



## **Material Safety Data Sheet**

### ***CORN Lithium-ion Rechargeable Battery***

**Products : Lithium ion Rechargeable Battery Pack**

**Model : 1BL275DIA-1(Dia-Ultrasonic)**

**Filing date : 2023. 10. 23 (REV.0)**

**CORN CO.,Ltd.**

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## **Safety Data Sheet**

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

### **Section I – IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING**

**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.

#### **1.1 Product identifier**

**Substance name :** [INR18650-29E](#)

**Substance name :** Lithium-ion batteries

**Synonyms :**

[Lithium-ion Cell](#), [Lithium-ion Pack](#), [Lithium-ion Battery](#), [Li-Ion Cell](#), [Li-Ion Pack](#), [Li-Ion Battery](#)

#### **1.2 Relevant identified uses of the substance or mixture and uses advised against**

**Relevant identified uses :** Lithium-ion batteries

**Uses advised against :** Use for recommended use only

**Further Information :** Not available

#### **1.3 Details of the supplier of the safety data sheet**

**Supplier :** SAMSUNG SDI Co., Ltd.

**Street address/P.O. Box :** 150-20, Gongse-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Korea

**Country ID/Postcode/Place :** KOR/17084

**Telephone number :** 1-800-424-9300: US and Canada / 1-703-527-3887: International

**Responsible Department:** Quality team

**E-mail address of competent person responsible for the SDS :** Not available

**National contact :** 1-800-424-9300: US and Canada / 1-703-527-3887: International

#### **1.4 Emergency Telephone**

: 1-800-424-9300: US and Canada / 1-703-527-3887: International

**Opening hours :** Not available

**Other comments :** Not available

#### **1.5 Further Information**

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

[Nominal Voltage: 3.65 V](#)

[Rated Capacity: 2.85 Ah](#)

[Wh rating: 10.4 Wh](#)

Anode (negative electrode): based on intercalation graphite

Cathode (positive electrode): based on lithiated metal oxide (Cobalt, Nickel or Manganese)

**Remark:**



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The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. SAMSUNG SDI Co., Ltd. makes no warranty, expressed or implied, with respect to this information and disclaims all liabilities from reliance on it.

## Section II – 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.



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**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.

**Information on whether the substance or mixture meets the criteria for PBT or vPvB :** See a section 12.5 of the Safety Data Sheet.

## Section III – COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Mixture

CAS No.	EC No.	REACH Registration No.	%[weight]	Name	Common Name (Synonyms)	Classification according to Regulation(EC) No 1278/2008(CLP)
12325-84-7	Not available	-	10~20	Litium nickel oxide	Li <sub>2</sub> NiO <sub>2</sub>	Not classified
7440-44-0	231-153-3	-	10~20	Carbon	Carbon activated	Not classified
7439-89-6	231-096-4	-	10~20	Iron	Fe	Not classified
7440-50-8	231-159-6	-	5~15	Copper	Cu	Acute Tox. 4, H302



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						Eye Irrit. 2, H319 Acute Tox. 3, H331 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
12031-65-1	620-400-4	-	1~10	Lithium nickel dioxide	Lithium nickelate	Skin Sens. 1, H317 STOT RE 1, H372 ** Carc. 1A, H350i
7429-90-5	231-072-3	-	1~10	Aluminium	Al	Pyr. Sol. 1, H250 Water-react. 2, H261(pyrophoric) Flam. Sol. 1, H228 Water-react. 2, H261(stabilised)
12190-79-3	235-362-0	-	1~10	Cobalt lithium dioxide	Lithium cobaltite	Not classified
616-38-6	210-478-4	-	1~10	Dimethyl carbonate	Carbonic acid dimethyl ester	Flam. Liq. 2, H225
12057-17-9	601-724-5	-	1~10	Lithium Manganese (III,IV) oxide	LiMn <sub>2</sub> O <sub>4</sub>	Not classified
9002-88-4	618-339-3	-	1~10	Polyethylene	Ethene, homopolymer	Not classified
96-49-1	202-510-0	-	1~3	Ethylene carbonate	1,3-Dioxolan-2-one	Not classified
21324-40-3	244-334-7	-	1~3	Lithium hexafluorophosphate(1-)	lithium hexafluorophosphate	Not classified
7782-42-5	231-955-3	-	1~3	Graphite	Grafito	Not classified
623-53-0	433-480-9	-	1~3	Ethyl methyl carbonate	EMC	Not classified
Trade secret	Not available	-	0.1~0.99	Trade secret 1	Gasket material	Not classified
7440-02-0	231-111-4	-	0.1~0.99	Nickel	Ni	Skin Sens. 1, H317 Carc. 2, H351 STOT RE 1, H372 Aquatic Chronic 3, H412
25640-14-6	607-767-6	-	0.1~0.99	1,4-Benzenedicarboxylic acid, 1,4-dimethyl ester, polymer with 1,4-cyclohexanedimethanol and 1,2-ethanediol	1,2 ethanediol	Not classified
9003-07-0	618-352-4	-	0.1~0.99	1-Propene, homopolymer	Polypropylene	Not classified
872-50-4	212-828-1	-	0.3~0.99	1-methyl-2-pyrrolidone	1-methylpyrrolidin-2-one	Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 3, H335 Repr. 1B, H360D***
16812-54-7	240-841-2	-	0.1~0.99	Nickel sulphide	Nickel monosulfide	Skin Sens. 1, H317 Muta. 2, H341 STOT RE 1, H372 ** Aquatic Acute 1, H400 Aquatic Chronic 1, H410 Carc. 1A, H350i
26023-21-2	631-079-5	-	0.1~0.99	Poly[N,N'-(1,4-phenylene)-3,3',4,4'-benzophenonetetracarboxylic imide/amic acid]	Imide resin	Not classified
7440-21-3	231-130-8	-	0.1~0.99	Silicon	Ferro Silicon	Acute Tox. 3 *, H301 Acute Tox. 3 *, H311 Acute Tox. 3 *, H331
Trade secret	Not available	-	0.1~0.99	Trade secret 2	Electrolyte additive	Not classified



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554-13-2	209-062-5	-	0.1~0.99	Lithium carbonate	Carbonic acid, dilithium salt	Not classified
1333-86-4	215-609-9	-	0.1~0.99	Carbon black	Carbon	Not classified
9003-55-8	618-370-2	-	0.1~0.99	1,3 Butadiene/styrene copolymers	Styrene, butadiene copolymer	Not classified
26337-35-9	Not available	-	0.1~0.99	Acetic acid ethenyl ester, polymer with carbon monoxide and ethene	Not available	Not classified
9004-32-4	618-378-6	-	0.1~0.99	Carboxymethyl cellulose sodium salt	Cellulose, carboxymethyl ether, sodium salt	Not classified
110-61-2	203-783-9	-	0.1~0.99	Succinonitrile	Butanedinitrile	Not classified
11089-89-7	Not available	-	0.1~0.99	Aluminum lithium oxide (ALiO)	Not available	Not classified

### **Further Information**

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.

## **Section IV – FIRST-AID MEASURES**

### **4.1 Description of first aid measures**

#### **Following eye contact :**

- Rinse eyes with plenty of water for at least 15 minutes and seek medical attention.

#### **Following skin contact :**

- Remove contaminated clothing and wash before reuse.
- Immediately rinse contact area with plenty of clean water.
- Provide first aid to contacted area to prevent infection.
- Get medical attention.

#### **Following inhalation :**

- In case of inhalation of organic electrolyte mist, remove from exposure to fresh air.
- If necessary give oxygen. Get medical attention.

#### **Following ingestion :**

- In case of ingestion of electrolyte don't induce vomiting.
- If patient is conscious and alert give 2~4 cupfuls of milk or water.
- Never give anything by mouth to an unconscious person.
- Get medical attention immediately.

#### **Further Information :**

- The following first aid measures are required only in case of exposure to interior battery components after damage of the external battery casing.
- Undamaged, closed cells do not represent a danger to the health.

### **4.2 Most important symptoms and effects, both acute and delayed**

**Acute effects :** Not available

**Delayed effects :** Not available

### **4.3 Indication of immediate medical attention and special treatment needed**



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- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

### Section V – 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.

### Section VI – 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





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### 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.

## Section VII – 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

## Section VIII – EXPOSURE CONTROLS / PERSONAL PROTECTION

### 8.1 Control parameters

#### Occupational Exposure limits

Name	ACGIH regulation	Biological exposure index	OSHA regulation	NIOSH regulation	EU regulation
Litium nickel oxide	TWA = 0.2 mg/m <sup>3</sup> (Nickel insoluble inorganic compounds), TWA = 0.1 mg/m <sup>3</sup> (Nickel soluble inorganic compounds)	Not available	Not applicable	Not applicable	Not applicable
Carbon	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Iron	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Copper	TWA = 0.2 mg/m <sup>3</sup> (f)	Not available	TWA = 1 mg/m <sup>3</sup> (ot)	TWA = 1 mg/m <sup>3</sup> (ot)	Not applicable



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	ume)		her copper compounds (as Cu) except copper fume)	her copper compounds (as Cu) except copper fume)	
Lithium nickel dioxide	TWA = 0.2 mg/m <sup>3</sup> (Nickel insoluble inorganic compounds), TWA = 0.1 mg/m <sup>3</sup> (Nickel soluble inorganic compounds)	Not available	Not applicable	Not applicable	Not applicable
Aluminium	TWA = 1 mg/m <sup>3</sup> (respirable particulate matter)	Not available	TWA = 10 mg/m <sup>3</sup> (Total dust), 5 mg/m <sup>3</sup> (Respirable fraction)	TWA = 10 mg/m <sup>3</sup> (Total dust), 5 mg/m <sup>3</sup> (Respirable fraction)	Not applicable
Cobalt lithium dioxide	TWA = 0.02 mg/m <sup>3</sup> (Cobalt inorganic compounds, as Co)	Not available	Not applicable	Not applicable	Not applicable
Dimethyl carbonate	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Lithium Manganese (III,IV) oxide	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Polyethylene	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Ethylene carbonate	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Lithium hexafluorophosphate(1-)	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Graphite	TWA = 2 mg/m <sup>3</sup>	Not available	TWA = 15 mppcf (mineral dusts)	TWA = 2.5 mg/m <sup>3</sup> (resp)	Not applicable
Ethyl methyl carbonate	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Trade secret 1	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Nickel	TWA = 1.5 mg/m <sup>3</sup> (inhalable particulate matter)	Not available	TWA = 1 mg/m <sup>3</sup>	Ca TWA = 0.015 mg/m <sup>3</sup>	Not applicable
1,4-Benzenedicarboxylic acid, 1,4-dimethyl ester, polymer with 1,4-cyclohexanedimethanol and 1,2-ethanediol	Not applicable	Not available	Not applicable	Not applicable	Not applicable
1-Propene, homopolymer	Not applicable	Not available	Not applicable	Not applicable	Not applicable
1-methyl-2-pyrrolidone	Not applicable	Not available	Not applicable	Not applicable	TWA = 10 ppm (40 mg/m <sup>3</sup> ), STEL = 20 ppm (80 mg/m <sup>3</sup> )
Nickel sulphide	TWA = 0.1 mg/m <sup>3</sup> (Nickel soluble inorganic compounds), 0.2 mg/m <sup>3</sup> (Nickel insoluble inorganic compounds)	Not available	Not applicable	Not applicable	Not applicable
Poly[N,N'-(1,4-phenylene)-3,3',4,4'-benzophenonetetracarboxylic imide/amic acid]	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Silicon	Not applicable	Not available	TWA = 10 mg/m <sup>3</sup> (Total dust), TWA =	TWA = 10 mg/m <sup>3</sup> (total) TWA = 5 mg/	Not applicable



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			5 mg/m <sup>3</sup> (Respirable fraction)	m <sup>3</sup> (resp)	
Trade secret 2	Not applicable	Not available	Not available	Not available	Not applicable
Lithium carbonate	Not applicable	Not available	Not available	Not available	Not applicable
Carbon black	TWA = 3 mg/m <sup>3</sup> (inhalable particulate matter)	Not available	TWA = 3.5 mg/m <sup>3</sup>	TWA = 3.5 mg/m <sup>3</sup> , TWA = 0.1 mg/m <sup>3</sup> (Carbon black in presence of Polycyclic aromatic hydrocarbons, as PAH)	Not applicable
1,3 Butadiene/styrene co polymers	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Acetic acid ethenyl ester, polymer with carbon monoxide and ethene	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Carboxymethyl cellulose sodium salt	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Succinonitrile	Not applicable	Not available	Not applicable	TWA = 6 ppm (20 mg/m <sup>3</sup> )	Not applicable
Aluminum lithium oxide (AlLiO)	TWA = 1 mg/m <sup>3</sup> (respirable particulate matter)(Aluminum in soluble compounds)	Not available	Not applicable	Not applicable	Not applicable

## 8.2 Exposure controls

### 8.2.1 Appropriate engineering controls :

#### Substance/mixture related measures to prevent exposure during identified uses:

- Avoid charging batteries in areas where hydrogen gas accumulate.
- Use local exhaust ventilation to maintain concentrations of hydrogen below the Lower Explosive collect and transport flammable gases in ventilation systems.
- Insure proper ventilation is present and electrolyte mist and vapours.

