Material Safety Data Sheet (**MSDS**)

(ZINC OXIDE, KS-1)

TAEKYUNG SB Chemical Co., Ltd.

Material Safety Data Sheet

Material Name	ZINC OXIDE, KS-1		
CAS NO	KE NO	UN NO	EC NO
1314-13-2	KE-35565	3077	215-222-5

1. Chemical Product and Company Identification

A Product Name: KS-1 ZINC OXIDE (Zinc Oxide)

B Product Recommended Use & Usage Limits

- O Recommended Use:
  Rubber, electrolysis, electroplating, batteries, alloy pigments, raw materials, pesticides, fillers, putty, Clay, heat transfer, anti-corrosion agent, stabilizer, catalyst, experimental chemical
- O Usage Limits: No drinking allowed.

C Company Identification/ Supplier/Distributer Information

- O Supply Company Name: TAEKYUNG SB Chemical Co., Ltd.
- O Address in Korea : 258,Sandandongseo-ro, Gunsan-si, Jeallabuk-do
- O Factory in Vietnam
  Name : SAMHO Co.,Ltd.
  Address in Vietnam : Lot A-9E-CN, Bau Bang Industrial Park, Lai Uyen Town, Bau Bang Dist, Binh Duong Prov, Vietnam
- O Information providing service or urgent contact: 063-463-3041
- O Department in charge: Technical Research Center
- O Preparation date: 1996. 5. 16
- O Number of revision and final revision date: 20th edition, 2020. 01. 26.

2. Hazards Identification

A Hazards Identification classification

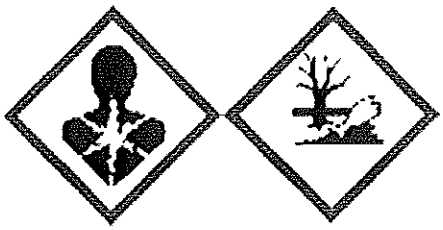
Reproductive cell mutation: Classification 2.

Acute aquatic environment hazards: Classification 1

Chronic aquatic environment hazards: Classification 1

B Warning marks

- O Pictorial symbol



- O Signal word: Danger
- O Hazardous expression

  H341 Suspected to cause genetic defects

  H400 Very harmful to aquatic organisms

  H410 May cause long-tem hazardous effects in the aquatic organisms

- O Precaution expression
  - Precaution

    P201 Secure the pre-use handling manual

    P202 Do not use it until you read and understand all safety precautions

    P273 Avoid release to the environment

    P280 Wear protective gloves/clothing/goggles/face protection.
  - Countmesure

    P391 Collect spilled materials.

    P308+P313 If you are worried about exposure or exposure, seek medical attention.
  - Storage

    P405 Store in a tightly sealed container.
  - Disposal

    P501 Dispose contents and container (according to regulation in relevant legal codes)..

C Other hazards not included in the hazard identification classification

No data available

3. Composition, Information on Ingredients

Chemical Name	Idiomatic Name	CAS Number	Contents
ZINC OXIDE	ZINC WHITE	1314-13-2	100%
Lead (PbO)		<0.01%	Impurity
Cadmium (CdO)		<0.005%	Impurity

4. First Aid Measures

A Eye contact:

Consult medical personnel urgently.

Immediately wash eyes and skin with running water for at least 15 minutes.

B Skin contact:

Consult medical personnel urgently.

Remove contaminated clothing and shoes and washing them before using.

Immediately wash eyes and skin with running water with soap.

C Inhalation:

Move to a place with fresh air.

Consult medical personnel urgently.

If person doesn't breathe, do the CPR.

D Ingestion:

Wash your mouth with water.

If you are unconscious, do not feed anything to them.

Do not induce vomiting.

E Other medical notices

Ensure that medical personnel are aware of the substance and take protective measures.

Do not take action without proper education or in dangerous situation

Artificial respiration might be dangerous to rescue providers.

