

Not available

B. Information of Health Hazardous

Acute toxicity

Oral : Not classified (ATEmix = 4,721 mg/kg)

- Cobalt lithium manganese nickel oxide : Rat LD₅₀ > 2,000 mg/kg(NCIS)
- Aluminium : Rat LD₅₀ > 15,900 mg/kg(Read-across)(OECD Guideline 401)
- Graphite : Rat LD₅₀ > 2,000 mg/kg(OECD Guideline 423, GLP)
- 1-methyl-2-pyrrolidone : Rat LD₅₀ = 4,150 mg/kg(OECD Guideline 401)
- Copper : Rat LD₅₀ = 481 mg/kg(OECD Guideline 401, GLP)
- Trade secret 1 : Rat LD₅₀ > 5,000 mg/kg(OECD Guideline 401, GLP)
- Trade secret 2 : Rat LD₅₀ = 10,400 mg/kg(OECD Guideline 401)
- Trade secret 3 : Rat LD₅₀ > 5,000 mg/kg(male/female)(OECD Guideline 401, GLP)
- Trade secret 4 : Rat LD₅₀ = 500 mg/kg (male)(OECD Guideline 423)
- Trade secret 5 : Rat LD₅₀ = 50~300 mg/kg(OECD Guideline 423, GLP)
- Lithium borofluoride : Rat LD₅₀ = 300 mg/kg(OECD Guideline 423, GLP)
- Trade secret 6 : Rat LD₅₀ = 300 mg/kg(OECD Guideline 423, GLP)
- Carbon black : Rat LD₅₀ > 10,000 mg/kg(OECD Guideline 401, GLP, ECHA)

Dermal : Not classified (ATEmix = 11,111 mg/kg)

- 1-methyl-2-pyrrolidone : Rat LD₅₀ > 5,000 mg/kg(OECD Guideline 402)
- Copper : Rat LD₅₀ > 2,000 mg/kg(OECD Guideline 402, GLP)
- Trade secret 2 : Rat LD₅₀ = 2,000 mg/kg(male/female)(OECD Guideline 402, GLP)
- Trade secret 3 : Rabbit LD₅₀ > 2,000 mg/kg(male/female)(GLP)
- Trade secret 4 : Rat LD₅₀ > 2,000 mg/kg (male/female) (OECD Guideline 402)
- Carbon black : Rat LD₅₀ > 3,000 mg/kg(ChemIDplus)

Inhalation : Not classified (ATEmix > 13 mg/L / 4 hr)

- 1-methyl-2-pyrrolidone : Rat LC₅₀ > 5.1 mg/L / 4 hr(OECD Guideline 403)
- Aluminium : Rat LC₅₀ > 0.888 mg/L / 4 hr(OECD Guideline 403)
- Graphite : Rat LC₅₀ > 2,000 mg/m³ / 4 hr(OECD Guideline 403, GLP)
- Copper : Rat LC₅₀ > 5.11 mg/L / 4 hr(OECD Guideline 436, GLP)
- Trade secret 1 : Rat LC₅₀ > 17.6 mg/L / 4 hr(OECD Guideline 403, GLP)
- Trade secret 2 : Rat LC₀ = 730 mg/m³ / 8 hr(male/female)(OECD Guideline 403)
- Trade secret 3 : Rat LC₅₀ > 5.36 mg/L / 4 hr(male/female)(OECD Guideline 403, GLP)
- Carbon black : Rat LC₀ = 4.6 mg/m³ / 4 hr(OECD Guideline 403, ECHA)