#### Structural measures to prevent exposure:

- Avoid charging batteries in areas where hydrogen gas accumulate.
- Use local exhaust ventilation to maintain concentrations of hydrogen below the Lower Explosive collect and transport flammable gases in ventilation systems.
- Insure proper ventilation is present and electrolyte mist and vapours.

**Organisational measures to prevent exposure:** Not available

#### Technical measures to prevent exposure:

- Insure proper ventilation is present and electrolyte mist and vapours.

### 8.2.2 Individual protection measures, such as personal protective equipment :

#### Eye and face protection

- Wear ANSI approved safety glasses with side shield during normal use.
- Wear NIOSH approved face shield with safety glasses and H.V protection during intentional disassembly.

#### Skin protection

##### Hand protection

- Wear nitrile butyl rubber, neoprene, or PVC glove during battery component disassembly.
- Discard contaminated work clothing after one work day.

##### Other skin protection



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- Wear protective clothing during battery component disassembly.
- Discard contaminated work clothing after one work day.

### **Respiratory protection :**

- None required during normal use.
- Wear NIOSH or European Standard EN 149 approved full or half face piece (with goggles) respiratory protective equipment when necessary.
- In lack of oxygen(< 19.5%), wear the supplied-air respirator or self-contained oxygen breathing apparatus.
- In case exposed to particulate material, the respiratory protective equipment as follow are recommended; facepiece filtering respirator or air-purifying respirator, high-efficiency particulate air(HEPA) filter media or respirator equipped with powered fan, filter media of use (dust, mist, fume)

### **8.2.3 Environmental exposure controls**

**Substance/mixture related measures to prevent exposure:** Not available

**Instruction measures to prevent exposure:** Not available

**Organizational measures to prevent exposure:** Not available

**Technical measures to prevent exposure:** Not available

## **Section IX – PHYSICAL AND CHEMICAL PROPERTIES**

### **9.1 Information on basic physical and chemical properties**

#### **Appearance**

**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) :** Not available

**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



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## 9.2 Other information

: Not available

## Section X – 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.
- 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

## Section XI – 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** : Not classified (ATEmix = 1001 mg/kg bw)

- Carbon : Rat LD<sub>50</sub> > 2000 mg/kg (OECD Guideline 423, GLP)
- Iron : Rat LD<sub>50</sub> = 98600 mg/kg (OECD Guideline 401, GLP)
- Copper : Rat LD<sub>50</sub> = 481 mg/kg (OECD Guideline 401, GLP)
- Aluminium : Rat LD<sub>50</sub> > 15900 mg/kg (Read-across)(OECD Guideline 401)
- Cobalt lithium dioxide : Rat LD<sub>50</sub> > 5000 mg/kg (OECD Guideline 425, GLP)
- Dimethyl carbonate : Rat LD<sub>50</sub> > 5000 mg/kg (male/female)(OECD Guideline 401, GLP)
- Polyethylene : Rat LD<sub>50</sub> > 2000 mg/kg
- Ethylene carbonate : Rat LD<sub>50</sub> = 10400 mg/kg (OECD Guideline 401)
- Lithium hexafluorophosphate(1-) : Rat LD<sub>50</sub> = 50~300 mg/kg (OECD Guideline 423, GLP)
- Graphite : Rat LD<sub>50</sub> > 2000 mg/kg (OECD Guideline 423, GLP)
- Ethyl methyl carbonate : Rat LD<sub>50</sub> > 5000 mg/kg (OECD Guideline 401, GLP)
- Nickel : Rat LD<sub>50</sub> > 9000 mg/kg (OECD Guideline 401, GLP)
- 1-methyl-2-pyrrolidone : Rat LD<sub>50</sub> = 4150 mg/kg (OECD Guideline 401)
- Nickel sulphide : Rat LD<sub>50</sub> > 5000 mg/kg (OECD Guideline 401, GLP)
- Silicon : Rat LD<sub>50</sub> > 5000 mg/kg (OECD Guideline 401, GLP)
- Trade secret 2 : Rat LD<sub>50</sub> = ca. 500 mg/kg (OECD Guideline 423, GLP)
- Lithium carbonate : Rat LD<sub>50</sub> = 525 mg/kg
- Carbon black : Rat LD<sub>50</sub> > 10000 mg/kg (OECD Guideline 401, GLP)
- Carboxymethyl cellulose sodium salt : Rat LD<sub>50</sub> = 27000 mg/kg (Food Research. Vol. 13, Pg. 29, 1948.)
- Succinonitrile : Rat LD<sub>50</sub> = 300~2000 mg/kg (OECD Guideline 423, GLP)

**Dermal** : Not classified (ATEmix = 26400 mg/kg bw)

- Copper : Rat LD<sub>50</sub> > 2000 mg/kg (OECD Guideline 402, GLP)
- Cobalt lithium dioxide : Rat LD<sub>50</sub> > 2000 mg/kg (OECD Guideline 402, GLP)
- Dimethyl carbonate : Rabbit LD<sub>50</sub> > 2000 mg/kg (male/female)(GLP)
- Ethylene carbonate : Rat LD<sub>50</sub> = 2000 mg/kg (male/female)(OECD Guideline 402, GLP)
- 1-methyl-2-pyrrolidone : Rat LD<sub>50</sub> > 5000 mg/kg (OECD Guideline 402)
- Silicon : Rabbit LD<sub>50</sub> > 5000 mg/kg
- Trade secret 2 : Rat LD<sub>50</sub> > 2000 mg/kg (OECD Guideline 402, GLP)
- Lithium carbonate : Rabbit LD<sub>50</sub> > 3000 mg/kg (OECD Guideline 402, GLP)
- Succinonitrile : Rat LD<sub>50</sub> > 2000 mg/kg (OECD Guideline 402, GLP)

**Inhalation** : Not classified (ATEmix = 95.45 mg/L)

- Carbon : Rat LC<sub>0</sub> = 8.5 mg/L / 1 hr (OECD Guideline 403)
- Iron : Rat LC<sub>50</sub> > 100 mg/m<sup>3</sup> / 6 hr (carbonyl iron)
- Copper : Rat LC<sub>50</sub> > 5.11 mg/L / 4 hr (OECD Guideline 436, GLP)
- Aluminium : Rat LC<sub>50</sub> > 0.888 mg/L / 4 hr (OECD Guideline 403)
- Dimethyl carbonate : Rat LC<sub>50</sub> > 5.36 mg/L / 4 hr (male/female)(OECD Guideline 403, GLP)
- Ethylene carbonate : Rat LC<sub>0</sub> = 730 mg/m<sup>3</sup> / 8 hr (male/female)(OECD Guideline 403)
- Graphite : Rat LC<sub>50</sub> > 2000 mg/m<sup>3</sup> / 4 hr (OECD Guideline 403, GLP)
- Ethyl methyl carbonate : Rat LC<sub>50</sub> > 17.6 mg/L / 4 hr (OECD Guideline 403, GLP)
- 1-methyl-2-pyrrolidone : Rat LC<sub>50</sub> > 5.1 mg/L / 4 hr (OECD Guideline 403)



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- Nickel sulphide : Rat LC<sub>50</sub> = 0.924 mg/L / 4 hr (OECD Guideline 403, GLP) (Read-across; Nickel subsulfide)
- Lithium carbonate : Rat LC<sub>50</sub> > 2 mg/L / 4 hr (OECD Guideline 403, GLP)
- Carbon black : Rat LC<sub>0</sub> = 4.6 mg/m<sup>3</sup> / 4 hr (OECD Guideline 403)
- Carboxymethyl cellulose sodium salt : Rat LC<sub>50</sub> > 5800 mg/m<sup>3</sup> / 4 hr (Toxicology Letters. Vol. (Suppl), Pg. 243, 1992.)
- Succinonitrile : Rat LC<sub>50</sub> ≥ 2.67 mg/L / 4 hr (OECD Guideline 403)

### **Skin corrosion/ irritation** : Not classified

- Carbon : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Iron : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP) (Fe<sub>2</sub>O<sub>3</sub> 83.5 %, FeO 12%, Co 4.5%)
- Copper : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Aluminium : In the skin irritation test using rabbits, the test material was not irritating. (Read-across)(OECD Guideline 404)
- Cobalt lithium dioxide : In in vitro skin irritation test, the test material was not irritating. (OECD Guideline 439)
- Dimethyl carbonate : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404)
- Polyethylene : In the skin irritation test using rabbits, the test material was mildly irritating.
- Ethylene carbonate : In the skin irritation test using rabbits, the test material was not classified. (OECD Guideline 404, GLP)
- Lithium hexafluorophosphate(1-) : In the skin irritation test using human skin model, the test material was corrosive. (EU Method B.40, GLP)
- Graphite : In the skin irritation test with rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Ethyl methyl carbonate : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Nickel : Industrial nickel dust causes nickel dermatitis.
- 1-Propene, homopolymer : Processes involved in production&processing of polyolefins are usually totally enclosed & type of accidents that may occur will be burns to skin or eyes, or asphyxiation or intoxication dueto inhalation of vapors escaping from leaks.
- 1-methyl-2-pyrrolidone : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404)
- Nickel sulphide : In the skin irritation test using rabbits, the test material was slightly irritating. The mean erythema score is 0.3 at 24 and 48h, and 0 at 72h. The effects are fully reversible within 72 hours. (OECD Guideline 404, GLP) (Read-across; Nickel subsulfide)
- Silicon : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Trade secret 2 : In the skin irritation test using human skin model, the test material was irritating. (OECD Guideline 439, GLP)
- Lithium carbonate : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)



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- Carbon black : In the skin irritation test using rabbits, the test material was not classified. (OECD Guideline 404)
- Succinonitrile : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404)

