 2 mg/m ³	-	TWA: 2 mg/m ³
Copper 7440-50-8	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³	TWA: 0.5 mg/m ³ STEL: 0.2 mg/m ³ STEL: 1.5 mg/m ³	TWA: 1 mg/m ³ TWA: 0.2 mg/m ³	-	TWA: 0.01 mg/m ³
Aluminum 7429-90-5	TWA: 1 mg/m ³	TWA: 3 mg/m ³ TWA: 1 mg/m ³ STEL: 10 mg/m ³ STEL: 3 mg/m ³	TWA: 4 mg/m ³ TWA: 1.5 mg/m ³	-	TWA: 1 mg/m ³
Phosphate(1-), hexafluoro-, lithium 21324-40-3	TWA: 2.5 mg/m ³	-	TWA: 2.5 mg/m ³	-	-

Chemical name	Sweden	Switzerland	United Kingdom
Graphite 7782-42-5	-	TWA: 3 mg/m ³ TWA: 10 mg/m ³	TWA: 10 mg/m ³ TWA: 4 mg/m ³ STEL: 30 mg/m ³ STEL: 12 mg/m ³
Copper 7440-50-8	NGV: 0.01 mg/m ³	TWA: 0.1 mg/m ³ STEL: 0.2 mg/m ³	TWA: 1 mg/m ³ TWA: 0.2 mg/m ³ STEL: 0.6 mg/m ³ STEL: 2 mg/m ³
Aluminum 7429-90-5	NGV: 5 mg/m ³ NGV: 2 mg/m ³	TWA: 3 mg/m ³ TWA: 10 mg/m ³	TWA: 10 mg/m ³ TWA: 4 mg/m ³ STEL: 30 mg/m ³ STEL: 12 mg/m ³
Phosphate(1-), hexafluoro-, lithium 21324-40-3	NGV: 2 mg/m ³	-	-

Biological occupational exposure limits

Chemical name	European Union	Austria	Bulgaria	Croatia	Czech Republic
Aluminum 7429-90-5	-	Check 60 µg/g Creatinine (urine - Aluminum after end of work day, at the end of a work week/end of the shift) (-)	-	200 µg/L - urine (Aluminum) - at the end of the work shift	-
Chemical name	Denmark	Finland	France	Germany DFG	Germany TRGS

Aluminum 7429-90-5	-	-	-	50 µg/g Creatinine (urine - Aluminum for long-term exposures: at the end of the shift after several shifts) 50 µg/g Creatinine - BAT (for long-term exposures: at the end of the shift after several shifts) urine 15 µg/g Creatinine - BAR (for long-term exposures: at the end of the shift after several shifts) urine	50 µg/g Creatinine (urine - Aluminum for long-term exposures: at the end of the shift after several shifts)
Phosphate(1-), hexafluoro-, lithium 21324-40-3	-	-	- urine (Fluorides) - beginning of shift - urine (Fluorides) - end of shift	-	-
Chemical name	Hungary	Ireland	Italy MDLPS	Italy AIDII	
Phosphate(1-), hexafluoro-, lithium 21324-40-3	7 mg/g Creatinine (urine - Fluoride end of shift) 4 mg/g Creatinine (urine - Fluoride prior to next shift) 42 µmol/mmol Creatinine (urine - Fluoride end of shift) 24 µmol/mmol Creatinine (urine - Fluoride prior to next shift)	-	-	2 mg/g Creatinine - urine (Fluorides) - prior to shift 3 mg/g Creatinine - urine (Fluorides) - end of shift	
Chemical name	Latvia	Luxembourg	Romania	Slovakia	
Aluminum 7429-90-5	-	-	200 µg/L - urine (Aluminum) - end of shift	60 µg/g creatinine (urine - Aluminum not critical)	
Phosphate(1-), hexafluoro-, lithium 21324-40-3	-	-	5 mg/g Creatinine - urine (Fluorine) - end of shift	-	
1,1-Difluoroethylene polymer 24937-79-9	-	-	5 mg/g Creatinine - urine (Fluorine) - end of shift	-	
Chemical name	Slovenia	Spain	Switzerland	United Kingdom	
Aluminum 7429-90-5	50 µg/L - urine (Aluminum) - for long-term exposure: at the end of the work shift after several consecutive workdays	-	50 µg/g creatinine (urine - Aluminum after several shifts (for long-term exposures)) 0.21 µmol/mmol creatinine (urine - Aluminum after several shifts (for long-term exposures))	-	

Derived No Effect Level (DNEL) - Workers

Chemical name	Oral	Dermal	Inhalation
Ferrous lithiumphosphate 15365-14-7	-	1 mg/kg bw/day [4] [6]	4.2 mg/m ³ [4] [6]

Graphite 7782-42-5	-	-	1.2 mg/m ³ [4] [6] 1.2 mg/m ³ [5] [6]
Copper 7440-50-8	-	137 mg/kg bw/day [4] [6] 273 mg/kg bw/day [4] [7]	-
Ethylene carbonate 96-49-1	-	4.3 mg/kg bw/day [4] [6]	15 mg/m ³ [4] [6]
Dimethyl carbonate 616-38-6	-	5 mg/kg bw/day [4] [6]	34.9 mg/m ³ [4] [6]
Phosphate(1-), hexafluoro-, lithium 21324-40-3	-	133 µg/kg bw/day [4] [6]	0.931 mg/m ³ [4] [6]

Notes

- [4] Systemic health effects.
 [5] Local health effects.
 [6] Long term.
 [7] Short term.