Skin corrosion/ irritation : Not classified

- Cobalt lithium manganese nickel oxide : the test material was not irritating.
- Aluminium : In the skin irritation test using rabbits, the test material was not irritating. (Read-across)(OECD Guideline 404)
- Graphite : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- 1-methyl-2-pyrrolidone : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404)
- Copper : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Trade secret 1 : 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 rabbits, the test material was not classified. (OECD Guideline 404, GLP)
- Trade secret 3 : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404)
- Trade secret 4 : In the skin irritation test using human skin model, the test material was non-corrosive. (OECD Guideline 431, GLP)
- Trade secret 5 : In the skin irritation test using human skin model, the test material was corrosive. (EU Method B.40, GLP)
- Lithium borofluoride : In the skin irritation test using human skin model, the test material was corrosive (OECD Guideline 439 (In Vitro Skin Irritation: Reconstructed Human Epidermis Test Method))
- Trade secret 6 : In the skin irritation test using human skin model, the test material was not corrosive (OECD Guideline 431, GLP)
- Carbon black : In the skin irritation test using rabbits, the test material was not classified. (OECD Guideline 404)

Serious eye damage/ irritation : Not classified

- Cobalt lithium manganese nickel oxide : the test material was not irritating.
- Aluminium : In the eye irritation test using rabbits, the test material was not irritating. (Read-across)
- Graphite : In the eyes irritation test with rabbits, the test material was irritating. but it was fully reversible within 7 days (OECD Guideline 405, GLP)
- 1-methyl-2-pyrrolidone : In the eyes 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)
- 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)
- Trade secret 1 : In the eye irritation test using rabbits, the test material was not irritating. (OECD Guideline 405, GLP)
- Trade secret 2 : In the eye irritation test using rabbits, the test material was mildly irritating. (OECD Guideline 405, GLP)
- Trade secret 3 : In the eye irritation test using rabbits, the test material was not irritating. (GLP)
- Trade secret 5 : In the eye irritation test using fertilised brown leghorn chicken eggs, the test material was severely irritating. (GLP)
- Lithium borofluoride In the eye irritation test, the test material was not irritating. (OECD Guideline 437)
- Trade secret 6 : In the eye irritation test, the test material was not irritating (OECD Guideline 437)
- Carbon black : In the eye irritation test using rabbits, the test material was not irritating. (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 sensitisation effects on the respiratory tract. In humans, no cases of allergies were reported to the responsible occupational physicians.

Skin sensitization : Not classified

- Cobalt lithium manganese nickel oxide : this material was not skin sensitizing. (Mouse)
- Aluminium : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing.
- Graphite : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)
- 1-methyl-2-pyrrolidone : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)
- Copper : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)
- Trade secret 1 : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)
- Trade secret 2 : In the skin sensitization test using guinea pigs, the test material was not classified. (OECD Guideline 406, GLP)
- Trade secret 3 : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)
- Trade secret 4 : In the skin sensitization test using mice, the test material was skin sensitization. (OECD Guideline 429, GLP)
- Trade secret 5 : In the skin sensitization test using mice, the test material was not skin sensitizing. (OECD Guideline 429, GLP)
- Lithium borofluoride : In the skin sensitization test, the test material was not skin sensitizing. (OECD Guideline 442C)
- Trade secret 6 : In the skin sensitization test, the test material was not skin sensitizing. (OECD Guideline 442C)
- Carbon black : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406, GLP)

Carcinogenicity : Not classified

- Cobalt lithium manganese nickel oxide :

IARC :

Group 1 (Nickel compounds)

Group 2B (Cobalt and cobalt compounds)

ACGIH:

A1 (Nickel insoluble inorganic compounds),

A3 (Cobalt inorganic compounds)

A4 (Nickel soluble inorganic compounds, Manganese inorganic compounds)

NTP:

K (Nickel compounds)

R (Cobalt compounds)

OSHA:

Present (Nickel compounds, Cobalt compounds)

- Aluminium :

ACGIH: A4 (Aluminum, Aluminum insoluble compounds)

- Carbon black :