### **Serious eye damage/ irritation** : Not classified

- Carbon : In the eyes irritation test with rabbits, the test material was slightly irritating. but they were fully reversible within 7 days. (OECD Guideline 405, GLP)
- Iron : In the eye irritation test using rabbits, the test material was not irritating. (OECD Guideline 405)
- Copper : In the eyes irritation test with rabbits, the test material was irritating. but it was fully reversible within 7 days. (OECD Guideline 405, GLP)
- Aluminium : In the eye irritation test using rabbits, the test material was not irritating. (Read-across)
- Cobalt lithium dioxide : In the eye irritation test using rabbits, the test material was not irritating. (OECD Guideline 405, GLP)
- Dimethyl carbonate : In the eye irritation test using rabbits, the test material was not irritating. (GLP)
- Polyethylene : In the eye irritation test using rabbits, the test material was mildly irritating.
- Ethylene carbonate : In the eye irritation test using rabbits, the test material was mildly irritating. (OECD Guideline 405, GLP)
- Lithium hexafluorophosphate(1-) : In the eye irritation test using fertilised brown leghorn chicken eggs, the test material was severely irritating. (GLP)
- Graphite : In the eyes irritation test with rabbits, the test material was slightly irritating. it was fully reversible within 7 days. (OECD Guideline 405, GLP)
- Ethyl methyl carbonate : In the eye irritation test using rabbits, the test material was not irritating. (OECD Guideline 405, GLP)
- Nickel : In the eyes irritation test with rabbits, the test material was slightly irritating. but they were fully reversible within 7 days. (OECD Guideline 405, GLP)
- 1-methyl-2-pyrrolidone : In the eye irritation test using rabbits, the test material was irritating. Moderate ocular effects observed, but Corneal and conjunctival effects were reversible within 14 days and 21 days, respectively. (OECD Guideline 405)
- Nickel sulphide : In the eye irritation test using rabbits, the test material was mildly irritating. the effects are fully reversible within 72 hours. (OECD Guideline 405, GLP) (Read-across; Nickel subsulfide)
- Silicon : In the eye irritation test using rabbits, the test material was not irritating. (OECD Guideline 405, GLP) (Read-across; Silica, precipitated, cryst.-free; CAS-No.: 112926-00-8)
- Lithium carbonate : In the eyes irritation test with rabbits, the moderate conjunctivitis was observed. but they were fully reversible within 7 days. (conjunctivae score 2,2,1.3,1/3)(OECD Guideline 405, GLP)
- Carbon black : In the eye irritation test using rabbits, the test material was not irritating. (OECD Guideline 405)
- Succinonitrile : In the eye irritation test using rabbits, the test material was not irritating. The group mean 24, 48, 72-hour scores were 0 for corneal opacity, 0 for iritic effect and 0.07 for chemosis(fully reversible within 7 days). (OECD Guideline 405)

### **Respiratory sensitization** : Not classified

- Aluminium: In the respiratory sensitization test using mice, the test material was not respiratory sensitization. (Read-across)
- Carbon black: This material has not been tested in animals for sensitization effects on the respiratory tract. In humans, no cases of allergies were reported to the responsible occupational physicians.





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### **Skin sensitization** : Not classified

- Carbon : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)
- Iron : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (FeO.Fe<sub>2</sub>O<sub>3</sub>)
- Copper : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)
- Aluminium : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing.
- Cobalt lithium dioxide : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)
- Dimethyl carbonate : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)
- Polyethylene : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing.
- Ethylene carbonate : In the skin sensitization test using guinea pigs, the test material was not classified. (OECD Guideline 406, GLP)
- Lithium hexafluorophosphate(1-) : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)
- Graphite : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)
- Ethyl methyl carbonate : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)
- Nickel : Nickel hypersensitivity dermatitis may be initiated by contact with nickel on the skin.
- 1-methyl-2-pyrrolidone : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)
- Nickel sulphide : In the skin sensitization test using guinea pigs, the test material was skin sensitising. Mean erythema score at 24 and 48 hours were 1.1 and 1.0, respectively.(Guinea pig maximization test, GLP) (Read-across)
- Trade secret 2 : In the skin sensitization test using mouse, the test material was skin sensitizing. (OECD Guideline 429, GLP)
- Lithium carbonate : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)
- Carbon black : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)
- Succinonitrile : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)

### **Carcinogenicity** : Not classified

- Lithium nickel oxide
  - IARC: Group 1 (Nickel compounds)
  - NTP: R (Nickel compounds)
  - OSHA: Present (Nickel compounds)
  - ACGIH: A1 (Nickel insoluble inorganic compounds), A4 (Nickel soluble inorganic compounds)
  - KOREA-ISHL: Carcinogenicity1A (Nickel(soluble compounds, insoluble inorganic compounds), CAS No.7440-02-0)
- Lithium nickel dioxide



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- IARC: Group 1 (Nickel compounds)
- NTP: R (Nickel compounds)
- OSHA: Present (Nickel compounds)
- ACGIH: A1 (Nickel insoluble inorganic compounds), A4 (Nickel soluble inorganic compounds)
- KOREA-ISHL: Carcinogenicity1A (Nickel(soluble compounds, insoluble inorganic compounds), CAS No. 7440-02-0)
- Aluminium
  - ACGIH: A4
- Cobalt lithium dioxide
  - IARC: Group 2B (Cobalt and cobalt compounds)
  - NTP: R (Cobalt compounds)
  - OSHA: Present (Cobalt compounds)
  - ACGIH: A3 (Cobalt inorganic compounds)
  - KOREA-ISHL: Carcinogenicity2 (Cobalt inorganic compounds)
- Polyethylene
  - IARC: Group 3
- Graphite
  - IARC: Group 3
- Nickel
  - IARC: Group 2B (Nickel, metallic and alloys)
  - NTP: R
  - OSHA: Present
  - ACGIH: A5
  - KOREA-ISHL: Carcinogenicity2 (metal)
  - EU Regulation 1272/2008: Carc.2
- 1-Propene, homopolymer
  - IARC: Group 3
- Nickel sulphide
  - IARC: Group 1 (Nickel compounds)
  - NTP: R (Nickel compounds)
  - OSHA: Present (Nickel compounds)
  - ACGIH: A1 (Nickel insoluble inorganic compounds), A4 (Nickel soluble inorganic compounds)
  - KOREA-ISHL: Carcinogenicity1A (Nickel(soluble compounds, insoluble inorganic compounds), CAS No. 7440-02-0)
- Carbon black
  - IARC: Group 2B
  - OSHA: Present
  - ACGIH: A3
  - KOREA-ISHL: Carcinogenicity2
- 1,3 Butadiene/styrene copolymers
  - IARC: Group 3
- Aluminum lithium oxide (ALiO)
  - IARC: Group 1 (Aluminium production)
  - OSHA: Present (Aluminium production)
  - ACGIH: A4 (Aluminum insoluble compounds)



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### **Mutagenicity** : Not classified

- Carbon : Negative reactions were observed in in vitro test(Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- Iron : Negative reactions were observed in in vitro test(Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP))
- Copper : Negative reactions were observed in in vivo test(mammalian somatic cell study: cytogenicity/erythrocyte micronucleus(EU Method B.12, GLP)).
- Aluminium : Negative reactions were observed in both in vivo (Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP)) and in vitro (Mammalian cell gene mutation test(OECD Guideline 476, GLP)).
- Cobalt lithium dioxide : Negative reactions were observed in in vitro tests(Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP) and Mammalian cell gene mutation Test(OECD Guideline 476, GLP))(WoE). Negative reactions were observed in in vivo tests(Mammalian Bone Marrow Chromosome Aberration Test(OECD Guideline 475) and Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP)).
- Dimethyl carbonate : Negative reactions were observed in in vivo (Mammalian Spermatogonial Chromosome Aberration Test (OECD Guideline 483, GLP))
- Polyethylene : No toxicity was observed in in vitro mutagenicity test using Salmonella typhimurium strain.
- Ethylene carbonate : Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- 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)).
- Graphite : Negative reactions were observed in in vitro test(Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- Ethyl methyl carbonate : Negative reactions were observed in vitro (Mammalian Chromosome Aberration Test (OECD Guideline 473, GLP))
- 1-methyl-2-pyrrolidone : Negative reactions were observed in in vitro tests(Bacterial Reverse Mutation Assay(OECD Guideline 471), Mammalian Gene Mutation Test(OECD Guideline 476, GLP) and DNA Damage and/or Repair Study(OECD Guideline 482, GLP)).  
Negative reactions were observed in in vivo tests(Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP) and Mammalian Bone Marrow chromosome Aberration Test(OECD Guideline 475, GLP)).
- Nickel sulphide : Positive reactions were observed in in vivo mammalian germ cell study.(Read-across)
- Silicon : Negative reactions were observed in both in vivo (Mammalian Bone Marrow Chromosome Aberration Test(OECD Guideline 475, GLP))
- Trade secret 2 : Negative reactions were observed in in vivo (Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP)).
- Lithium carbonate : Negative reactions were observed in in vivo genetic toxicity test.
- Carbon black : Positive reactions were observed in both in vitro (Chromosomal aberrations test (OECD Guideline 476, GLP)) and in vivo (ypoxanthine-guanine phosphoribosyl transferase gene (hprt) mutations in alveolar epithelial cells).
- Succinonitrile : Negative reactions were observed in in vitro tests(Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP) and Mammalian Chromosome Aberration Test(OECD Guideline



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473, GLP)). Negative reactions were observed in in vivo tests(Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP))

### **Reproductive toxicity** : Not classified

- Copper : In the reproductive toxicity and developmental toxicity test with rats, there were no significant adverse effects on reproductive parameters and no evidence of malformations at any doses. (OECD Guideline 416, 414, GLP)
- Aluminium : In the reproductive toxicity and developmental toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 422, GLP)(OECD Guideline 414)
- Cobalt lithium dioxide : In the reproductive toxicity and developmental toxicity screening tests with rats, treatment with 300 mg cobalt powder/kg bw/day resulted in an increase of the post-implantation loss and a decrease in the live birth index. Treatment with 30 mg cobalt powder/kg bw/day resulted that the mean litter weight of pups was slightly reduced in a dose-related way (not significant at  $p \leq 0.01$ ), significant only at 300 mg cobalt powder/kg bw/day. (NOAEL(P, F1) = 30 mg/kg bw/day) (OECD Guideline 422, GLP)
- Dimethyl carbonate : In the reproductive toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 415, GLP)  
In the developmental toxicity test using rabbits, adverse effects were not observed, respectively. (OECD Guideline 414, GLP)
- Ethylene carbonate : In the reproductive toxicity test using mouse, adverse effects were not observed, respectively. (GLP) In the developmental toxicity test using rabbits, adverse effects were not observed, respectively. (GLP)
- Lithium hexafluorophosphate(1-) : In the reproductive toxicity and developmental toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 416, GLP)(OECD Guideline 414)
- Graphite : In the reproductive toxicity with rats, there were no significant adverse effects on reproductive parameters. (OECD Guideline 422, GLP)
- Ethyl methyl carbonate : In the reproductive toxicity and developmental toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 414)
- Nickel : In the reproductive toxicity and developmental toxicity test with rats, the number of live pups/litter was significantly decreased, pup mortality was significantly increased, and average pup body weight was significantly decreased at the 500 ppm dose level. (OECD Guideline 416, GLP)
- 1,4-Benzenedicarboxylic acid, 1,4-dimethyl ester, polymer with 1,4-cyclohexanedimethanol and 1,2--1-methyl-2-pyrrolidone : In the two-generation reproductive toxicity test with rats, developmental toxicity was evidenced by increased pup mortality and reduced body weight gain, including corresponding effects in the investigated organs, in pups treated at 500/350 mg/kg bw/day. (NOAEL(F) = 160 mg/kg bw/day) (OECD Guideline 416, GLP)
- Nickel sulphide : In the reproductive toxicity with rats, the 500 ppm dose caused significant body weight depression of both mothers and pups and increased neonatal mortality during the postnatal development period. (equivalent or similar to OECD Guideline 416, GLP) (Nickel Chloride Hexahydrate (7791-20-0)).
- Silicon : In the reproductive toxicity and developmental toxicity test using rats, adverse effects were not observed, respectively. (equivalent or similar to OECD Guideline 478) (Read-across; FDA-Compound 71-41 = Silene, calcium silicate (hydrated))
- Lithium carbonate : In the reproductive toxicity test with rats, no toxicological significant changes were detected. (OECD Guideline 416, GLP)