Derived No Effect Level (DNEL) - General Public

Chemical name	Oral	Dermal	Inhalation
Graphite 7782-42-5	813 mg/kg bw/day [4] [6]	-	0.3 mg/m ³ [5] [6]
Copper 7440-50-8	0.041 mg/kg bw/day [4] [6]	273 mg/kg bw/day [4] [6] 273 mg/kg bw/day [4] [7]	1 mg/m ³ [5] [6] 1 mg/m ³ [5] [7]
Ethylene carbonate 96-49-1	2.1 mg/kg bw/day [4] [6]	-	3.7 mg/m ³ [4] [6]
Dimethyl carbonate 616-38-6	2.5 mg/kg bw/day [4] [6]	-	8.7 mg/m ³ [4] [6]

Notes

- [4] Systemic health effects.
 [5] Local health effects.
 [6] Long term.
 [7] Short term.

Predicted No Effect Concentration (PNEC)

Chemical name	Freshwater	Freshwater (intermittent release)	Marine water	Marine water (intermittent release)	Air
Copper 7440-50-8	7.8 µg/L	-	5.2 µg/L	-	-
Ethylene carbonate 96-49-1	5.9 mg/L	59 mg/L	0.59 mg/L	0.059 mg/L	-
Dimethyl carbonate	0.5 mg/L	1 mg/L	0.05 mg/L	-	-

Chemical name	Freshwater	Freshwater (intermittent release)	Marine water	Marine water (intermittent release)	Air
616-38-6					
Phosphate(1-), hexafluoro-, lithium 21324-40-3	0.31 mg/L	0.68 mg/L	0.031 mg/L	-	-

Chemical name	Freshwater sediment	Marine sediment	Sewage treatment	Soil	Food chain
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Ferrous lithiumphosphate 15365-14-7	-	-	10 mg/L	-	0.33 mg/kg food
Copper 7440-50-8	87 mg/kg sediment dw	676 mg/kg sediment dw	230 µg/L	65 mg/kg soil dw	-
Ethylene carbonate 96-49-1	28.3 mg/kg sediment dw	2.83 mg/kg sediment dw	-	2.2 mg/kg soil dw	-
Dimethyl carbonate 616-38-6	-	-	188 mg/L	-	-
Aluminum 7429-90-5	-	-	20 mg/L	-	-
Phosphate(1-), hexafluoro-, lithium 21324-40-3	7.73 mg/kg sediment dw	1.55 mg/kg sediment dw	48 mg/L	13.5 mg/kg soil dw	-

8.1. Exposure controls

Engineering controls

Showers
Eyewash
stations
Ventilation systems.

Personal protective equipment

Eye/face protection

None required for normal handling of the finished product. If necessary to handle damaged product where exposure to the electrolyte is a possibility, chemical splash goggles and a face shield are recommended. Eye protection must conform to standard EN 166.

Hand protection

None required for normal handling of the finished product. If necessary to handle damaged product where exposure to the electrolyte is a possibility, chemically resistant gloves are recommended. Gloves must conform to standard EN 374.

Skin and body protection

None required for normal handling of the finished product. If necessary to handle damaged product where exposure to the electrolyte is a possibility, a chemically resistant apron is recommended (EN ISO 6529).

Respiratory protection

No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

General hygiene considerations

Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Avoid contact with skin, eyes or clothing.

Environmental exposure controls

See Section 6 for more information.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance: Cylindrical

Description: Solid

Color: Not available

Odor: Odorless

Odor threshold: Not available

pH: Not available

Melting point/freezing point: Not available
Initial boiling point and boiling range: Not available
Flash point: Not available
Evaporation rate: Not available
Flammability (solid, gas): Not available
Upper/lower flammability or explosive limits: Not available
Vapor pressure: Not available
Solubility (ies): insoluble.
Vapor density: Not available
Relative density: Not available
Partition coefficient: n-octanol/water: Not available
Auto ignition temperature: Not available
Decomposition temperature: Not available
Viscosity: Not available
Explosive properties: Not available
Oxidizing properties: Not available
Molecular weight: Not available

9.2 Other information

Not available

10. STABILITY AND REACTIVITY

10.1 Reactivity

- Stable at ambient temperature.

10.2 Chemical stability

- There is no hazard when the measures for handling and storage are followed.
- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Will not occur under normal conditions.
- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- Containers may explode when heated. - Fire may produce irritating and/or toxic gases. - Some liquids produce vapors that may cause dizziness or suffocation. - Inhalation of material may be harmful.

10.4 Conditions to avoid

- Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- Friction, heat, sparks or flames
- Dusts or shavings from borings, turnings, cuttings, etc.
- Do not exceed manufacturer's recommendation for charging or use battery for an application for which it was not specifically designed.
- Do not electrically short.

10.5 Incompatible materials

- Avoid contact with acids and oxidizers.
- Keep away from any possible contact with water, because of violent reaction and possible flash fire.
- Handle under inert gas. Protect from moisture.
- Combustibles, reducing agents

10.6 Hazardous decomposition products

- None under normal conditions.
- Corrosive and/or toxic fume

- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.
- Irritating and/or toxic gases