IARC : Group 2B

ACGIH: A3

OSHA: Present

Mutagenicity : Not classified

- Cobalt lithium manganese nickel oxide : Negative : in vitro test ((Ames test, S. typhimurium, E. Coli)(Chromosome aberration test, human lymphocyte)
- 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)).
- Graphite : : Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay (OECD Guideline 471, GLP))
- 1-methyl-2-pyrrolidone : 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)).
- Copper : Negative reactions were observed in in vivo test(mammalian somatic cell study: cytogenicity/erythrocyte micronucleus(EU Method B.12, GLP)).
- Trade secret 1 : Negative reactions were observed in vitro (Mammalian Chromosome Aberration Test (OECD Guideline 473, GLP))
- Trade secret 2 : Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- Trade secret 3 : Negative reactions were observed in in vivo (Mammalian Spermatogonial Chromosome Aberration Test (OECD Guideline 483, GLP))
- Trade secret 4 : Positive reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)) and Negative reactions were observed in vivo (Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP)).
- Trade secret 5 : 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)).
- Lithium borofluoride : Positive reactions were observed in vitro (Bacterial Reverse Mutation Assay (OECD Guideline 471, GLP))
- Trade secret 6 : : Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay (OECD Guideline 471, GLP))
- 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).

Reproductive toxicity : Not classified

- Aluminium : In the reproductive toxicity and developmental toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 422, GLP)(OECD Guideline 414)
- Graphite : In the reproductive toxicity and developmental toxicity test using rats, adverse effects were not observed (OECD Guideline 422, GLP)
- 1-methyl-2-pyrrolidone : 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)).
- 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)
- Trade secret 1 : In the reproductive toxicity and developmental toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 414)
- Trade secret 2 : 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)

- Trade secret 3 : 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)

- Trade secret 5 : In the reproductive toxicity and developmental toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 416, GLP)(OECD Guideline 414)

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

Specific target organ toxicity (single exposure) : Not classified

- 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)

- Graphite : In the acute oral toxicity test using rats, adverse effects were not observed (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)

- 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)

- Trade secret 1 : 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)

- Trade secret 2 : In the acute dermal/inhalation toxicity test using rats, adverse effects were not observed, respectively. (OECD Guideline 402, GLP)(OECD Guideline 403)

- Trade secret 3 : 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)

- Trade secret 5 : In the acute oral toxicity test with rats, lethargy, hunched posture, uncoordinated movements, piloerection were observed. (OECD Guideline 423, 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)

Specific target organ toxicity (repeat exposure) : Not classified

- Cobalt lithium manganese nickel oxide : In surviving animals in 50 mg / m³ (3 weeks recovery group), the minimum degradation / regeneration in lung was observed. NAOEC (no adverse effect observation) was not decided. (Rat, 6 hr/day, 2 times exposure, 28 days observation, 2, 10, 50mg / m³, inhalation test, short term - lung toxicity test)

- 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)"
- Graphite : : In the repeated oral toxicity test using rats, toxicity to organs was not observed. (OECD Guideline 422, GLP) In the repeated inhalation toxicity test using rats, increased frequency of fibrosis in the lungs at high concentrations (OECD Guideline 412, 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)
- 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)
- Trade secret 1 : In the repeated oral toxicity test using rats, toxicity to organs was not observed. (OECD Guideline 407, GLP)
- Trade secret 2 : In the repeated oral toxicity tests using rats, toxicity to organs was not observed. (OECD Guideline 452)
- Trade secret 3 : In the repeated oral toxicity tests using rats, toxicity to organs was not observed. (OECD Guideline 408, GLP)
- 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.

Aspiration Hazard : Not available

12. Ecological information

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

A. Ecological toxicity

- **Acute toxicity** : Not classified (L(E)C₅₀ > 0.6 mg/L)

Fish :

- Aluminium : 96hr-LC₅₀(*Pimephales promelas*) = 1.16 mg/L (GLP)
- Graphite : 96hr-LC₅₀(*Danio rerio*) > 100 mg/L (OECD Guideline 203, GLP)
- 1-methyl-2-pyrrolidone : 96hr-LC₅₀(*Oncorhynchus mykiss*) > 500 mg/L (OBBA-bulletin No.
- Copper : 96hr-LC₅₀(*Oncorhynchus mykiss*) = 0.164 mg/L
- Trade secret 1 : 96hr-LC₅₀(*Oncorhynchus mykiss*) > 100 mg/L (OECD Guideline 203, GLP)
- Trade secret 2 : 96hr-LC₅₀(*Oncorhynchus mykiss*) > 100 mg/L (OECD Guideline 203, GLP)
- Trade secret 3 : 96hr-LC₅₀(*Danio rerio*) ≥ 100 mg/L (OECD Guideline 203, GLP)
- Trade secret 5 : 96hr-LC₅₀(*Oncorhynchus mykiss*) = 51 mg/L