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- Carbon black : In the reproductive toxicity and developmental toxicity test using mice, adverse effects were not observed, respectively. (OECD Guideline 414, GLP)

- Succinonitrile : In the reproductive toxicity and developmental toxicity tests with rats, there were no significant adverse effects on reproductive parameters. (OECD Guideline 416, GLP)

### **Specific target organ toxicity (single exposure) : Not classified**

- Carbon : In the acute oral toxicity test with rats, Animals visible exhibited labored breathing and intermittent gasping. (OECD Guideline 403)

- Iron : In the acute oral toxicity test with rats, inactivity and depression of the animals within a few minutes after administration.(OECD Guideline 401, GLP)

- Copper : In the acute oral toxicity test with rats, clinical signs observed included lethargy, prostrate posture, green coloured diarrhoea, voiding few faeces and moribundity. (OECD Guideline 401, GLP) In the acute inhalation toxicity test with rats, slight to moderate ataxia, slight to moderate tremor and slight to moderate dyspnoea were observed. (OECD Guideline 436, GLP)

- Aluminium : In the acute oral toxicity test using rats, adverse effects were not observed, respectively. (Read-across)(OECD Guideline 401) In the acute inhalation toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 403)

- Cobalt lithium dioxide : In the acute toxicity tests with rats, there were no signs of gross toxicity, adverse pharmacologic effects, or abnormal behaviour. (OECD Guideline 425, 402, GLP)

- Dimethyl carbonate : In the acute oral toxicity test using rats, hypoactivity, ataxia and loss of the righting reflex were observed. (OECD Guideline 401, GLP) In the acute dermal toxicity test using rabbits, adverse effects were not observed, respectively. (GLP) In the acute inhalation toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 403, GLP)

- Ethylene carbonate : In the acute dermal/inhalation toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 402, GLP)(OECD Guideline 403)

- Lithium hexafluorophosphate(1-) : In the acute oral toxicity test with rats, lethargy, hunched posture, uncoordinated movements, piloerection were observed. (OECD Guideline 423, GLP)

- Graphite : In the acute oral toxicity test with rats, no signs of discomfort or toxicity effects. (OECD Guideline 423, GLP)

- Ethyl methyl carbonate : In the acute oral and inhalation toxicity test using rats, ataxia, hunched posture, lethargy, decreased respiratory rate and laboured respiration are observed. (OECD Guideline 401, GLP) (OECD Guideline 403, GLP)

- Nickel : In the acute oral toxicity test with rats, no signs of discomfort or toxicity effects. (OECD Guideline 423, GLP)

- 1-methyl-2-pyrrolidone : In the acute oral toxicity test with rats, ataxia and diuresis(4,150 mg/kg bw) were observed. (OECD Guideline 401)

- Nickel sulphide : In the acute inhalation toxicity test with rats, facial staining, ocular discharge, hypoactivity, a thin appearance, hunched posture, reduced fecal volume, cold limbs, and/or reduced food consumption was observed after dosing. (OECD Guideline 403, GLP) (Read-across; Nickel subsulfide)

- Silicon : In the acute oral/dermal toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 401, GLP)

- Trade secret 2 : In the acute oral toxicity test with rats, piloerection, hypoactivity were observed during the 1st and 2nd step(300 mg/kg). convulsion, labored breathing immediately after dosing and then were found dead within 4 hours after dosing at the 3rd step(2,000 mg/kg). (OECD Guideline 423, GLP)



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- Lithium carbonate : In the acute inhalation toxicity test with rats, both increased secretory responses and labored breathing were observed. (OECD Guideline 403, GLP)
- Carbon black : In the acute oral toxicity and acute inhalation toxicity test with rats, adverse effects were not observed, respectively. (OECD Guideline 401, GLP)(OECD Guideline 403)
- Succinonitrile : In the acute oral toxicity test with rats, decrease in locomotor activity, emaciation, and soiled perineal region and mortality(2,000 mg/kg bw) were observed. (OECD Guideline 423, GLP)

### **Specific target organ toxicity (repeat exposure) : Not classified**

- Carbon : In the repeated oral toxicity test, Slight lung inflammatory changes based on minimal increases in pulmonary neutrophils. (OECD Guideline 413, GLP)
- Iron : In the repeated oral toxicity test with rats, the toxic effects include cellular apoptosis or necrosis in heart, spleen and pancreas. (carbonyl iron)
- Copper : In the repeated oral toxicity and inhalation toxicity test using rats, toxicity to organs was not observed. (EU Method B.26, GLP)(OECD Guideline 412, GLP)
- Aluminium : In the repeated oral toxicity tests using rats, toxicity to organs was not observed. (Read-across)(OECD Guideline 422, GLP) In the repeated inhalation toxicity tests using rats, toxicity to organs was not observed. (OECD Guideline 413)
- Cobalt lithium dioxide : In the repeated oral toxicity test in 90 days with rats, toxicity to organs was not observed. (OECD Guideline 408, GLP)
- Dimethyl carbonate : In the repeated oral toxicity tests using rats, toxicity to organs was not observed. (OECD Guideline 408, GLP)
- Polyethylene : Reported progressive systemic sclerosis in patients repeatedly exposed to chemicals.
- Ethylene carbonate : In the repeated oral toxicity tests using rats, toxicity to organs was not observed. (OECD Guideline 452)
- Graphite : In the repeated oral toxicity test with rats, no signs of discomfort or toxicity effects. (OECD Guideline 422, GLP) In the repeated inhalation toxicity test with rats, in the Graphite high-dose group, clearly adverse effects such as markedly increased incidence of interstitial fibrosis, were seen in the lung. (OECD Guideline 412, GLP)
- Ethyl methyl carbonate : In the repeated oral toxicity test using rats, toxicity to organs was not observed. (OECD Guideline 407, GLP)
- Nickel : In the repeated oral toxicity test, metallic nickel is a potent respiratory tract toxicant that directly injures the lung and the nasal tissues of the rat, and produces marked secondary effects in the lung-draining lymph nodes. (OECD Guideline 413, GLP)
- 1-methyl-2-pyrrolidone : In the repeated oral toxicity test in 90 days with rats, a specific target organ for compound-related adverse systemic toxicity was not identified. (OECD Guideline 408, GLP)
- Nickel sulphide : In the repeated inhalation toxicity tests with rats, the test material had similar effects in the respiratory tract in that all produced atrophy of the olfactory epithelium and a chronic inflammation in the lung. (OECD Guideline 413)(Read-across; Ni<sub>3</sub>S<sub>2</sub>)
- Silicon : In the repeated inhalation toxicity tests in 90 days using rats, repeated inhalation of silicon particles for 90 days did not induce any severe adverse effects in rats. (OECD Guideline 413, GLP)(Jetmilled Silicon)
- Lithium carbonate : In the repeated oral toxicity test for human, toxicity to organs was not observed.
- Carbon black : In the sub-chronic inhalation toxicity test using rats, there was clear evidence of inflammation and some alveolar epithelial cell hyperplasia and fibrosis at the high exposure group. In the mid-exposure group there was evidence of inflammation characterised by accumulation of neutrophils and macrophages within the alveolar spaces.





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- Succinonitrile : In the repeated oral toxicity test in 90 days with rats, No abnormal gross pathological findings were observed. (OECD Guideline 408, GLP)

**Aspiration Hazard** : Not available

## Section XII – 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** : Not classified (ATEmix = 0.11 mg/L)

#### Fish

- Iron : 96hr-LC<sub>0</sub>(*Danio rerio*) > 100000 mg/L (OECD Guideline 203)
- Copper : 96hr-LC<sub>50</sub>(*Oncorhynchus mykiss*) = 0.164 mg/L
- Aluminium : 96hr-LC<sub>50</sub>(*Pimephales promelas*) = 1.16 mg/L (GLP)
- Cobalt lithium dioxide : 96hr-LC<sub>50</sub>(*Oncorhynchus mykiss*) = 1.51 mg/L (ASTM) (Read-across; cobalt (II) chloride hexahydrate)
- Dimethyl carbonate : 96hr-LC<sub>50</sub>(*Danio rerio*) ≥ 100 mg/L (OECD Guideline 203, GLP)
- Ethylene carbonate : 96hr-LC<sub>50</sub>(*Oncorhynchus mykiss*) > 100 mg/L (OECD Guideline 203, GLP)
- Lithium hexafluorophosphate(1-) : 96hr-LC<sub>50</sub>(*Oncorhynchus mykiss*) = 51 mg/L
- Graphite : 96hr-LC<sub>50</sub>(*Danio rerio*) > 100 mg/L (OECD Guideline 203, GLP)
- Ethyl methyl carbonate : 96hr-LC<sub>50</sub>(*Oncorhynchus mykiss*) > 100 mg/L (OECD Guideline 203, GLP)
- Nickel : 96hr-LC<sub>50</sub>(*Oncorhynchus mykiss*) = 15.3 mg/L (measured)
- 1-methyl-2-pyrrolidone : 96hr-LC<sub>50</sub>(*Oncorhynchus mykiss*) > 500 mg/L (OBBA-bulletin No. 33, 1975)
- Nickel sulphide : 96hr-LC<sub>50</sub>(*Danio rerio*) = 100~320 mg/L (OECD Guideline 203, GLP)
- Trade secret 2 : 96hr-LC<sub>50</sub>(*Danio rerio*) = 6~60 mg/L (OECD Guideline 203, GLP)
- Lithium carbonate : 96hr-LC<sub>50</sub>(*Oncorhynchus mykiss*) = 5.69 mg/L (OECD Guideline 203)(calculated for lithium ion)
- Carbon black : 96hr-LC<sub>0</sub>(*Danio rerio*) = 1000 mg/L (OECD Guideline 203, GLP)
- Succinonitrile : 96hr-LC<sub>50</sub>(*Danio rerio*) > 100 mg/L (OECD Guideline 203, GLP)

#### Crustacean

- Iron : 48hr-EC<sub>50</sub>(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)
- Copper : 48hr-LC<sub>50</sub>(*Ceriodaphnia dubia*) = 0.014 mg/L
- Aluminium : 48hr-LC<sub>50</sub>(*Ceriodaphnia dubia*) = 0.72 mg/L (GLP)
- Cobalt lithium dioxide : 48hr-LC<sub>50</sub>(*Ceriodaphnia dubia*) = 0.61 mg/L (USEPA 2002) (Read-across; cobalt (II) chloride hexahydrate)
- Dimethyl carbonate : 48hr-EC<sub>50</sub>(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)
- Ethylene carbonate : 48hr-EC<sub>50</sub>(*Ceriodaphnia dubia*) = 5,900 mg/L
- Lithium hexafluorophosphate(1-) : 48hr-LC<sub>50</sub>(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)
- Graphite : 48hr-EC<sub>50</sub>(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)

- Ethyl methyl carbonate : 48hr-EC<sub>50</sub>(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)
- Nickel : 48hr-LC<sub>50</sub>(*Ceriodaphnia dubia*) = 0.0744 mg/L (USEPA 2002, ASTM 2001, OECD 1984)(measured)
- 1-methyl-2-pyrrolidone : 24hr-EC<sub>50</sub>(*Daphnia magna*) > 1000 mg/L (DIN 38412 Part 11)
- Nickel sulphide : 48hr-EC<sub>50</sub>(*Daphnia magna*) = 9.48 mg/L (OECD Guideline 202, GLP)
- Trade secret 2 : 48hr-EC<sub>50</sub>(*Daphnia magna*) = 8.4 mg/L (OECD Guideline 202, GLP)
- Lithium carbonate : 48hr-EC<sub>50</sub>(*Daphnia magna*) = 6.24 mg/L (OECD Guideline 202, GLP)(calculated for lithium ion)
- Carbon black : 24hr-EC<sub>50</sub>(*Daphnia magna*) > 5600 mg/L (OECD Guideline 202, GLP)
- Succinonitrile : 48hr-EC<sub>50</sub>(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)