5. Fire-Fighting Measures

A Appropriate (and inappropriate) Extinguishing Media

- No direct injection
- Water spray, alcohol-resistant foam, powder-extinguishing product, carbon dioxide use.

B. Specific hazards from chemicals.

- This substance is very toxic to aquatic organisms and continues to affect them in the long term.

Prevent discharge into sewers and drains.

- It can decompose at high temperatures and produce toxic gases.

C. Protective equipment and preventive measures when extinguishing a fire.

- Wear a personal respirator (SCBA) with adequate protective equipment

6. Accidental leakage countermeasures.

A Required measures to protect human body:

Wipe the spilled materials immediately, and follow precautions in the clause of protective equipment.

If not dangerous, stop the leakage.

Wear appropriate protective clothes, and don't touch damaged container or leaking substances

Ventilate contaminated areas

Do not enter if you do not need to enter or are not equipped with protective equipment

B Required measures to protect environment

Avoid inflow to water way, drain, basement, and sealed areas

Avoid release to the environment.

C Purification or removal method

Move the container from the leak area

Absorb the spilled materials with inactive materials (for examples, dry sand or soil), and collect them in chemical waste container.

Stay in the opposite direction to the wind and avoid low areas.

Discard and collect dust to avoid scattering.

7. Handling & Storage

A Safe handling:

Stop contact to your skin and eyes

Wash off contacting area after handling

Wear protective gloves, clothing, goggles, and facial protective equipment

Do not eat, drink, or smoke when using this product

Install suitable exhaust systems in places where dust can be fly

Avoid inhaling dust

Pay attention to substances and conditions to avoid

B Safe storage:

Seal and store it

Stay away from the no-mixing substances (strong acid, strong base)

Store it in a well ventilated place.

Stay away from the heat source.

Store in a cool and dry place.

8. Exposure Controls & Personal Protection

A Exposure standards for the chemical substance, biological exposure standards, etc.

- O Domestic regulations: TWA: 2 mg/m3 STEL: 0 mg/m3 ZINC OXIDE (fume)
- O ACGIH regulations: TWA 2 mg/m3 STEL 10 mg/m3
- O Biological exposure standards: No data available

B Engineering Controls

Use process isolation, local exhaust or other engineering management that adjusts the air level below the exposure standard.

Install washing facilities and safety showers for the place that store or use this substance.

No data available

C Personal protective equipment

- O Respiratory protection:

ZINC OXIDE dust (respiratory dust)

Wear respiratory protective gears suitable for the physical and chemical characteristics of exposed substance and certified by Korea Occupational Safety and Health Agency

ZINC OXIDE(fume)

Wear respiratory protective gears suitable for the physical and chemical characteristics of exposed substance and certified by Korea Occupational Safety and Health Agency

- O Eyes protection:
  Install face wash facilities and emergency shower facilities near the workplace
  Use chemical protective glasses and face shield
- O Hands protection:
  Wear chemical-resistant protective gloves to avoid direct chemical contact
- O Body protection:
  Wear chemical-resistant protective clothing to prevent skin exposure

9. Physical & Chemical Properties

A. Appearance	Physical state: Power
	Color: White
B. Odor	Odorless
C. Odor Threshold	No data available
D. PH	No data available
E. Melting point/Freezing point	1,975℃ (3,587°F)
F. Initial Boiling point and Boiling point range	No data available
G. Flash point	No data available
H. Evaporation Rate	(Not applicable)
I. Flammability (solid, gas)	Unburnable
J. Low & Upper limit of Flammable or Explosion Range	No data available
K. Vapor Pressure	90 hPa (20℃)
L. Solubility	2.9mg/L (20℃)
M. Vapor Density	No data available
N. Specific Gravity	No data available
O. n n-Octanol/water partition coefficient	log Kow = 0.739 (25℃)
P. Auto-ignition Temp.	No data available
Q. Auto-ignition Temp.	No data available
R. Viscosity	0.472 mPa·s (25℃)

S. Molecular Weight	81.38
T. Refractive index	1.9 ~ 2.0
U. Specific heat	9.6 cal/deg/mole at 25℃

10. Stability & Reactivity

A Chemical sability and Possibility of hazardous reactions.