- Carbon black : 96hr-LC₀(*Danio rerio*) = 1,000 mg/L (OECD Guideline 203, GLP, ECHA)
crustacean :

- Aluminium : 48hr-LC₅₀(*Ceriodaphnia dubia*) = 0.72 mg/L (GLP)
- Graphite : 48hr-EC₅₀(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)
- Copper : 48hr-LC₅₀(*Ceriodaphnia dubia*) = 0.014 mg/L
- Trade secret 1 : 48hr-EC₅₀(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)
- Trade secret 2 : 48hr-EC₅₀(*Ceriodaphnia dubia*) = 5,900 mg/L
- Trade secret 3 : 48hr-EC₅₀(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)
- Trade secret 4 : 48hr-LC₅₀ = 8.4 mg/L (OECD Guideline 202, GLP)
- Trade secret 5 : 48hr-LC₅₀(*Daphnia magna*) > 100 mg/L (OECD Guideline 202, GLP)
- Lithium borofluoride : 48hr-EC₅₀(*Daphnia magna*) = 33.53 mg/L (OECD Guideline 202, GLP)
- Trade secret 6 : 48hr-EC₅₀(*Daphnia magna*) > 24.2 mg/L (OECD Guideline 202, GLP)
- Carbon black : 24hr-EC₅₀(*Daphnia magna*) > 5,600 mg/L (OECD Guideline 202, GLP, ECHA)

Algae :

- Aluminium : 72hr-EC₅₀(*Pseudokirchneriella subcapitata*) = 0.2 mg/L (OECD Guideline 201, GLP)
- Graphite : 72hr-EC₅₀(*Pseudokirchneriella subcapitata*) > 100 mg/L (OECD Guideline 201, GLP)
- 1-methyl-2-pyrrolidone : 72hr-EC₅₀(*Desmodesmus subspicatus*) = 600.5 mg/L (DIN 38412 Part9)
- Copper : 96hr-EC₅₀(*Chlamydomonas reinhardtii*) = 0.047 mg/L
- Trade secret 1 : 72hr-EC₅₀(*Desmodesmus subspicatus*) > 62 mg/L (OECD Guideline 201, GLP)
- Trade secret 2 : 72hr-EC₅₀(*Pseudokirchneriella subcapitata*) > 100 mg/L (OECD Guideline 201, GLP)
- Trade secret 3 : 72hr-EC₅₀(*Pseudokirchneriella subcapitata*) > 100 mg/L (OECD Guideline 201, GLP)
- Trade secret 4 : 72hr-EC₅₀ = 32 mg/L
- Trade secret 5 : 96hr-EC₅₀(*Pseudokirchneriella subcapitata*) > 100 mg/L (OECD Guideline 201, GLP)
- Lithium borofluoride : 72hr-EC₅₀(*Freshwater Alga and Cyanobacteria*) = 48.32 mg/L (OECD Guideline 201, GLP)
- Trade secret 6 : 72hr-EC₅₀(*Freshwater Alga and Cyanobacteria*) > 28.9 mg/L (OECD Guideline 201, GLP)
- Carbon black : 72hr-EC₅₀(*Desmodesmus subspicatus*) > 10,000 mg/L (OECD Guideline 201, GLP), ECHA)

- **Chronic toxicity :** Not classified

Fish :

- Aluminium : 33day-NOEC(*Danio rerio*) = 0.0715 mg/L (OECD Guideline 210, GLP)
- Copper : 30day-NOEC(*Perca fluviatilis*) = 0.188 mg/L (OECD Guideline 204)
- Trade secret 5 : 22day-NOEC(*Pimephales promelas*) = 0.2 mg/L (EPA 540/86, GLP)

crustacean :