**Algae**

- Copper : 96hr-EC<sub>50</sub>(*Chlamydomonas reinhardtii*) = 0.047 mg/L
- Aluminium : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) = 0.2 mg/L (OECD Guideline 201, GLP)
- Cobalt lithium dioxide : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) = 0.144 mg/L (OECD Guideline 201) (Read-across)
- Dimethyl carbonate : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) > 100 mg/L (OECD Guideline 201, GLP)
- Ethylene carbonate : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) > 100 mg/L (OECD Guideline 201, GLP)
- Lithium hexafluorophosphate(1-) : 96hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) > 100 mg/L (OECD Guideline 201, GLP)
- Graphite : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) > 100 mg/L (OECD Guideline 201, GLP)
- Ethyl methyl carbonate : 72hr-EC<sub>50</sub>(*Desmodesmus subspicatus*) > 62 mg/L (OECD Guideline 201, GLP)
- Nickel : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) = 0.188 mg/L (equivalent or similar to OECD Guideline 201)
- 1-methyl-2-pyrrolidone : 72hr-EC<sub>50</sub>(*Desmodesmus subspicatus*) = 600.5 mg/L (DIN 38412 Part9)
- Nickel sulphide : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) = 0.082~0.148 mg/L (OECD Guideline 201)
- Silicon : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) = ca. 250 mg/L (OECD Guideline 201) (Read-across)
- Trade secret 2 : 72hr-EC<sub>50</sub>(*Pseudokirchneriella subcapitata*) = 32 mg/L (OECD Guideline 201, GLP)
- Lithium carbonate : 72hr-EC<sub>50</sub>(*Desmodesmus subspicatus*) > 400 mg/L (OECD Guideline 201, GLP)(Li<sub>2</sub>CO<sub>3</sub>)
- Carbon black : 72hr-EC<sub>50</sub>(*Desmodesmus subspicatus*) > 10000 mg/L (OECD Guideline 201, GLP)

**Chronic toxicity : Not classified**

**Fish**

- Copper : 30day-NOEC(*Perca fluviatilis*) = 0.188 mg/L (OECD Guideline 204)
- Aluminium : 33day-NOEC(*Danio rerio*) = 0.0715 mg/L (OECD Guideline 210, GLP)
- Cobalt lithium dioxide : 34day-NOEC(*Pimephales promelas*) = 0.21 mg/L (ASTM 2002) (Read-across; cobalt (II) chloride hexahydrate)
- Lithium hexafluorophosphate(1-) : 22day-NOEC(*Pimephales promelas*) = 0.2 mg/L (EPA 540/86, GLP)
- Nickel : 32day-NOEC(*Oncorhynchus mykiss*) = 0.134 mg/L (measured)
- Nickel sulphide : 28day-NOEC(*Cyprinodon variegatus*) = 21.7 mg/L (ASTM 2004 and APHA 1998, GLP)



- Lithium carbonate : 34day-NOEC(*Danio rerio*) = 2.87 mg/L (OECD Guideline 210, GLP)(calculated for lithium ion)
- Succinonitrile : 28day-NOEC(*Rare Minnow*) > 10 mg/L (OECD Guideline 210, GLP)

**crustacean**

- Copper : 14day-NOEC(*Penaeus mergulensis and Penaeus monodon (prawns)*) = 0.033 mg/L
- Aluminium : 28day-NOEC(*Hyalella azteca*) = 0.0531 mg/L (GLP)
- Cobalt lithium dioxide : 28day-NOEC(*Hyallela azteca*) = 0.00683 mg/L (OECD Guideline 211) (Read-across; Cobalt dichloride dihydrate)
- Dimethyl carbonate : 21day-NOEC(*Daphnia magna*) = 25 mg/L (OECD Guideline 211, GLP)
- Lithium hexafluorophosphate(1-) : 7day-NOEC(*Ceriodaphnia dubia*) = 2.55 mg/L (EPA/600/4-91/002)
- Nickel : 7day-NOEC(*Ceriodaphnia dubia*) = 0.0053~0.0153 mg/L (equivalent or similar to EPA/600/4-91/002)(measured)
- 1-methyl-2-pyrrolidone : 21day-NOEC = 12.5 mg/L (OECD Guideline 211, GLP)
- Nickel sulphide : 10day-NOEC = 0.0202 mg/L (OECD Guideline 211)
- Lithium carbonate : 21day-NOEC(*Daphnia magna*) = 1.7 mg/L (OECD Guideline 211, GLP)
- Succinonitrile : 21day-NOEC(*Daphnia magna*) = 0.784 mg/L (OECD Guideline 211, GLP)

**Algae**

- Copper : 19day-NOEC(*giant kelp Macrocystis pyrifera*) = 0.0102 mg/L
- Cobalt lithium dioxide : 72hr-NOEC(*Pseudokirchneriella subcapitata*) = 0.0322 mg/L (OECD Guideline 201) (Read-across)
- Ethylene carbonate : 72hr-NOEC(*Pseudokirchneriella subcapitata*) = 100 mg/L (OECD Guideline 201, GLP)
- Lithium hexafluorophosphate(1-) : 96hr-NOEC(*Pseudokirchneriella subcapitata*) = 22 mg/L (OECD Guideline 201, GLP)
- Graphite : 72hr-NOEC(*Pseudokirchneriella subcapitata*) ≥ 100 mg/L (OECD Guideline 201, GLP)
- Ethyl methyl carbonate : 72hr-NOEC(*Desmodesmus subspicatus*) = 62 mg/L (OECD Guideline 201, GLP)
- 1-methyl-2-pyrrolidone : 72hr-EC<sub>50</sub>(*Desmodesmus subspicatus*) = 672.8 mg/L (DIN 38412 Part9)
- Trade secret 2 : 72hr-NOEC(*Pseudokirchneriella subcapitata*) = 1 mg/L (OECD Guideline 201, GLP)
- Lithium carbonate : 72hr-NOEC(*Desmodesmus subspicatus*) = 9.39 mg/L (OECD Guideline 201, GLP)(calculated for lithium ion)
- Carbon black : 72hr-NOEC(*Desmodesmus subspicatus*) > 10000 mg/L (OECD Guideline 201, GLP)
- Succinonitrile : 72hr-NOEC(*Desmodesmus subspicatus*) = 100 mg/L (OECD Guideline 201, GLP)

**12.2 Persistence and degradability**

**Persistence**

- Carbon : Low persistency (log K<sub>ow</sub> is less than 4 estimated.) ( log K<sub>ow</sub> = 0.78 ) (estimated)
- Dimethyl carbonate : Low persistency (log K<sub>ow</sub> is less than 4 estimated.) ( log K<sub>ow</sub> = 0.354 ) (20°C, 6.5 < pH < 7.5)
- Ethylene carbonate : Low persistency (log K<sub>ow</sub> is less than 4 estimated.) ( log K<sub>ow</sub> = 0.11 ) (20 °C, 5.33 < pH < 5.79)
- Lithium hexafluorophosphate(1-) : Hydrolysis readily in contact with water. According to this it was not possible to determine the partition coefficient. (OECD Guideline 107, GLP)
- Ethyl methyl carbonate : Low persistency (log K<sub>ow</sub> is less than 4 estimated.) ( log K<sub>ow</sub> = 0.972 ) (40 °C, EU Method A.8, GLP)
- 1-methyl-2-pyrrolidone : Low persistency (log K<sub>ow</sub> is less than 4 estimated.) ( log K<sub>ow</sub> = -0.46 )



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- Trade secret 2 : Low persistency (log  $K_{ow}$  is less than 4 estimated.) ( log  $K_{ow}$  = -0.435 ) (OECD Guideline 107, GLP)
- Succinonitrile : Low persistency (log  $K_{ow}$  is less than 4 estimated.) ( log  $K_{ow}$  = -0.99 )

### Degradability :

- Polyethylene : (1) Polyethylene films incubated in aerobic and anaerobic bioreactors did not degrade over the course of 4-week to 25-week exposure periods. (2) Similar experiments conducted using aerobic and anaerobic bioreactors concluded no biodegradation of polyethylene occurred over 40-70 day incubation periods.

### 12.3 Bioaccumulative potential

#### Bioaccumulation

- Carbon : Bioaccumulation is expected to be low according to the BCF < 500 ( BCF = 2.433 ) (estimated)
- Cobalt lithium dioxide : Bioaccumulation is expected to be high according to the BCF  $\geq$  500 ( BCF = 5500 )
- Dimethyl carbonate : Bioaccumulation is expected to be low according to the BCF < 500 ( BCF < 3.2 )
- Lithium hexafluorophosphate(1-) : Bioaccumulation is expected to be low according to the BCF < 500 ( BCF = 53~58 )
- Nickel : Bioaccumulation is expected to be low according to the BCF < 500 ( BCF = 45 )
- 1-methyl-2-pyrrolidone : Bioaccumulation is expected to be low according to the BCF < 500 ( BCF = 3.162 ) (estimated)
- Nickel sulphide : Bioaccumulation is expected to be low according to the BCF < 500 ( BCF = 45 )
- Succinonitrile : Bioaccumulation is expected to be low according to the BCF < 500 ( BCF = 3.162 ) (estimated)

#### Biodegradation

- 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 301C)
- Ethylene carbonate : As well-biodegraded, it is expected to have low accumulation potential in living organisms(86% biodegradation was observed after 29 days) (OECD Guideline 301B)
- Ethyl methyl carbonate : As well-biodegraded, it is expected to have low accumulation potential in living organisms(98% biodegradation was observed after 28 days) (GLP)
- 1-methyl-2-pyrrolidone : As well-biodegraded, it is expected to have low accumulation potential in living organisms(73% biodegradation was observed after 28 days) (OECD Guideline 301C)
- Trade secret 2 : As not well-biodegraded, it is expected to have high accumulation potential in living organisms(65% biodegradation was observed after 28 days) (OECD Guideline 301D, GLP)
- Succinonitrile : As well-biodegraded, it is expected to have low accumulation potential in living organisms(99.4% biodegradation was observed after 14 days) (OECD Guideline 301A, GLP)

### 12.4 Mobility in soil

- Carbon : No potency of mobility to soil. ( $K_{oc}$  = 8.823) (estimated)
- Dimethyl carbonate : No potency of mobility to soil. ( $K_{oc}$  = 2.9 ~ 6.65) (25 °C)
- Ethylene carbonate : No potency of mobility to soil. ( $K_{oc}$  = 11.9)
- Ethyl methyl carbonate : No potency of mobility to soil. ( $K_{oc}$  = 1.58) (OECD Guideline 121, GLP)
- 1-methyl-2-pyrrolidone : No potency of mobility to soil. ( $K_{oc}$  = 4.65) (estimated)
- Succinonitrile : No potency of mobility to soil. ( $K_{oc}$  = 14.52) (estimated)

### 12.5 Results of PBT and vPvB assessment : Not applicable

### 12.6 Other adverse effects : Not available



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## **Section XIII – 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

## **Section XIV – TRANSPORTATION INFORMATION**

※ If those lithium-ion batteries are packed with or contained in an equipment, then it is the responsibility of the shipper to ensure that the consignment are packed in compliance to the latest edition of the IATA Dangerous Goods Regulations section II of either Packing Instruction 966 or 967 in order for that consignment to be declared as NOT RESTRICTED (non-hazardous/non-Dangerous). If those lithium-ion batteries are packed with or contained in an equipment, UN No. is UN3481.