Some of them can burn, but they don't ignite easily.

Container can explode when heated

In case of fire, irritating, corrosive, and toxic gases can be generated

The material itself does not burn due to non-flammability, but it may decompose when heated and cause corrosive/toxic fume

B Conditions to Avoid

Heat

C Materials to Avoid

No data available

D Hazardous Decomposition Products

Corrosive/toxic fume irritable, corrosive, and toxic gas

11. Toxicological Information

A Information for highly possible exposure route:

May cause irritation, metal fume heat, difficulty in breathing

May cause nausea, diarrhea, and constipation

May cause irritation

B Health hazardous information

- O Acute toxicity:
  - Oral: LD50 > 5000mg/kg (Rat) : Not classified as an acute oral toxic substance
  - Dermal: No data available
  - Inhalation: LC50 >5700 mg/ m3 (Rat) : Not classified as an acute oral toxic substance
- O Skin corrosive or irritation effect:

  From the results of skin irritation test using rabbit, it is no classified as Skin corrosive substance
- O Severe eye damage or irritation:

  From the results of skin irritation test using rabbit, it is no classified as eye damage or irritation
- O Respiratory sensitization: No data available
- O Skin sensitization:

  From the results of skin irritation test using Guinea pig, it is no classified as Skin sensitization
- O Carcinogenesis effect:

  Exposure of zinc sulfate to a concentration of up to 22 g/L (zinc 5,000 ppm) in mice for 1 year was not

classified toxic substance because carcinogenicity due to exposure was not observed.

Occupation Safety and Health Acts	No data available
Notification by the Ministry of Labor	No data available
IARC	No data available
OSHA	No data available
ACGIH	No data available
NTP	No data available
EU CLP	No data available

- O Mutagenicity effect on reproductive cell : Classification 2
  Weak positive is observed in tests using animals, and positive (in vitro) tests using reproductive cells, Reproductive toxicity: Not classified
  As a result of oral exposure of zinc chloride to Rat up to 30 mg/kg bw/day to be confirmed reproductive toxicity, a decrease in baby size, viability (0, 4th day), and a decrease in baby weight were observed in the postural zone, but the symptoms were only confirmed at a high concentration of 30 mg/kg bw/day. (OECD TG 403)
- O Specific target organ toxicity (1 time exposure) : Not classified
  When exposed to inhalation steam to Rat, symptoms of dusty hair in the head were observed, and there were no other significant effects, so it was not classified (OECD TG 403).
- O Specific target organ toxicity (repeated exposure) : Not classified
  Repeated oral exposure to Rat for 90 days did not show any effect to the concentration of 31.52 mg/kg bw/day, and increased plasma ALAT, alkaline phosphoric acid hydrolyzate and creatine kinase were observed in the 0.2% (127.52 mg/kg) exposure group. But that is not that significant toxic effect, it is not classified (OECD TG 408).
- O Aspiration hazards: No data available

12. Ecological Information

A Ecological toxicity

Acute toxicity : classification 1.

(Acute toxicity values for fish, crustaceans, and birds are less than 1 mg/L)

- O Fish: LC50 = 0.112 ㎎/ℓ (Thymallus arcticus, 96Hr, ASTM E-729-88, Zinc chloride)
- O Crustacean: EC 50 = 0.416㎎/ℓ ((Daphnia magna, 48Hr, OECD TG 202, Zinc))
- O Algae: IC50 = 0.136 ㎎/ℓ ((Pseudokirchnerella subcapitata, 72Hr, OECD TG 201))