- Aluminium : 28day-NOEC(*Hyalella azteca*) = 0.0531 mg/L (GLP)
- 1-methyl-2-pyrrolidone : 21day-NOEC = 12.5 mg/L (OECD Guideline 211, GLP)

- Copper : 14day-NOEC(*Penaeus mergulensis* and *Penaeus monodon* (prawns) = 0.033 mg/L
- Trade secret 3 : 21day-NOEC(*Daphnia magna*) = 25 mg/L (OECD Guideline 211, GLP)
- Trade secret 5 : 7day-NOEC(*Ceriodaphnia dubia*) = 2.55 mg/L (EPA/600/4-91/002)

Algae :

- Graphite : 72hr-NOEC(*Pseudokirchneriella subcapitata*) \geq 100 mg/L (OECD Guideline 201, GLP)
- 1-methyl-2-pyrrolidone : 72hr-EC₅₀(*Desmodesmus subspicatus*) = 672.8 mg/L (DIN 38412 Part9)
- Copper : 19day-NOEC(*giant kelp Macrocyctis pyrifera*) = 0.0102 mg/L
- Trade secret 1 : 72hr-NOEC(*Desmodesmus subspicatus*) = 62 mg/L (OECD Guideline 201, GLP)
- Trade secret 2 : 72hr-NOEC(*Pseudokirchneriella subcapitata*) = 100 mg/L (OECD Guideline 201, GLP)
- Trade secret 5 : 96hr-NOEC(*Pseudokirchneriella subcapitata*) = 22 mg/L (OECD Guideline 201, GLP)
- Carbon black : 72hr-NOEC(*Desmodesmus subspicatus*) > 10,000 mg/L (OECD Guideline 201, GLP, ECHA)

B. Persistence and degradability

Persistence :

- 1-methyl-2-pyrrolidone : Low persistency (log K_{ow} is less than 4 estimated.) (log K_{ow} = -0.46)
- Trade secret 1 : Low persistency (log K_{ow} is less than 4 estimated.) (log K_{ow} = 0.972) (40 °C, EU Method A.8, GLP)
- Trade secret 2 : Low persistency (log K_{ow} is less than 4 estimated.) (log K_{ow} = 0.11) (20 °C, 5.33 < pH < 5.79)
- Trade secret 3 : Low persistency (log K_{ow} is less than 4 estimated.) (log K_{ow} = 0.354) (20°C, 6.5 < pH < 7.5)
- Trade secret 4 : Low persistency (log K_{ow} is less than 4 estimated.) (Log K_{ow} = - 0.435)
- Trade secret 5 : Hydrolysis readily in contact with water. According to this it was not possible to determine the partition coefficient. (OECD Guideline 107, GLP)

Degradability :

- Cobalt lithium manganese nickel oxide : Because it is an inorganic substance, it is not decomposed.

C. Bioaccumulative potential

Bioaccumulation :

- 1-methyl-2-pyrrolidone : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
- Trade secret 3 : Bioaccumulation is expected to be low according to the BCF < 500 (BCF < 3.2)
- Trade secret 5 : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 53~58)

Biodegradation :

- 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 1 : As well-biodegraded, it is expected to have low accumulation potential in living organisms(98% biodegradation was observed after 28 days) (GLP)
- Trade secret 2 : As well-biodegraded, it is expected to have low accumulation potential in living organisms(86% biodegradation was observed after 29 days) (OECD Guideline 301B)
- Trade secret 3 : As well-biodegraded, it is expected to have low accumulation potential in living organisms(86% biodegradation was observed after 28 days) (OECD Guideline 301C)
- Trade secret 4 : As not well-biodegraded, it is expected to have high accumulation potential in living organisms (= 38% biodegradation was observed after 21 days) (OECD Guideline 301 D, GLP)