11. TOXICOLOGICAL INFORMATION

※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

11.1 Information on toxicological effects

Acute toxicity

Oral: ATEmix = 5,082.4 mg/kg bw

- Graphite: Rat LD₅₀>2,000 mg/kg (female)(OECD Guideline 401)
- Fe: Rat LD₅₀ = 98,600 mg/kg (Reduced iron, OECD TG 401)
- Copper: Rat LD₅₀>2,500 mg/kg (Cupric oxide; read across)(OECD TG 423, GLP)
- Aluminum: Rat LD₅₀>15,900 mg/kg (OECD TG 401)(Fumed alumina; read across)
- Lithium hexafluorophosphate(1-): Rat LD₅₀ = 50 ~ 300 mg/kg (Female)(OECD Guideline 423, GLP)
- 4-fluoro-1,3-dioxolan-2-one: Rat LD₅₀ = 500 mg/kg (male)(OECD Guideline 423)
- Dimethyl carbonate: Rat LD₅₀>5,000 mg/kg (male/female) (OECD Guideline 401)
- Polyethylene: Rat LD₅₀>2,000 mg/kg
- Diiron trioxide: Rat LD₅₀>5,000 mg/kg (male/female)(EU Method B.1)
- Boehmite (Al(OH)O): Rat LD₅₀>2,000 mg/kg (OECD Guideline 423, GLP)
- Carbon black: Rat LD₅₀>8,000 mg/kg (OECD TG 401)
- Nickel; Raney nickel: Rat LD₅₀>9,000 mg/kg (male/female) (OECD Guideline 401, GLP)
- 1-Methyl-2-pyrrolidinone: Rat LD₅₀ = 4,150 mg/kg (male/female)(OECD Guideline 401)
- Chromium: Rat LD₅₀>5,000 mg/kg (Read across; chromium(III) oxide)(OECD TG 420, GLP)
- Lithium carbonate;Lithane: Rat LD₅₀ = 525 mg/kg - Ethylbenzene : Rat LD₅₀ = 3,500 mg/kg (male or female)

Dermal: ATEmix = 1,651,224 mg/kg bw

- Copper: Rat LD₅₀>2,000 mg/kg (OECD TG 402, GLP)
- 4-fluoro-1,3-dioxolan-2-one: Rat LD₅₀ > 2,000 mg/kg (male/female) (OECD Guideline 402)
- Dimethyl carbonate: Rabbit LD₅₀>2,000 mg/kg (male/female)
- 1-Methyl-2-pyrrolidinone: Rat LD₅₀>5,000 mg/kg (male/female) (OECD Guideline 402)
- Lithium carbonate;Lithane: Rabbit LD₅₀>3,000 mg/kg (male/female) (OECD Guideline 402)
- Ethylbenzene: Rabbit LD₅₀ = 15,432 mg/kg

Inhalation: ATEmix = 226.04 mg/L

- Graphite: Rat LD₅₀>2 mg/L/4hr (male/female) (OECD Guideline 403)
- Fe: Rat LC₅₀>100 mg/m³/6hr
- Aluminum: Rat LC₅₀>0.888 mg/L/4hr (analytical) (OECD TG 403)
- Dimethyl carbonate: Rat LD₅₀>5.36 mg/L/4hr (male/female) (OECD Guideline 403)
- Diiron trioxide: Rat LC₅₀ = 5.05 mg/L/4hr (male/female) (OECD Guideline 403, GLP)
- Boehmite (Al(OH)O): Rat LD₅₀>~ 0.888 mg/kg/4hr (OECD Guideline 403, GLP)
- Carbon black: Rat LC₅₀>0.005 mg/L/4hr
- 1-Methyl-2-pyrrolidinone: Rat LC₅₀>5.1 mg/L/4hr (male/female) (OECD Guideline 403)
- Chromium : Rat LD₅₀>5.41 mg/L/4hr (Read across; chromium(III) oxide)(OECD TG 403, GLP)
- Lithium carbonate;Lithane: Rat LC₅₀>2 mg/L/4hr (male/female) (OECD Guideline 403)
- Ethylbenzene: Rat LC₅₀ = 17.8 mg/L/4hr

Skin corrosion/ irritation :

- Graphite: In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Fe: In test on skin irritation with rabbits, skin irritations were not observed.(Read across;Fe₃O₄)(OECD TG 404, GLP)
- Copper: In test on skin irritation with rabbits, skin irritations were not observed. (OECD TG 404, GLP)
- Aluminum: Aluminium oxide caused slight erythema in 2/12 rabbits. The observed effects do not lead to a classification. Aluminium oxide is, therefore, not considered to be a primary skin irritant. (OECD TG 404)(Read across; aluminium oxide)
- Lithium hexafluorophosphate(1-) : In the skin irritation test using human, the test material was corrosive. (EU Method B.40, GLP)
- 4-fluoro-1,3-dioxolan-2-one : In the skin irritation test using human skin model, the test material was non-corrosive. (OECD Guideline 431, GLP)
- Dimethyl carbonate: In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404)
- Polyethylene: No irritation was observed at the other two treated sites and no corrosive effects were noted during the study using rabbits. The primary irritation index was calculated as 0.2 and polyethylene was classified as a mild irritant.
- Diiron trioxide: In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Boehmite (Al(OH)O): In the skin irritation test using rabbits, skin irritations were not observed.(OECD Guideline 404, GLP)
- Carbon black: In test on skin irritation with rabbits, skin irritations were not observed. (OECD TG 404)
- Nickel; Raney nickel: Industrial nickel dust causes nickel dermatitis.
- 1-Methyl-2-pyrrolidinone: In the skin irritation test using rabbits, the test material was slightly irritating. (OECD Guideline 404, GLP)
- Chromium: In test on skin irritation with rabbits, skin irritations were not observed.(Read across; chromium(III) oxide)(OECD TG 404, GLP)
- Lithium carbonate;Lithane: In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Ethylbenzene: In test on skin irritation with rabbits, moderate irritations were observed to rabbit skin.