**14.1 UN Number :** 3480

**14.2 UN Proper shipping name :** LITHIUM ION BATTERIES (including lithium ion polymer batteries)

**14.3 Transport Hazard class :** 9

**14.4 Packing group :** II

**14.5 Special provisions :** 188, 230, 384

**14.6 Packing instructions :** P903

**14.7 Environmental hazards :** No

**14.8 Special precautions for user**

**in case of fire :** F-A

**in case of leakage :** S-I

**14.9 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code :** Not Available

**14.10 IATA Transport :** the 61th edition of the IATA of Dangerous Goods Regulations PI 965-Section IB

**14.11 Package labels**



## Section XV – 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 (SVHC list)

#### U.S.A regulations

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

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

- Copper : 5,000 lb
- Nickel : 100 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) :**

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

#### KOREA regulations

**Occupational Safety and Health Act**

- Lithium nickel oxide : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control, Special management materials, Harmful Agents Subject to Work Environment Monitoring (Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months), Chemicals subject to permissible exposure limit
- Iron : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control
- Copper : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control, Harmful Agents Subject to Work Environment Monitoring (Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months)
- Lithium nickel dioxide : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control, Special management materials, Harmful Agents Subject to Work Environment Monitoring



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(Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months), Chemicals subject to permissible exposure limit

- Aluminium : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control, Harmful Agents Subject to Work Environment Monitoring (Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months)

- Cobalt lithium dioxide : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control, Harmful Agents Subject to Work Environment Monitoring (Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months)

- Lithium Manganese (III,IV) oxide : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control, Harmful Agents Subject to Work Environment Monitoring (Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months)

- Graphite : Threshold Limit Values (TLVs) chemicals, Harmful Agents Subject to Work Environment Monitoring (Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months)

- Nickel : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control, Special management materials, Harmful Agents Subject to Work Environment Monitoring (Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months), Chemicals subject to permissible exposure limit

- Nickel sulphide : Threshold Limit Values (TLVs) chemicals, Hazardous Substances Subject to Control, Harmful Agents Subject to Work Environment Monitoring (Measurement cycle : 6 Months), Harmful Agents Subject to Workers Requiring Health Examination (Diagnostic cycle : 12 Months), Chemical substance subject to authorization

- Silicon : Threshold Limit Values (TLVs) chemicals

- Carbon black : Threshold Limit Values (TLVs) chemicals

### **Chemicals Control Act**

- 1-methyl-2-pyrrolidone : Toxic chemicals (2014-1-700, 0.3%)

- Nickel sulphide : Toxic chemicals (97-1-130, 0.1%)

- Succinonitrile : Toxic chemicals (2018-1-816, 25%)

### **Safety Control of Dangerous Substances Act**

- Carbon : Non-dangerous goods

- Iron : Iron content class 2, 500 kg

- Copper : Non-dangerous goods

- Aluminium : Metal powder class 2, 500 kg

- Dimethyl carbonate : Petroleum class 4-1 (non-water soluble liquid), 200ℓ

- Lithium Manganese (III,IV) oxide : Non-dangerous goods

- Ethylene carbonate : Non-dangerous goods

- Nickel : Non-dangerous goods

- 1-methyl-2-pyrrolidone : Petroleum class 4-3 (water soluble liquid), 4,000ℓ

- Silicon : Metal powder class 2, 500 kg

- Trade secret 2 : Petroleum class 4-3 (non-water soluble liquid), 2000ℓ

- Lithium carbonate : Non-dangerous goods

- Carbon black : Non-dangerous goods

- Carboxymethyl cellulose sodium salt : Non-dangerous goods

### **Wastes Control Act**



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- 1-methyl-2-pyrrolidone : Controlled wastes (Wastes toxic chemicals)
- Nickel sulphide : Controlled wastes Wastes toxic chemicals)
- Succinonitrile : Controlled wastes Wastes toxic chemicals)

### External information :

**Substance of Roterdame Protocol** : Not regulated

**Substance of Stockholme Protocol** : Not 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.

## Section XVI – OTHER INFORMATION EU

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** : 01 Feb. 2019

**Version** : Rev. 00

### 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)



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**EINECS** = European Inventory of Existing Commercial chemical Substances

**ELINCS** = European List of Notified Chemical Substances

### 16.3 Key literature reference and sources for data :

UN Recommendations on the transport of dangerous goods 17th

Emergency Response Guidebook 2008;

[http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/erg2008\\_eng.pdf](http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/erg2008_eng.pdf)

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

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

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

<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>

OECD SIDS; <http://webnet.oecd.org/hpv/ui/Search.aspx>

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

EPISUITE v4.11; <https://www.epa.gov/tsca-screening-tools/download-epi-suitetm-estimation-program-interface-v411>

Chemicalbook; [http://www.chemicalbook.com/ProductIndex\\_EN.aspx](http://www.chemicalbook.com/ProductIndex_EN.aspx)

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

Chemblink;<http://www.chemblink.com/>

SIGMA-ALDRICH; <http://www.sigmaaldrich.com/united-states.html>

Chemspider; <http://www.chemspider.com/>

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>

American Conference of Governmental Industrial Hygienists TLVs and BEIs.

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

EPA-IRIS; <http://www.epa.gov/ncea/iris/index.html>

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

Korea Occupational Health & Safety Agency; <http://www.kosha.or.kr>

National Chemicals Information System; <http://ncis.nier.go.kr/main.do>

Ministry of Public Safety and Security-Korea dangerous material inventory management system;

<http://hazmat.mpss.kfi.or.kr/index.do>

Waste Control Act enforcement regulation attached [1]

### 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 guarantee for the characteristics of the product(s) as defined by the legal warranty regulations. "(n.a. = not applicable; n.d. = not determined)"



# GOLD PLATING SERVICES

## MATERIAL SAFETY DATA SHEET

### SECTION 1 PRODUCT IDENTIFICATION

**TRADE NAME (as labeled)** Bright Nickel Plate – Decorative Nickel Plate  
**CHEMICAL NAMES, COMMON NAMES** Nickel Sulfate, Nickel Chloride

#### **SUPPLIERS NAME & ADDRESS:**

Gold Plating Services, Inc.  
 378 North Main #112  
 Kaysville, Utah 84037

24 hour emergency: (801) 629-0667 or (800) 633-8253

### SECTION II HAZARDOUS INGREDIENTS

<u>CHEMICAL NAMES</u>	<u>RQ</u>	<u>CAS NUMBER</u>	<u>PERCENT</u>	<u>EXPOSURE LIMIT</u>
Nickel Sulfate NiSO <sub>4</sub>	100 lbs	7786-81-4	>24%	TWA=1 mg/M <sup>3</sup> (as Ni <sup>+2</sup> )
Nickel Chloride NiCl <sub>2</sub>	100 lbs	7718-54-9	5%	TWA=1 mg/M <sup>3</sup> (as Ni <sup>+2</sup> )

### SECTION III PHYSICAL PROPERTIES

VAPOR DENSITY (AIR=1)	NA	SPECIFIC GRAVITY	not known
VAPOR PRESSURE (mm Hg@20°C)	NA	MELTING POINT (degrees f)	NA
EVAPORATION RATE	NA	BOILING POINT (degrees f)	~ 212° F
SOLUBILITY IN WATER:	Very Soluble		
APPEARANCE AND ODOR:	Green solution slight acid odor.		

### SECTION IV. FIRE AND EXPLOSION

FLASH POINT (F°) (METHOD USED);	NA (DOES NOT BURN)	
AUTOIGNITION TEMPERATURE. F.	NA	
FLAMMABLE LIMITS IN AIR VOLUME %	NA	UPPER LIMIT NA
FIRE EXTINGUISHING MATERIALS:	Water Spray	

SPECIAL FIREFIGHTING PROCEDURES. None.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None.



**SECTION V****HEALTH HAZARD INFORMATION****SYMPTOMS OF OVER-EXPOSURE FOR EACH POTENTIAL ROUTE OF EXPOSURE.****INHALATION:**

Upper respiratory tract irritation. Hypersensitive individuals may develop asthma bronchitis.

**CONTACT WITH SKIN OR EYES:**

Irritation, allergic sensitization is some individuals in the presence of heat and humidity.

**ABSORBED THROUGH SKIN:**

Same as inhalation and skin contact. (“Nickel Itch”)

**SWALLOWED:**

Nausea, gastrointestinal problems, unconsciousness.

**HEALTH EFFECTS OR RISKS FROM EXPOSURE. EXPLAIN IN LAY TERMS. ATTACH EXTRA PAGE IF MORE SPACE IS NEEDED.**

<b>ACUTE.</b>	<b>Local:</b>	Irritant, allergen, ingestion, inhalation - slight. Causes readily reversible changes which disappear after end of exposure.
	<b>Systemic:</b>	Ingestion or inhalation – slight. Causes readily reversible changes which disappear after end of exposure.
<b>CHRONIC:</b>	<b>Local:</b>	Irritant, allergen – slight to moderate. May involve both irreversible and reversible changes; not severe enough to cause death or permanent injury.
	<b>Systemic:</b>	Inhalation – moderate. May involve both irreversible and reversible changes; not severe enough to cause death or permanent injury.

**FIRST AID: EMERGENCY PROCEDURES**

<b>EYE CONTACT:</b>	Flush eyes with water (15 minutes or longer). Call Physician.
<b>SKIN CONTACT:</b>	wash thoroughly with soap and water. Call physician if symptoms appear.
<b>INHALED:</b>	Remove to fresh air. If breathing difficulties develop, call physician
<b>SWALLOWED:</b>	Induce vomiting <b>if conscious</b> , give emetic (1 tablespoon salt to a glass of warm water). Repeat until vomit fluid is clear. Call physician.

SUSPECTED CANCER AGENT?  NO  YES**SECTION VI -----REACTIVITY DATA-----**

STABILITY: Stable  
 CONDITIONS TO AVOID: Do not mix with free cyanides.

INCOMPATIBILITY (MATERIALS TO AVOID): free cyanides

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION: Will not occur

CONDITIONS TO AVOID: Do not mix with free cyanides

**SECTION VII SPILL, LEAK AND OTHER PROCEDURES.**

Spill response procedures (include employee protection measures):

Absorb with sawdust or clay. Flush with water. Dispose of waste according to local, state and federal regulations. Waste material may contain recoverable nickel.

For employee protection, see Section VIII.

NOTE: Dispose of all wastes in accordance with Federal, State and Local regulations.

**SECTION VIII SPECIAL HANDLING INFORMATION**

TRANSPORTATION Not Restricted for quantities under the RQ of nickel components  
(416 pounds of solution)

VENTILATION. Local Exhaust

RESPERATORY PROTECTION Not required

EYE PROTECTION: Safety glasses, chemical goggles or face shield.

GLOVES: Rubber Gloves

OTHER CLOTHING AND EQUIPMENT: Rubber apron, long sleeved shirts.

WORK PRACTICES, HYGENE Wash Thoroughly after handling.

OTHER HANDLING AND STORAGE Store in a cool, dry, ventilated area (55-85 °F).  
Keep container closed.

**End of Report**

## Material Safety Data Sheet

### SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

物质及厂商资料

Mianyang Longhua Film Co.,  
绵阳龙华薄膜有限公司  
Yongxing Industrial Development Zone, Mianyang, Sichuan, PRC  
四川绵阳永兴工业开发区

Visit **LONGHUA FILM** Plastics on the Web at [WWW.membrane-china.COM](http://WWW.membrane-china.COM)

### PHONE NUMBERS

Emergency +86-816-2566443

Non-Emergency Information :  
For Products +86-816-2566443/2566427/2565306/2566465

### SECTION 2: PRODUCT IDENTIFICATION/产品资料

#### PRODUCT DESCRIPTION/产品描述:

#### PRODUCT USE/产品用途:

May be used as received, processed or thermoformed to produce other articles, or as a component of other industrial products.可直接加工或热成型生成其它物品以及作为其它工业产品的组成成分。

Pc resin supplier is American DOW  
原料供应商是美国陶氏公司.