D. Mobility in soil :

- 1-methyl-2-pyrrolidone : No potency of mobility to soil. ($K_{oc} = 4.65$) (estimated)
- Trade secret 1 : No potency of mobility to soil. ($K_{oc} = 1.58$) (OECD Guideline 121, GLP)
- Trade secret 2 : No potency of mobility to soil. ($K_{oc} = 11.9$)
- Trade secret 3 : No potency of mobility to soil. ($K_{oc} = 2.9 \sim 6.65$) (25 °C)
- Trade secret 4 : Low potency of mobility to soil. ($K_{oc} = 5.117$)

E. Other hazardous effect : Not available

F. Hazardous to the ozone layer : Not applicable

13. Disposal considerations

A. Disposal method :

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

B. Disposal precaution :

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

14. Transport 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.

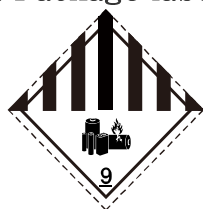
A. UN Number : 3480

B. UN Proper shipping name : LITHIUM ION BATTERIES (including lithium ion polymer batteries)

C. Transport Hazard class : 9

D. Packing group : II

- E. Special provisions : 188
- F. Packing instructions : P903
- G. Environmental hazards : No
- H. Special precautions
 - in case of fire : F-A
 - in case of leakage : S-I
- I. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not Available
- J. IATA Transport : PI 965-Section IA
- K. Package labels :



- L. Additional transport information in U.S.A
US Hazardous Materials Regulations 49 CFR (Code of Federal Regulations) :
 - Sections 172.101 (Lithium ion batteries including lithium ion polymer batteries ; UN3480)
 - Sections 172.102 (Special provisions 388, 422, A54, A100)
 - Sections 173.185 (Lithium batteries and cells)

15. Regulatory information

A. U.S.A Regulatory information

U.S.A Inventory (TSCA)

- Cobalt lithium manganese nickel oxide : Present [PMN; S; 5E] (ACTIVE)
- Graphite : Present (ACTIVE)
- Aluminium : Present (ACTIVE)
- 1-methyl-2-pyrrolidone : Present (ACTIVE)
- Copper : Present (ACTIVE)
- Trade secret 1: Present (ACTIVE)
- Trade secret 2 : Present (ACTIVE)
- Trade secret 3 : Present (ACTIVE)
- Trade secret 4 : Present (ACTIVE)
- Trade secret 5 : Present [PMN] (ACTIVE)
- Trade secret 6 : Present [PMN; S] (ACTIVE)
- Lithium borofluoride : Present (ACTIVE)
- Carbon black : Present (ACTIVE)

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

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

- Cobalt lithium manganese nickel oxide : Indicates that no RQ is assigned to this generic or broad class, although the class is a CERCLA hazardous substance. (Nickel Compounds, Cobalt Compounds)

- Copper : 5000lb
- 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) :
 - Cobalt lithium manganese nickel oxide : Regulated (Nickel, Cobalt, Manganese compounds)
 - Aluminium : Regulated (fume or dust)
 - Copper : Regulated
- Substance of Rotterdam Convention : Not regulated
- Substance of Stockholm Convention : Not regulated
- Substance of Montreal Protocol : Not regulated

16. Other information

A. Information source and references :

UN Recommendations on the transport of dangerous goods 17th
Emergency Response Guidebook 2008;
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
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.
NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>

B. Issuing date : 21. Feb, 2020

C. Revision number and date

revision number : Rev.(01)

date of the latest revision : 22. Oct, 2020

D. Others :

- The content is based on the latest information and knowledge that we currently possess.

- This SDS was authored to aid buyer, processor or any other third person who handles the chemical of subject in the SDS; additionally, it does not warrant suitability of the chemical for special purposes or the commercial use of statements that approves the use of it in combination with other chemicals as well as technical or legal liabilities.
- The content of the SDS may vary depending on the country or the region and may not coincide with the actual regulations. Therefore, the buyer or the processor of the chemical is responsible for observing responsible government's or the region's regulations.