Serious eye damage/ irritation:

- Graphite: In the eye irritation test using rabbit, the test material was not irritating. (OECD Guideline 405, GLP)
- Fe: In test on eyes irritation with rabbits, eyes irritations were not observed. (Read across; Fe₃O₄)(OECD TG 405, GLP)
- Copper: In test on skin irritation with rabbits, skin irritations were not observed. (OECD TG 405, GLP)
- Aluminum: An eye irritation study of the aluminium oxide was performed in rabbits. No eye irritation/ corrosion effects were observed. (Read across; aluminium oxide)
- Lithium hexafluorophosphate(1-): In the eye irritation test using fertilised brown leghorn chicken eggs, the test material was severely irritating. (GLP)
- Dimethyl carbonate: In the eye irritation test using rabbit, the test material was not irritating. (GLP)
- Polyethylene: Mild irritants were observed in eye irritation test with rabbits. (Score 11.7/110)
- Diiron trioxide: In the eye irritation test using rabbits, the test material was not irritating. (OECD Guideline 405, GLP)
- Boehmite (Al(OH)O): In the eyes irritation test using rabbits, the test material was not irritating.(OECD Guideline 405, GLP)
- Carbon black: In test on eyes irritation with rabbits, eyes irritations were snot observed. (OECD TG 405) -
- 1-Methyl-2-pyrrolidinone: In the eye irritation test using rabbit, the test material was moderately irritating. (OECD Guideline 405, GLP)

- Chromium: In test on eyes irritation with rabbits, eyes irritations were not observed. (Read across; chromium(III) oxide)(OECD TG 405, GLP)
- Lithium carbonate; Lithane : In the eye irritation test using rabbit, the test material was moderately irritating. (OECD Guideline 405, GLP)
- Ethylbenzene: In test on eyes irritation with rabbits, slight irritations were observed to rabbit.

Respiratory sensitization: Not classified

- Aluminum: Al₂O₃ was the least inflammatory material tested and led to only weak effects on the mouse lung. (Read across; Aluminium oxide)
- Boehmite (Al(OH)O): In respiratory sensitization test with mice, it did not induce respiratory sensitization.
- Carbon black: In respiratory sensitization test with mice, it did not induce respiratory sensitization.

Skin sensitization:

- Graphite: In the skin sensitization test using mice, the test material was not skin sensitization. (OECD Guideline 429, GLP)
- Fe: In the test using guinea pigs, the test substance was not considered to be a dermal sensitizer in guinea pigs. (read across; FeO, Fe₂O₃)
- Copper: In maximization test on skin sensitization with guinea pig, skin sensitization was not observed. (OECD TG 406, GLP)
 - Aluminum: In test with guinea pigs, it can be concluded that aluminium oxide has no sensitisation potential under the experimental conditions. (Read across; Aluminium oxide)
 - Lithium hexafluorophosphate(1-) : In the skin sensitization test using mice, the test material was not skin sensitization. (OECD Guideline 429, GLP)
 - 4-fluoro-1,3-dioxolan-2-one : In the skin sensitization test using mice, the test material was skin sensitization. (OECD Guideline 429, GLP)
 - Dimethyl carbonate: In the skin sensitization test using guinea pig, this material was not skin sensitizing. (OECD Guideline 406, GLP)
 - Polyethylene: No reactions were observed in skin sensitization test with guinea pigs.
 - Diiron trioxide: In the skin sensitization test using guinea pigs, the test material was not skin sensitizing.
 - Boehmite (Al(OH)O): In the skin sensitization test using guinea pig, this material was not skin sensitizing. (OECD Guideline 406, GLP)
 - Carbon black: In skin sensitization test with guinea pig, it did not induce skin sensitization. (OECD TG 406, GLP)
 - Nickel; Raney nickel: Nickel hypersensitivity dermatitis may be initiated by contact with nickel on the skin.
 - 1-Methyl-2-pyrrolidinone: In the skin sensitization test using mice, the test material was not skin sensitization. (OECD Guideline 429, GLP)
 - Chromium: In vitro skin sensitisation test, the test substance was not considered to be a dermal sensitizer.
 - Lithium carbonate; Lithane: In the skin sensitization test using guinea pig, this material was not skin sensitizing. (OECD Guideline 406, GLP)

Carcinogenicity:

IARC

- Nickel: Group 2B
- Cobalt and cobalt compounds: Group 2B
- Polyethylene: Group 3
- diiron trioxide: Group 3
- Carbon black: Group 2B
- Chromium: Group 3
- Ethylbenzene: Group 2B

NTP

- Nickel: R
- Iron: Present

- Carbon black: Present

OSHA

- Nickel: Present
- Carbon black: Present

ACGIH

- Nickel: A5
- Aluminum: A4
- Cobalt and cobalt compounds: A3
- diiron trioxide: A4
- Carbon black: A3
- Chromium: A4
- Ethylbenzene: A3

KOREA-ISHL

- Lithium Nickel Oxide: 2
- Nickel: 1A
- Cobalt and inorganic compounds: 2
- Carbon black: 2
- Chromium: 1A(Chromium(VI)compounds(Water insoluble inorganic compounds))
- Ethylbenzene: 2

EU

- Nickel: Carc. 2
- Copper: EPA IRIS: D In carcinogenicity study with rat, tumor was not observed.
- Polyethylene: Fifty rats were implanted with polyethylene. In the polyethylene group, 23 developed tumors (two of these were unrelated to the implants).
- Boehmite (Al(OH)O): bauxite and alumina exposure was not associated with increased cancer risk.
- Ethylbenzene: there was clear evidence of carcinogenic activity of ethylbenzene in rat(male/female)with based on increased incidences of renal tubule neoplasms; increased incidence of testicular adenoma.