This product consists primarily of high molecular weight polymers which are not expected to be hazardous. please as follow:  
产品主要由高分子聚合物组成, 无危害, 主要成分见下表:

<b>PRODUCT IDENTIFIER</b> 产品资料:	Polycarbonate Film Longhua®PC-1860(A)-ECO/Longhua®ECO35 、 Longhua®PC1870(A)-ECO 环保印刷级聚碳酸酯薄膜		
Component-Chemical Name&Common Names and Environment-protection Index 产品成分及环保指标	Test method	Percentage 成分百分比%	化学文摘号 CAS NO.

聚碳酸酯 PC	-----	>98%	25037-45-0
其它成分 (others)	-----	<2%	---
环保参数 Environment-protection Index			
铅 Pb	EPA method 3050B:1996	<2ppm	7339-92-1
铬 Cr <sup>6+</sup>	EPA 3060A&EPA 7196A	<2ppm	18540-29-9
汞 Hg	EPA 3052:1996	<2ppm	7439-97-6
镉 Cd	BS EN 1122:2001 method B	<2ppm	7440-43-9
PBBEs	With reference to SGS in-house method , analysis was performed by GC/MS	<5ppm	1163-19-5
PBBs	ICP-AES after as per US EPA 3050B	<5ppm	059536-65-1
溴 (Br)	PR EN 14582 method B	<50ppm	007726-95-6
氯 (Cl)	PR EN 14582 method B	<50ppm	007782-50-5

### SECTION 3: Physical and chemical properties 物理及化学性能

常态 state of substance : 固态 solid

气味 odor : 无 NO

颜色 colour::

Longhua®PC-1860-ECO、Longhua®ECO35: 本色 Natural

Longhua®PC1870-ECO: 黑色 Black

PH 值: 7

密度 density g/cm : >1

外观 Appearance : 薄膜

熔点 Melt point: 220°C

伸长率 elongation: >90%

防火等级 Flammability UL 94: @≤0.25 VTM-0。

维卡软化点 Vicat softening point: 135°C

吸水率 Water absorption (%): 0.30

正常情况下安定 Stable

### SECTION 4: HAZARDS IDENTIFICATION 危害辨别资料

#### EMERGENCY OVERVIEW /紧急概要:

- Plastic film or sheet /塑料薄膜或片材
- Can burn in a fire creating dense toxic smoke./遇火能燃烧产生大量有毒浓烟。
- Molten plastic can cause severe thermal burns./塑料熔体会引起严重灼伤。

- Vapor produced during melt processing may cause eye, skin, and respiratory tract irritation./熔化过程中产生的气体会引起眼睛，皮肤和呼吸道的不适。
- Secondary operations, such as grinding, sanding, or sawing can produce dust which may not present an explosion respiratory hazard./再加工，例如打磨，砂纸打磨，或锯时产生灰尘不会引起爆炸或呼吸的危害。

HMIS Ratings: Health/健康 = 0; Flammability/可燃性 = 1; Reactivity/反应 = 0; PPE/个人防护装备 = B

POTENTIAL HEALTH EFFECTS/潜在健康影响

INGESTION/摄取: Not acutely toxic/非剧毒。

INHALATION/吸入: Inhalation of product not likely due to physical form.不会由于物理作用吸入。

EYE CONTACT: Product may cause irritation or injury due to mechanical action.

眼睛接触 可能会由于机械作用引起过敏和损伤。

SKIN CONTACT: Product may cause irritation or injury due to mechanical action.

皮肤接触 可能会由于机械作用引起不适和损伤。

CHRONIC / CARCINOGENICITY/慢性/致癌性

NTP:/ Not Tested.未测试

OSHA:/ Not Regulated 未规定

IARC: Not Listed.未列出

Processing fumes may cause irritation to the eyes, skin, and respiratory tract. In cases of severe exposure.加工过程中产生的浓烟可能会引起眼睛，皮肤和呼吸道的不适。

Grease-like processing fume condensates on ventilation ductwork, molds, and other surfaces can cause irritation and injury to skin.

燃烧时产生类似油脂类的浓烟，在通风管道系统、模具和其他表面冷凝物能引起皮肤不适和损伤。

MEDICAL RESTRICTIONS/医学限制: There are no known human health effects aggravated by exposure to this product. However, certain sensitive individuals and individuals with respiratory impairments may be affected by exposure to components in the processing vapors.

产品暴露对人体健康影响未知。但是，在处理蒸汽过程中能对人的皮肤造成敏感以及呼吸易受损。

## SECTION 5: FIRST AID MEASURES 急救措施

EYES 眼睛:	Immediately flush eyes with plenty of water. Get medical attention if irritation develops or persists. After initial flushing, remove any contact lenses.立即用大量的水冲洗眼睛，如果仍然不适立即就医。在最初冲洗后，摘除隐形眼镜。
SKIN 皮肤:	Wash with soap and water. Get medical attention if irritation develops or persists. For hot product, immediately immerse in or flush affected area with large amounts of cold water to dissipate heat. Cover with clean cotton sheeting or gauze and get prompt medical attention 用肥皂和水洗。如果仍然不适立即就医。对热产品立即用大量冷水降温。用干净的棉布或纱布覆盖并即时处理。

INGESTION 食入:	No hazard in normal industrial use. Do not induce vomiting. Seek medical attention if symptoms develop.在正常工业用途中无危害。不会引起呕吐。如果有任何症状立即就医。
INHALATION 吸入:	No specific treatment is necessary since this material is not likely to be hazardous by inhalation. If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.产品无危害, 所以不需要特殊处理。如果暴露在大量灰尘和浓烟, 移向通风处, 引起咳嗽或有其他症状立即就医。
BURNING FUMES 燃烧产生的浓烟:	Processing fumes inhalation may be irritating to the respiratory tract. If symptoms are experienced remove victim from the source of contamination or move victim to fresh air and obtain medical advice.吸入浓烟可能会引起呼吸道不适。如果症状严重把受害人从污染环境移开或移向通风处, 立即就医。

## SECTION 6: FIRE FIGHTING MEASURES 灭火措施

FIRE FIGHTING 灭火	Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Water may be the most suitable extinguishing media due to its cooling properties on molten compounds.未着防护装备措施 (包括完备的呼吸装置和全面的保护装备), 勿进入火场。由于潜在的危害物和分解物, 应在安全距离和保护区灭火。水是最适合的灭火剂, 因为它的冷却性好。
EXTINGUISHING MEDIA 灭火剂	Water spray and foam. Carbon dioxide and dry chemical are not recommended because their lack of cooling capacity may permit re-ignition.建议用洒水和喷泡沫方法灭火。因为二氧化碳和干粉灭火剂冷却性能较差, 会引起复燃, 所以不推荐使用。
HAZARDOUS COMBUSTION PRODUCTS 燃烧物的危害	Intense heat, smoke, carbon dioxide, carbon monoxide, hydrocarbon fragments 高温加热时, 能产生大量的烟、二氧化碳、一氧化碳、碳氢化合物等物质。
FLASH POINT/闪点:	Not established 不确定
LOWER FLAMMABILITY LIMIT 低燃极限:	Not established 不确定
UPPER FLAMMABILITY LIMIT 高燃极限:	Not established 不确定
CONDITIONS OF FLAMMABILITY 引燃条件:	Requires a continuous flame source to ignite.长时间与火焰接触才会引起燃烧。
EXPLOSION DATA 爆炸数据:	Material not sensitive to mechanical impact but is sensitive to static discharge under dust cloud conditions.产品不受机械性影响, 但在尘雾条件下易放电

## SECTION 7: ACCIDENTAL RELEASE MEASURES 泄漏处理方法

GENERAL: Gather and store in a closed container pending a waste disposal evaluation 储存在密闭容器中。

## SECTION 8: HANDLING AND STORAGE 安全处置与储藏方法

HANDLING  
安全处置: When handling heated molten material, use protective equipment and ventilation recommended in Section VIII/在处置热熔化产品时,使用防护装备措施和通风系统,参考第8部分。.

STORAGE  
储藏: Store in a cool dry place. Avoid excessive heat and ignition sources./存放在阴凉干燥处。远离热源、火源。

## SECTION 9: EXPOSURE CONTROL PERSONAL PROTECTION 暴露预防措施

ENGINEERING CONTROLS  
工程控制: A continuous supply of fresh air to the workplace together with removal of processing fumes through exhaust systems is recommended. Processing fume condensate may be a fire hazard and toxic; remove periodically from exhaust hoods, ductwork, and other surfaces using appropriate personal protection. Local ventilation requirements must be determined to limit exposure to processing fumes in the workplace.保持工作环境通风良好,并远离排气系统产生的浓烟。浓烟冷凝物可能有毒,远离排气罩,管道系统和其他表面,使用适合个人的防护措施。

### PERSONAL PROTECTION/个人防护

EYE/FACE  
眼/面部: Wear safety glasses with side shields or chemical goggles. In addition, use full-face shield when cleaning processing fume condensates from hoods, ducts, and other surfaces 戴双面防护镜或抗化学物质的护镜。在清洁处理浓烟冷凝物时穿戴好防护用具。.

SKIN  
皮肤: When handling pellets or powder, avoid prolonged or repeated contact with skin. Wear long pants, long sleeves, well insulated gloves, and a face shield during melt processing. Appropriate clothing - including chemical resistant gloves - should be worn to prevent contact with processing fumes condensate. 在处理料粒或粉末时,应避免长时间接触皮肤。在接触熔融的物料时,应穿长裤,长袖,戴绝缘手套和面罩等合适的防护服(包括化学防护手套),避免与浓烟冷凝物接触

RESPIRATORY  
呼吸: When using this product at elevated temperatures, implement engineering systems, administrative controls, or a respiratory protection program

(including a respirator approved for protection from organic vapors, acid gases, and particulate matter) if processing fumes are not adequately controlled or operators experience symptoms of overexposure. If dust or powder are produced from secondary operations such as sawing or grinding, use a respirator approved for protection from dust.在高温使用产品时，如果浓烟处理不能充分、控制或操作中感光过度，实现工程系统，管理控制，或呼吸防护程序（包括呼吸器防护，远离有机物，酸性气体和颗粒物）如果在再加工中例如锯或研磨时产生的灰尘和粉末，使用呼吸器防护灰尘。

## SECTION 10:PHYSICAL AND CHEMICAL PROPERTIES 物理及化学性能

PHYSICAL STATE 物理状态:	Solid/固态
ODOR AND APPEARANCE 气味及外形:	Sheet or film with slight or no odor 片材或薄膜有轻微气味或无味。
MELTING POINT 熔点	This product does not exhibit a sharp melting point but softens gradually over a wide range of temperatures.产品没有固定熔点，但在较宽的温度范围内会软化。
VAPOR PRESSURE (mmHg) 气压	Not applicable/非适用
WATER SOLUBILITY 水溶性:	Insoluble/不能溶解
% VOLATILES 挥发性	Negligible/可忽略.
EVAPORATION RATE 蒸发率	Not applicable/非适用
OCTANOL/ 辛醇 :WATER/ 水	: Not established/未确定
PARTITION COEFFICIENT 系数比	

## SECTION 11:STABILITY AND REACTIVITY 稳定性和化学活性

STABILITY 稳定性	Stable/稳定
REACTIVITY 反应性	Not reactive under recommended conditions of handling, storage, processing, and use.在一般情况下，处理、储藏、加工和使用时比较稳定,不会发生化学变化。
CONDITIONS TO AVOID 应避免之状况	Do not exceed melt temperature recommendations in product literature. See Section 8 for respiratory protection advice 不要超过熔点。有关呼吸道防护参考第 8 部分。.
HAZARDOUS DECOMPOSITION PRODUCTS 危害分解物	Processing fumes evolved at recommended processing conditions may include trace levels of phenol, alkylphenols, and diarylcarbonate.燃烧时产生的浓烟中含有微量苯酚，烷基苯酚和二芳基碳酸盐