Chronic toxicity : classification 1

If the value of chronic toxicity (NOEC) is less than 0.1 mg/L and there is no data on resolution, but there is no available resolution data, it is considered non-decomposable (UNGHS Rev. 7 part 4, 2017)

- O Fish: NOEC = 0.039 ㎎/ℓ (Oncorhynchus mykiss, 30days, OECD TG 215, Zinc chloride)

- O Crustacean: NOEC = 0.039㎎/ℓ ((Daphnia magna, 21days, OECD TG 211, Zinc chloride)

B Residue property and Resolvability

- O Residue property: No data available
- O Resolvability: No data available

C Bio-accumulative potential

- O Biodegradation: No data available
- O Accumulative potential: BCF= 2.92~69.48 (Capoeta fusca, Fresh water, Zinc sulfate)

D Movement in soil: No data available

E Other hazardous effects: No data available

13. Disposal Considerations

A Disposal method

Avoid or minimize waste generation as much as possible

These substances, solutions, and by-products must always comply with the local Environmental Protection Act and waste disposal regulations

B Disposal considerations

When disposing of empty containers (packaging materials), completely remove the contents

If significant amount of product waste, should not be disposed of through sewage, but through suitable effluent treatment plants.

14. Transport information

A UN Number: 3077

B UN adequate shipping name: : Environmentally hazardous substance, solid, n.o.s.

C Transportation hazard class: 9

D Container class: Ⅲ

E Marine Pollutant: Yes

F Special safety measures related to transportation or transportation means and required to user to aware

- O Emergency procedure type for fire: F-A
- O Emergency procedure type for leakage: S-F

G [IATA] This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.

H [IMDG] This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.

15. Regulatory Information

A Regulation by Occupation Safety and Health Act:

Working environment measurement substances (measuring cycle: 6 months)

Special health diagnosis substance (diagnostic cycle: 12 months)

Hazardous substances to be managed.

Exposure standard setting substance

B Korea Chemicals Control Act: Not applicable

C Regulation by Safety Control of Dangerous Substances Act: Not applicable

D Regulation by Wastes Control Act: No data available

E Act on registration and evaluation of chemical substances

- O Existing chemical substances
- O Registered target chemicals

F Regulation by other domestic and foreign acts

O Domestic regulations

Persistent Organic Pollutants Control Act	Not applicable

O Foreign regulations

US control information (OSHA regulation)	Not applicable
US control information (CERCLA regulation)	Not applicable
US control information (EPCRA 302 regulation)	Not applicable
US control information (EPCRA 304 regulation)	Not applicable
US control information (EPCRA 313 regulation)	Not applicable
US control information (Substance in Rotterdam convention)	Not applicable
US control information(Substance in Stockholm convention)	Not applicable
US control information (Substance in Montreal Protocol)	Not applicable
EU classification information (Confirmed classification result)	N; R50-53
EU classification information (Hazardous phrase)	R50/53
EU classification information (Safety phrase)	S60, S61

16. Other Information

A Data Source

IUCLID Chemical Data Sheet, EC-ECB

Corporate Solution from Thomson Micromedex (http://csi.micromedex.com)

Industrial poisoning handbook, Shingwang publisher

TOXNET, U.S. National Library of Medicine(http://toxnet.nlm.nih.gov)

Chemicals Information System, National Institute of Environmental Research(http://ncis.nier.go.kr)

Dangerous Substances Information Management System, National Emergency Management Agency(http://hazmat.nema.go.kr)

ECOTOX Database, EPA(http://cfpub.epa.gov/ecotox)

ECB-ESIS(European chemical Substances Information System)(http://ecb.jrc.it/esis)

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

The Chemical Database,

The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)

B TAEKYUNG SBC Co., Ltd reconstituted this MSDS according to MSDS format regulated by the Occupation Safety and Health Acts, using the Korean version of this MSDS.

Material Safety Data Sheet (**MSDS**)

(ZINC OXIDE, KS-2)

TAEKYUNG SB Chemical Co., Ltd.