Mutagenicity:

- Graphite: Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- Fe: In mammalian cell gene mutation assay electrolytic iron, positive carbonyl iron exhibited a cytotoxic and mutagenic response (OECD TG 476)
- Copper: Negative reactions were observed in both in vitro(Ames test) and in vivo(DNA damage and/or repair; unscheduled DNA synthesis, micronucleus assay). (GLP)
- Aluminum: Negative reactions were observed in vitro (mammalian cell gene mutation assay with mouse lymphoma L5178Y cells(OECD TG 476, GLP)) and in vivo (micronucleus assay with rats (OECD TG 474, GLP)). (Aluminium hydroxide, aluminium chloride, aluminum oxide; read across)
- Lithium hexafluorophosphate(1-): Negative reactions were observed in both in vivo (Mammalian Erythrocyte Micronucleus test(OECD Guideline 474)) and in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- 4-fluoro-1,3-dioxolan-2-one: Positive reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)) and Negative reactions were observed in vivo (Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP)).
- Dimethyl carbonate: Negative reactions were observed in both in vitro (Mammalian Chromosome Aberration Test (OECD Guideline 473, GLP)) and in vivo (Mammalian Spermatogonial Chromosome Aberration Test (OECD Guideline 483))
- Polyethylene: Negative reactions were observed in Ames test using Salmonella typhimurium and Escherichia coli.
- Diiron trioxide: Negative reactions were observed in both in vitro (Mammalian Chromosome Aberration

Test (OECD Guideline 473, GLP)) and in vivo (DNA damage, chromosome aberration and micronuclei induction test)

- Boehmite (Al(OH)₃): Negative reactions were observed in vitro (mammalian cell gene mutation assay (OECD TG 476, GLP), Negative reactions were observed in vivo Mammalian Erythrocyte Micronucleus Test (OECD TG 474, GLP))

- Carbon black: Negative reactions were observed in both in vitro (Bacterial gene mutation test (OECD TG 471, GLP), Chromosomal aberrations test (OECD TG 476)) and in vivo (DNA damage and/or repair test).

- 1-Methyl-2-pyrrolidinone: Negative reactions were observed in both in vitro (Chromosomal aberrations test (OECD Guideline 476, GLP)) and in vivo (Mammalian Erythrocyte Micronucleus Test (OECD Guideline 474, GLP)).

- Chromium: In vitro mammalian chromosome aberration test, the result of the assay was negative. (Read across; stainless steel) (OECD TG 473, GLP)

- Lithium carbonate; Lithane: Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay (OECD Guideline 471, GLP)).

- Ethylbenzene: Negative reactions were observed in in vitro-mammalian chromosome aberration test (OECD TG 473), mammalian cell gene mutation test (OECD TG 476, GLP) and in vivo-unscheduled DNA synthesis (UDS) test with mammalian liver cells (OECD TG 486, GLP), mammalian erythrocyte micronucleus test (OECD TG 474, GLP).

Reproductive toxicity:

- Graphite:

- Copper: In reproductive toxicity with rats, there were no effects considered (up to 1500 ppm). (OECD TG 416, GLP)

- Aluminum: No reproduction, breeding and early post-natal developmental toxicity was observed in rats at 1000 mg/kg bw for males and females. (OECD TG 422, GLP) (Aluminium chloride; read across)

- Lithium hexafluorophosphate(1-): In the two-generation reproductive toxicity with rats, no effects observed on reproductive toxicity. (male/female) (OECD Guideline 416, GLP) (OECD Guideline 414) (Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture))

- Boehmite (Al(OH)₃): No reproduction, breeding and early post-natal developmental toxicity was observed in rats at 1000 mg/kg body weight for males and females. (OECD Guideline 422, GLP)

- Carbon black: No adverse effects on the reproductive function are expected. (OECD TG 414)

- Chromium: In the 90 days inhalation toxicity study using rat, there were no effects on clinical signs, mortality. (OECD TG 413)

- Ethylbenzene: There were no adverse effects on reproductive or developmental endpoints at dose levels up to 500 ppm EB in this guideline two-generation rat inhalation study. (OECD TG 416, GLP);

Results of prenatal Developmental Toxicity tests for rats, litter size was comparable between the treated and control dose groups, while a statistically significant dose-related reduction in fetal weights were noted in the 1000 and 2000 ppm dose groups. Visceral malformations occurred in one or few fetuses from the 100, 1000 and 2000 ppm exposure groups, without a clear dose relationship and no statistical significance. NOAEC = 2000 ppm (OECD Guideline 414)

Specific target organ toxicity (single exposure):

- Fe: If inhaled, iron is a local irritant to the lung and gastrointestinal tract.

- Copper: All animals showed expected gains in bodyweight over the study period and there were no abnormalities noted at necropsy. (OECD TG 423, GLP)

- Aluminum: In test using rats, Clinical signs of depression, laboured respiration, piloerection and hunched appearance was noted at the highest dose 15900 mg/kg. Macroscopic examination at the end of the observation period did not reveal any aluminium-related changes of the internal organs of the aluminium treated animals compared to the control group. (OECD TG 401) (Fumed alumina; read across)

- Lithium hexafluorophosphate(1-): Clinical signs observed during the study period were lethargy, hunched posture, uncoordinated movements, piloerection at 300 mg/kg, hunched posture, piloerection at 50 mg/kg. The surviving animals had recovered from the symptoms by Day 3. (OECD Guideline 423, GLP)

- Polyethylene: No test substance-related toxic effects were observed in an acute oral toxicity study with rats.
- Carbon black: No effect on endothelins or blood pressure was observed after exposure to carbon black. There were also no effects on body temperature and activity of the animals.
- Nickel; Raney nickel: In the acute oral toxicity using rat, there were no effects on clinical signs, systemic toxicity.(OECD Guideline 401, GLP)
- Chromium: In the acute oral toxicity using rat, salivation increased among all animals 15 minutes after administration of the test substance, and lasted about 8 hours. (OECD TG 420, GLP)
- Ethylbenzene: In acute oral, inhalation, dermal toxicity study with rats, adverse effects were not observed related to acute toxicity.