## SECTION 12:TOXICOLOGICAL INFORMATION 毒性资料



## ACUTE HEALTH HAZARDS TEST 急毒性

ACUTE ORAL/口腔:	Estimated to be > 5.0 g/kg
ACUTE DERMAL 皮肤:	Product not considered primary skin irritant. Draize Skin Primary Irritation Score (rabbit) for similar products, in finely divided form, for a 24-hour exposure is 0. Not expected to be a skin sensitizer based on results of Modified Buehler Guinea Pig Sensitization Test from similar products. Dermal LD50 (rabbit) > 2g/kg, estimated.产品对皮肤无刺激。在类似产品环境中暴露 24 小时, 项目划分很细的 Draize 皮肤测试 (兔子) 结果: 皮肤受伤害级别为零。结果不同于 Modified Buehler 天竺鼠在类似产品环境中的皮肤测试结果。DermalLD50(兔子)>2g/kg,评估值。
ACUTE INHALATION 大量吸入:	Processing fumes from similar products are not considered toxic. In acute inhalation tests, laboratory rats were exposed to processing fumes at concentrations exaggerating those that would likely occur in workplace situations. No deaths or signs of toxicity, except transient irritancy in some cases, were noted during the 6 hour fume exposure tests. There were no distinct or consistent treatment related tissue or organ changes noted in gross necropsies.类似产品加工过程中产生的浓烟无毒。将实验的老鼠暴露在浓烟浓度与车间环境非常接近的环境中, 做大量吸入测试, 经过 6 小时浓烟暴露, 测试除了几例有短暂的不适, 无死亡和中毒的信息。简单验尸结果表明没有明显的或相关的组织或器官变化。
EYE CONTACT 眼睛接触:	Product may cause irritation or injury due to mechanical action.机械作用引起不适或损伤。
SKIN CONTACT 皮肤接触:	Product may cause irritation or injury due to mechanical action.机械作用引起不适或损伤。

## **SECTION 13: ECOLOGICAL INFORMATION 生态资料**

GENERAL: This material is not expected to be harmful to the ecology.此产品不会危害生态环境。

## **SECTION 14: DISPOSAL INFORMATION 废料处理方式**

WASTE DISPOSAL  
废料处理: Recycling is encouraged. Landfill or incinerate in accordance with national and local requirements. Collected processing fume condensates and incinerator ash should be tested to determine waste classification.可回收利用。垃圾掩埋和焚烧应遵守国家和当地有关规定。测试收集处理浓烟冷凝物和燃烧灰烬时, 应该检验并进行垃圾分类。

POSSIBLE EPA WASTE CODES/: Spent or discarded material is not expected to be a hazardous waste.废料无危害。

**SECTION 15:TRANSPORTATION INFORMATION 运送资料**

REGULATORY STATUS/规定标准: Not Regulated/未规定.

**SECTION 16: 说明 REMARK**

制表单位: 绵阳龙华薄膜有限公司

SUPPLIER: MIANYANG LONGHUA FILM CO., LTD.

编制人: 蒋天刚

MADE BY: JIANG TIANGANG

电话: 0086-816-2566427-804

TEL: 0086-816-2566427-804

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## Article Information Sheet

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This Article Information Sheet is provided as a courtesy in response to a customer request. A Safety Data Sheet (SDS) has not been prepared for these product(s) because they are articles. Articles are not subject to the Occupational Safety and Health Administration's Hazard Communication Standard (29 CFR 1910.1200(b)(6)(v)). As defined in this standard: "Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical, and does not pose a physical or health risk to employees.

**Document Group:** 19-4993-2 **Version Number:** 1.00

### SECTION 1: Identification

#### 1.1. Product identifier

3M™ Polyimide Film Tape 5413

#### Product Identification Numbers

70-0160-2077-1, 70-0160-3918-5, 70-0160-3919-3, 70-0160-3920-1, 70-0160-3921-9, 70-0160-3922-7, 70-0160-3923-5, 70-0061-9375-2, 70-0061-9377-8, 70-0061-9378-6, 70-0061-9700-1, 70-0061-9702-7, 70-0061-9717-5, 70-0061-9723-3, 70-0061-9738-1, 70-0061-9744-9, 70-0062-1105-9, 70-0062-1161-2, 70-0062-1164-6, 70-0062-1211-5, 70-0062-1285-9, 70-0062-6390-2, 70-0063-7298-4, 70-0063-7435-2, 70-0063-7564-9, 70-0063-7593-8, 70-0063-7757-9, 70-0063-7815-5, 70-0063-7855-1, 70-0063-7893-2, 70-0063-7894-0, 70-0063-7995-5, 70-0063-8028-4, 70-0063-8034-2, 70-0063-8035-9, 70-0063-8046-6, 70-0063-8057-3, 70-0063-8081-3, 70-0063-8109-2, 70-0063-8199-3, 70-0160-4800-4, 70-0160-4853-3, 70-0160-4889-7, 70-0160-5468-9, 70-0160-5527-2, 70-0160-5631-2, 70-0160-5643-7, 70-0160-5674-2

#### 1.2. Recommended use and restrictions on use

##### Recommended use

Broad temperature specialty tape for application temperatures from -100°F to 500°F., Attachment/Reinforcement

#### 1.3. Supplier's details

**MANUFACTURER:** 3M  
**DIVISION:** Electronics Markets Materials Division  
**ADDRESS:** 3M Center, St. Paul, MN 55144-1000, USA  
**Telephone:** 1-888-3M HELPS (1-888-364-3577)

#### 1.4. Emergency telephone number

1-800-364-3577 or (651) 737-6501 (24 hours)

### SECTION 2: Hazard identification

This product is exempt from hazard classification according to OSHA Hazard Communication Standard, 29 CFR 1910.1200.

### SECTION 3: Composition/information on ingredients

Ingredient	C.A.S. No.	% by Wt
Silicone Adhesive	Trade Secret*	50 - 65
Polyimide Film Backing	None	35 - 50

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

### SECTION 4: First aid measures

#### 4.1. Description of first aid measures

**Inhalation:**

No need for first aid is anticipated.

**Skin Contact:**

No need for first aid is anticipated.

**Eye Contact:**

No need for first aid is anticipated.

**If Swallowed:**

No need for first aid is anticipated.

### SECTION 5: Fire-fighting measures

In case of fire: Use a fire fighting agent suitable for ordinary combustible material such as water or foam.

### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

Not applicable.

#### 6.2. Environmental precautions

Not applicable.

#### 6.3. Methods and material for containment and cleaning up

Not applicable.

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

This product is considered to be an article which does not release or otherwise result in exposure to a hazardous chemical under normal use conditions.

#### 7.2. Conditions for safe storage including any incompatibilities

No special storage requirements.

### SECTION 8: Exposure controls/personal protection

This product is considered to be an article which does not release or otherwise result in exposure to a hazardous chemical under normal use conditions. No engineering controls or personal protective equipment (PPE) are necessary.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

<b>General Physical Form:</b>	Solid
<b>Odor, Color, Grade:</b>	Amber polyimide film with clear pressure sensitive adhesive
<b>Odor threshold</b>	<i>Not Applicable</i>
<b>pH</b>	<i>Not Applicable</i>
<b>Melting point</b>	<i>Not Applicable</i>
<b>Boiling Point</b>	<i>Not Applicable</i>
<b>Flash Point</b>	<i>Not Applicable</i>
<b>Evaporation rate</b>	<i>Not Applicable</i>
<b>Flammability (solid, gas)</b>	Not Classified
<b>Flammable Limits(LEL)</b>	<i>Not Applicable</i>
<b>Flammable Limits(UEL)</b>	<i>Not Applicable</i>
<b>Vapor Pressure</b>	<i>Not Applicable</i>
<b>Vapor Density</b>	<i>Not Applicable</i>
<b>Density</b>	<i>Not Applicable</i>
<b>Specific Gravity</b>	<i>Not Applicable</i>
<b>Solubility in Water</b>	Nil
<b>Solubility- non-water</b>	<i>Not Applicable</i>
<b>Partition coefficient: n-octanol/ water</b>	<i>No Data Available</i>
<b>Autoignition temperature</b>	<i>Not Applicable</i>
<b>Decomposition temperature</b>	<i>Not Applicable</i>
<b>Viscosity</b>	<i>Not Applicable</i>
<b>Percent volatile</b>	<i>Not Applicable</i>

## SECTION 10: Stability and reactivity

This material is considered to be non reactive under normal use conditions.

## SECTION 11: Toxicological information

### Inhalation:

No health effects are expected

### Skin Contact:

No health effects are expected

### Eye Contact:

No health effects are expected

### Ingestion:

No health effects are expected

**Additional Information:**

This product, when used under reasonable conditions and in accordance with the directions for use, should not present a health hazard. However, use or processing of the product in a manner not in accordance with the product's directions for use may affect the performance of the product and may present potential health and safety hazards.

**SECTION 12: Ecological information**

This article is expected to present a low environmental risk either because use and disposal are unlikely to result in a significant release of components to the environment or because those components that may be released are expected to have insignificant environmental impact.

**SECTION 13: Disposal considerations**

Dispose of contents/container in accordance with the local/regional/national/international regulations.

**SECTION 14: Transport Information**

Not regulated per U.S. DOT, IATA or IMO.

*These transportation classifications are provided as a customer service. As the shipper YOU remain responsible for complying with all applicable laws and regulations, including proper transportation classification and packaging. 3M transportation classifications are based on product formulation, packaging, 3M policies and 3M understanding of applicable current regulations. 3M does not guarantee the accuracy of this classification information. This information applies only to transportation classification and **not the packaging, labeling, or marking requirements**. The original 3M package is certified for U.S. ground shipment only. If you are shipping by air or ocean, the package may not meet applicable regulatory requirements.*

**SECTION 15: Regulatory information**

**Chemical Inventories**

This product is an article as defined by TSCA regulations, and is exempt from TSCA Inventory requirements.

**SECTION 16: Other information**

**NFPA Hazard Classification**

**Health: 0 Flammability: 1 Instability: 0 Special Hazards: None**

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

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evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for user's method of use or application.

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## Product Compliance Statement

Molex is committed to managing the use of chemical substances in accordance with governmental regulations, industry standards, and customer-specific requirements in order to protect the environment. For each part listed, this document provides:

- **EU RoHS Compliance Status.** EU RoHS status is declared per Directive 2011/65/EU and its subsequent amendments, including the Directive EU 2015/863 which additionally prohibited four phthalates. Homogeneous materials of parts that are compliant to this legislation have less than 0.1% by weight each of lead, mercury, hexavalent chromium, PBB, PBDE, DBP, BBP, DIBP, DEHP, and 0.01% by weight of cadmium. In situations where an exemption applies, the preceding limits, corresponding to the exempted substance(s), may be higher.

- **EU REACH SVHC Content.** Substances of Very High Concerns (SVHCs) are declared if above 0.1% of the article per Regulation (EC) No. 1907/2006 and its subsequent amendments. The Candidate List of SVHCs is continually updated at <https://echa.europa.eu/candidate-list-table>.

- **Low-Halogen Status.** Homogeneous materials of parts that are considered Low-Halogen have less than 0.09% by weight each of bromine and chlorine, and less than 0.15% by weight of the sum of bromine and chlorine.

Molex's sole liability for incorrectly certifying a product shall be either replacement of the Molex product or, alternatively and in the sole discretion of Molex, return of the purchase price paid for the relevant Molex product.

For additional information regarding Molex's environmental initiatives and further explanation of this information, please visit [www.molex.com](http://www.molex.com)



Haim Eliyahu  
Director, Global Product Stewardship



**Table A**

<b>Molex P/N</b>	<b>Part Description</b>	<b>RoHS Compliance Status</b>	<b>REACH SVHC</b>	<b>Low-Halogen Status</b>
50375043	2.50mm Pitch, Mini-SPOX Receptacle Crimp Housing, Single Row, Friction Lock, 4 Circuits, Natural	Compliant	Not Contained Per - D(2022)4187-DC (10 June 2022)	Low-Halogen