Material Safety Data Sheet

Material Name	ZINC OXIDE, KS-2		
CAS NO	KE NO	UN NO	EC NO
1314-13-2	KE-35565	3077	215-222-5

1. Chemical Product and Company Identification

A Product Name: KS-2 ZINC OXIDE (Zinc Oxide)

B Product Recommended Use & Usage Limits

- O Recommended Use:

  Rubber, electrolysis, electroplating, batteries, alloy pigments, raw materials, pesticides, fillers, putty, Clay, heat transfer, anti-corrosion agent, stabilizer, catalyst, experimental chemical
- O Usage Limits: No drinking allowed.

C Company Identification/ Supplier/Distributer Information

- O Supply Company Name: TAEKYUNG SB Chemical Co., Ltd.
- O Address in Korea : 258,Sandandongseo-ro, Gunsan-si, Jeallabuk-do
- O Factory in Vietnam

  Name : SAMHO Co.,Ltd.

  Address in Vietnam : Lot A-9E-CN, Bau Bang Industrial Park, Lai Uyen Town, Bau Bang Dist, Binh Duong Prov, Vietnam

  Information providing service or urgent contact: 063-463-3041
- O Department in charge: Technical Research Center
- O Preparation date: 1996. 5. 16
- O Number of revision and final revision date: 20th edition, 2022. 01. 26.

2. Hazards Identification

A Hazards Identification classification

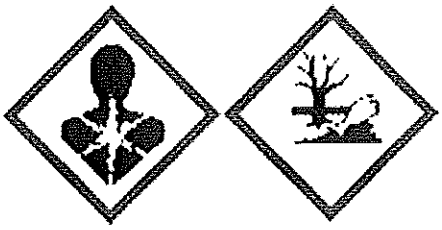
Reproductive cell mutation: Classification 2.

Acute aquatic environment hazards: Classification 1

Chronic aquatic environment hazards: Classification 1

B Warning marks

- O Pictorial symbol



- O Signal word: Danger
- O Hazardous expression

  H341 Suspected to cause genetic defects

  H400 Very harmful to aquatic organisms

  H410 May cause long-tem hazardous effects in the aquatic organisms

- O Precaution expression
  - Precaution

    P201 Secure the pre-use handling manual

    P202 Do not use it until you read and understand all safety precautions

    P273 Avoid release to the environment

    P280 Wear protective gloves/clothing/goggles/face protection.
  - Countmesure

    P391 Collect spilled materials.

    P308+P313 If you are worried about exposure or exposure, seek medical attention.
  - Storage

    P405 Store in a tightly sealed container.
  - Disposal

    P501 Dispose contents and container (according to regulation in relevant legal codes)..

C Other hazards not included in the hazard identification classification

No data available

3. Composition, Information on Ingredients

Chemical Name	Idiomatic Name	CAS Number	Contents
ZINC OXIDE	ZINC WHITE	1314-13-2	93%~100%
Lead (PbO)	Impurity		<0.25%
Cadmium (CdO)	Impurity		<0.05%

4. First Aid Measures

A Eye contact:

Consult medical personnel urgently.

Immediately wash eyes and skin with running water for at least 15 minutes.

B Skin contact:

Consult medical personnel urgently.

Remove contaminated clothing and shoes and washing them before using.

Immediately wash eyes and skin with running water with soap.

C Inhalation:

Move to a place with fresh air.

Consult medical personnel urgently.

If person doesn't breathe, do the CPR.

D Ingestion:

Wash your mouth with water.

If you are unconscious, do not feed anything to them.

Do not induce vomiting.

E Other medical notices

Ensure that medical personnel are aware of the substance and take protective measures.

Do not take action without proper education or in dangerous situation

Artificial respiration might be dangerous to rescue providers.

5. Fire-Fighting Measures

A Appropriate (and inappropriate) Extinguishing Media

- No direct injection
- Water spray, alcohol-resistant foam, powder-extinguishing product, carbon dioxide use.