Specific target organ toxicity (repeat exposure):

- Fe: Rats were exposed to metallic iron as carbonyl iron via their feed (2.5%) for 2, 4, 6, or 9 weeks. This resulted in a strong increase of non-heme iron in the liver and clear lipid peroxidation in the liver and the mucosa of the duodenum. No evidence for DNA breakage were found. What follows is the original abstract of the publication. (carbonyl iron)
- Copper: In test with rats for 92 days, there were no mortalities or signs of clinical toxicity observed in any of the test species during the duration of the study. Ophthalmoscopic examinations revealed no abnormalities at any dose level tested. At gross pathology, significant decreases in heart and kidney weight were noted in the high dose males in the thymus and kidneys of high dose females. (GLP)
- Aluminum: On occasion workers chronically exposed to aluminum-containing dusts or fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax.
- Lithium hexafluorophosphate(1-): According to expert review of fluoride intake and effects on human health, fluoride intake in drinking water at levels close to or above 4 mg/l is associated with dental fluorosis and perhaps also bone fluorosis and/or weakening.; Damage to dental enamel recorded: especially notable in young animals, which also showed atrophy of respiratory organs/tissues with local oedema of bronchial mucosa. Older animals showed peribronchial hyperplasia. Animals around 1 year in age showed cavity formation in their bones.(Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture))(OECD Guideline 412)
- Polyethylene: No significant adverse effects were observed in subchronic (90-day) oral toxicity study with rats and dogs.
- Boehmite (Al(OH)O): There were no clear clinical signs or observations during necropsy which could be related to the treatment.(OECD Guideline 408, GLP), Intratracheal injection of aluminium powder caused nodular pulmonary fibrosis in the lungs of the rats only at the highest dose administered (100 mg).(OECD Guideline 413)
- Carbon black: Mice were continuously fed various types of carbon black in massive quantities (10% in diet) for 12 to 18 months. This led to no detectable changes from the normal in the organs and tissues of the mice fed.
- Nickel; Raney nickel: In nickel plating industry, exposure to nickel containing vapors has been reported to be assoc with asthma.
- Chromium: In the repeated Dose 90-Day Oral toxicity test using rat, there were no effects on clinical signs, mortality.
- Ethylbenzene: In repeated oral toxicity study with rats for 28 days, increased liver weight and hepatocellular hypertrophy at higher dose levels were observed. (NOEAL = 75 mg/kg bw/day) (OECD TG407, GLP); In repeated inhalation toxicity study with rats for 13 weeks, increases in liver and kidney weights but no other treatment related effects were observed in rats that inhaled ≥ 250 ppm ethylbenzene vapour for 13 weeks, NOAEC = 1000ppm (OECD Guideline 413, GLP), Classified as Category 2 according to EU GHS

Aspiration Hazard:

- Ethylbenzene: Classified as Category 1 according to EU GHS

12. ECOLOGICAL INFORMATION

※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

12.1 Ecological toxicity

- Acute toxicity: ATEmix = 0.48250mg/ℓ

Fish

- Graphite: 96hr-LC50 (*Brachydanio rerio*) > 100 mg/L

- Fe: 96hr-LC50 > 10000 mg/L (OECD TG 203, GLP)

- : 96hr-LC50 = 54.1 mg/L (Read across; cobalt (II) chloride hexahydrate), 34d-NOEC (*Pimephales promelas*) = 0.21 mg/L

- Aluminum: 96hr-LC50 > 218.64 mg/L (GLP)(Read across; aluminium chloride hexahydrate), 28d-NOEC (*Pimephales promelas*) = 4.7 mg/L (Read across; aluminium sulphate)

- Lithium hexafluorophosphate(1-): 96hr-LC50 = 51 ~ 193 mg/L Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture); 21d-NOEC = 4 mg F-/L

- Boehmite (Al(OH)O): 96hr-LC50 = 1.16 mg/L

- Carbon black: 96hr-LC0 = 1000 mg/L (OECD TG 203, GLP)

- 1-Methyl-2-pyrrolidinone: 96hr-LC50 > 500 mg/L (BBA-bulletin No. 33, 2. edition)

- Lithium carbonate; Lithane: 96hr-LC50 = 30.3 mg/L (OECD Guideline 203, GLP), 34d-NOEC (*Danio rerio*) = 15.28 mg/L (Read across; lithium hydroxide monohydrate)(OECD Guideline 210, GLP)

- Ethylbenzene: 96hr-LC50 = 4.2 mg/L (OECD Guideline 203)

Crustacean

- Graphite: 48hr-EC50 (*Daphnia magna*) > 100 mg/L

- Fe: 48hr-EC50 > 100 mg/L (OECD TG 202, GLP)

- : 48hr-EC50 = 2.618 mg/L (GLP)(Read across; cobalt (II) chloride hexahydrate), 42d-NOEC (*Neanthes arenaceodentata*) = 0.713 mg/L (ASTM Method E1562, GLP)

- Aluminum: 48hr-LC50 = 0.071 mg/L (Read across; CAS 13473-90-0), 8d-NOEC (*Ceriodaphnia dubia*) = 4.9 mg/L (Read across; CAS 7784-13-6)

- Lithium hexafluorophosphate(1-): 48hr-LC50 > 100 mg/L (OECD Guideline 202, GLP); 21d-NOEC (*Daphnia magna*) = 10 mg/L (Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture)) (OECD guideline 202, GLP)

- 4-fluoro-1,3-dioxolan-2-one : 48hr-LC50 = 8.4 mg/L (OECD Guideline 202, GLP)

- Boehmite (Al(OH)O): 48hr-EC50 > 100 mg/L (OECD Guideline 202, GLP)

- Carbon black: 24hr-EC50 > 5600 mg/L (OECD TG 202, GLP)

- 1-Methyl-2-pyrrolidinone: 24hr-EC50 > 1000 mg/L German Industrial Standard DIN 38 412 Part 11

- Lithium carbonate; Lithane : 48hr-EC50 = 33.2 mg/L (OECD Guideline 202, GLP), 21d-NOEC (*Daphnia magna*) = 9 mg/L (Read across; lithium)(OECD Guideline 211, GLP)

- Ethylbenzene: 48hr-EC50 = 1.8 ~ 2.4 mg/L (EPA method F), 7d-NOEC (*Ceriodaphnia dubia*) = 0.96 mg/L (U.S. EPA 600/4-91-003)

Algae

- Graphite: 72hr-EC50 (*Selenastrum capricornutum*) > 100 mg/L

- : 96hr-EC50 = 71.314 mg/L (Read across; cobalt (II) chloride hexahydrate), 96hr-NOEC (*Dunaliella tertiolecta*) = 4.672 mg/L

- : 96hr-EC50 > 500 mg/L - Aluminum : 72hr-EC50 = 0.0169 mg/L (OECD TG 201), (Read across; CAS 13473-90-0)

- Lithium hexafluorophosphate(1-): 96hr-EC50 > 100 mg/L ; 96h-NOEC = 22 mg/L (OECD Guideline 201, GLP)

- 4-fluoro-1,3-dioxolan-2-one: 72hr-EC50 = 32 mg/L

- Boehmite (Al(OH)O): 72hr-EC50 > 100 mg/L (OECD Guideline 201, GLP)

- Carbon black: 72hr-EC50 > 10000 mg/L , 72hr-NOEC > 10,000mg/l (OECD TG 201, GLP)
- 1-Methyl-2-pyrrolidinone: 72hr-EC50 = 600.5 mg/L
- Lithium carbonate; Lithane: 72hr-EC50 > 400 mg/L
- Ethylbenzene: 96hr-EC50 = 3.6 mg/L (U.S. EPA. 1985. Toxic substance Control Act Test guidelines)

12.2 Persistence and degradability

Persistence

- Graphite: Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.78)
- : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.82)
- Aluminum: Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.33) (estimated)
- Lithium hexafluorophosphate(1-): Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.354) (20 °C, pH > 6.5 - < 7.5)(OECD Guideline 107, GLP)
- 4-fluoro-1,3-dioxolan-2-one: Low persistency (log Kow is less than 4 estimated.) (Log Kow = -0.435)
- 1-Methyl-2-pyrrolidinone: Low persistency (log Kow is less than 4 estimated.) (Log Kow = -0.46)
- Ethylbenzene: Low persistency (log Kow is less than 4 estimated.) (Log Kow = 3.6) (EU Method A.8)

Degradability: Not available

12.3 Bioaccumulative potential

Bioaccumulation

- Graphite : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 2.433)
- Copper : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 0.02 ~ 20)
- : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 23) (Read across; 57CoCl)
- : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 2.5)
- Aluminum : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
- Lithium hexafluorophosphate(1-) : Bioaccumulation is expected to be low according to the BCF < 500 (BCF < 31)
- 4-fluoro-1,3-dioxolan-2-one : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
- Dimethyl carbonate: Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.2)
- Nickel; Raney nickel: Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 70)
- Ethylbenzene : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 1)

Biodegradation

- Lithium hexafluorophosphate(1-) : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 86% biodegradation was observed after 28 days) (OECD Guideline 301 C, GLP)
- 4-fluoro-1,3-dioxolan-2-one : As not well-biodegraded, it is expected to have high accumulation potential in living organisms (= 38% biodegradation was observed after 21 days) (OECD Guideline 301 D, GLP)
- Dimethyl carbonate: As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 86% biodegradation was observed after 28 days) (OECD Guideline 301 C, GLP)
- Polyethylene: As not well-biodegraded, it is expected to have high accumulation potential in living organisms (= 0% biodegradation was observed after 28 days)
- Carbon black: carbon black is an inorganic substance and will not biodegraded by microorganisms.
- 1-Methyl-2-pyrrolidinone: As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 73% biodegradation was observed after 28 days)
- Ethylbenzene: As well-biodegraded, it is expected to have low accumulation potential in living organisms (70% ~ 80% biodegradation was observed after 28 days) (ISO 14593-CO2-Headspace Test)

12.4 Mobility in soil

- 4-fluoro-1,3-dioxolan-2-one : Low potency of mobility to soil. (Koc = 5.117)
- Nickel; Raney nickel: Low potency of mobility to soil. (Koc = 2.86)
- 1-Methyl-2-pyrrolidinone: Low potency of mobility to soil. (Koc = 20.94) (estimated)
- Ethylbenzene: Low potency of mobility to soil. (Koc = 257.04)

12.5 Results of PBT and vPvB assessment: Not available

12.6 Other adverse effects: Not available

13. DISPOSAL CONSIDERATION

13.1 Waste treatment methods

Product/Packaging disposal

- Consider the required attentions in accordance with waste treatment management regulation.

Waste codes / Waste designation according to LoW(2015) : 16-06-05

Waste treatment-relevant information

- Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Sewage disposal-relevant information: Not available

Other disposal recommendations: Not available

14. TRANSPORT INFORMATION

UN Number: UN 3480

Proper Shipping Name: Lithium ion battery

Hazard Class: 9

ICAO/IATA (air transportation):

Packing Group: II

The product shall meet the General Requirements and Packaging Instruction 966 I.

IMO (sea transportation):

Packing Group: II

The product shall meet the General Requirements and Packing instruction of P903, P908, P909, P910, LP903 & LP904.

U.S. DOT (ground transportation):

Packing Group: II

The product shall meet the requirement of US Hazardous Materials Regulations 49 CFR (Code of Federal Regulations) Sections 173.185 in USA.

Canada TDG (ground transportation):

Packing Group: II

The product shall meet the requirement of Transportation of Dangerous Goods Regulations in Canada.

European Agreements ADR/RID/AND (ground transportation):

Packing Group: II

The product shall meet the General Requirements and Packing instruction of P903, P908, P909, P910, LP903 & LP904.

Australian Dangerous Goods ADG (ground transportation):

Packing Group: II

The product shall meet the General Requirements and Packing instruction of P903, P908, P909, P910, LP903 & LP904.

15. REGULATORY INFORMATION

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

EU regulations

Authorisations and/or restrictions on use:

Authorisations: Not regulated

Restrictions on use:

- Nickel: Regulated
- 1-Methyl-2-pyrrolidinone: Regulated

Other EU regulations:

- 1-Methyl-2-pyrrolidinone: Regulated

Foreign Regulatory Information

External information:

U.S.A management information (OSHA Regulation): Not regulated

U.S.A management information (CERCLA Regulation) :

- Copper: 5,000 lb
- Nickel: 100 lb
- Chromium: 5,000 lb
- ethylbenzene: 1,000 lb

U.S.A management information (EPCRA 302 Regulation): Not regulated

U.S.A management information (EPCRA 304 Regulation): Not regulated

U.S.A management information (EPCRA 313 Regulation):

- Aluminium (metal): Regulated
- Copper: Regulated
- Nickel: Regulated
- 1-Methyl-2-pyrrolidinone: Regulated
- Chromium: Regulated
- lithium carbonate: Regulated

Substance of Roterdame Protocol: Not regulated

Substance of Stockholme Protocol:

- lithium hexafluorophosphate(1-) : Regulated

Substance of Montreal Protocol : Not regulated

15.2 Chemical safety assessment:

- No chemical safety assessment has been carried out for this product by the supplier.

16. OTHER INFORMATION

Product safety data sheet for PA0001N0006A/PA0001N0007A/PA001N0008A prepared in accordance with Regulation (EU) 2015/830 (REACH), Annex II, and OSHA 29 CFR 1910.1200

16.1 Indication of changes

Date Updated : 2021/1/12

Version : v3.0

16.2 Abbreviations and acronyms

ACGIH = American Conference of Government Industrial Hygienists

CLP = Classification Labelling Packaging Regulation ; Regulation (EC) No 1272/2008

CAS No. = Chemical Abstracts Service number

DMEL = Derived Minimal Effect Levels

DNEL = Derived No Effect Level

EC Number = EINECS and ELINCS Number (see also EINECS and ELINCS)

EU = European Union

IARC = International Agency for Research on Cancer

ISHL = Industrial Safety & Health Law

NIOSH = National Institute for Occupational Safety & Health

NTP = National Toxicology Program

OSHA = European Agency for Safety and Health at work

PBT = Persistent, Bioaccumulative and Toxic substance

PNEC(s) = Predicted No Effect Concentration(s)

REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 453/2010

STP = Sewage Treatment Plant

SVHC = Substances of Very High Concern

vPvB = Very Persistent and Very Bioaccumulative

UN = United Nations

MARPOL = International Convention for the Prevention of Pollution from Ships (IMO)

IBC = Intermediate Bulk Container

CERCLA = Comprehensive Environmental Response, Compensation & Liability Act (US)

EPCRA = Emergency Planning and Community Right-to-Know Act (US)

EINECS = European Inventory of Existing Commercial chemical Substances

ELINCS = European List of Notified Chemical Substances

16.3 Key literature reference and sources for data :

U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB)

LookChem; <http://www.lookchem.com/>

IUCLID: <http://ecb.jrc.ec.europa.eu/IUCLID-DataSheets/7631905.pdf>

CHRIP(CheMical Risk Information Platform)

EPISUITE v4.11; <http://www.epa.gov/opt/exposure/pubs/episuitedl.html>

The Chemical Database -The Department of Chemistry at the University of Akron;

<http://ull.chemistry.uakron.edu/erd/>

ECOTOX: <http://cfpub.epa.gov/ecotox/>

International Chemical Safety Cards (ICSC): <http://www.nihs.go.jp/ICSC/>

National Chemical Information System (<http://ncis.nier.go.kr>)

Korea Dangerous Material Inventory Management System (<http://hazmat.nema.go.kr>)

REACH information on registered substances; <https://echa.europa.eu/information-on-chemicals/registered-substances>

EU CLP; <https://echa.europa.eu/information-on-chemicals/cl-inventory-database>

NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>

National Toxicology Program; <http://ntp.niehs.nih.gov/results/dbsearch/>

TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>

UN Recommendations on the transport of dangerous goods 17th

American Conference of Governmental Industrial Hygienists TLVs and BEIs.

16.4 Classification and procedure used to derive the classification for mixtures according to Regulation(EC)

1272/2008(CLP) : Not classified

16.5 Relevant H-statements : Not applicable

16.6 Training advice :

- Do not handle until all safety precautions have been read and understood.

16.7 Further information :

Data of sections 4 to 8, as well as 10 to 12, do not necessarily refer to the use and the regular handling of the product (in this sense consult package leaflet and expert information), but to release of major amounts in case of accidents and irregularities. The information describes exclusively the safety requirements for the product (s) and is based on the

present level of our knowledge. This data does not constitute a uarantee for the characteristics of the product(s) as defined by the legal warranty regulations. "(n.a. = not applicable; n.d. = not determined)"

The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.