B. Specific hazards from chemicals.

- This substance is very toxic to aquatic organisms and continues to affect them in the long term.

Prevent discharge into sewers and drains.

- It can decompose at high temperatures and produce toxic gases.

C. Protective equipment and preventive measures when extinguishing a fire.

- Wear a personal respirator (SCBA) with adequate protective equipment

6. Accidental leakage countermeasures.

A Required measures to protect human body:

Wipe the spilled materials immediately, and follow precautions in the clause of protective equipment.

If not dangerous, stop the leakage.

Wear appropriate protective clothes, and don't touch damaged container or leaking substances

Ventilate contaminated areas

Do not enter if you do not need to enter or are not equipped with protective equipment

B Required measures to protect environment

Avoid inflow to water way, drain, basement, and sealed areas

Avoid release to the environment.

C Purification or removal method

Move the container from the leak area

Absorb the spilled materials with inactive materials (for examples, dry sand or soil), and collect them in chemical waste container.

Stay in the opposite direction to the wind and avoid low areas.

Discard and collect dust to avoid scattering.

7. Handling & Storage

A Safe handling:

Stop contact to your skin and eyes

Wash off contacting area after handling

Wear protective gloves, clothing, goggles, and facial protective equipment

Do not eat, drink, or smoke when using this product

Install suitable exhaust systems in places where dust can be fly

Avoid inhaling dust

Pay attention to substances and conditions to avoid

B Safe storage:

Seal and store it

Stay away from the no-mixing substances (strong acid, strong base)

Store it in a well ventilated place.

Stay away from the heat source.

Store in a cool and dry place.

8. Exposure Controls & Personal Protection

A Exposure standards for the chemical substance, biological exposure standards, etc.

- O Domestic regulations: TWA: 2 mg/m3 STEL: 0 mg/m3 ZINC OXIDE (fume)
- O ACGIH regulations: TWA 2 mg/m3 STEL 10 mg/m3
- O Biological exposure standards: No data available

B Engineering Controls

Use process isolation, local exhaust or other engineering management that adjusts the air level below the exposure standard.

Install washing facilities and safety showers for the place that store or use this substance.

No data available

C Personal protective equipment

- O Respiratory protection:

ZINC OXIDE dust (respiratory dust)

Wear respiratory protective gears suitable for the physical and chemical characteristics of exposed substance and certified by Korea Occupational Safety and Health Agency

ZINC OXIDE(fume)

Wear respiratory protective gears suitable for the physical and chemical characteristics of exposed substance and certified by Korea Occupational Safety and Health Agency

- O Eyes protection:
  Install face wash facilities and emergency shower facilities near the workplace
  Use chemical protective glasses and face shield
- O Hands protection:
  Wear chemical-resistant protective gloves to avoid direct chemical contact
- O Body protection:
  Wear chemical-resistant protective clothing to prevent skin exposure

9. Physical & Chemical Properties

A. Appearance	Physical state: Power
	Color: White
B. Odor	Odorless
C. Odor Threshold	No data available
D. PH	No data available
E. Melting point/Freezing point	1,975℃ (3,587°F)
F. Initial Boiling point and Boiling point range	No data available
G. Flash point	No data available
H. Evaporation Rate	(Not applicable)
I. Flammability (solid, gas)	Unburnable
J. Low & Upper limit of Flammable or Explosion Range	No data available
K. Vapor Pressure	90 hPa (20℃)
L. Solubility	2.9mg/L (20℃)
M. Vapor Density	No data available
N. Specific Gravity	No data available
O. n n-Octanol/water partition coefficient	log Kow = 0.739 (25℃)
P. Auto-ignition Temp.	No data available
Q. Auto-ignition Temp.	No data available
R. Viscosity	0.472 mPa·s (25℃)

S. Molecular Weight	81.38
T. Refractive index	1.9 ~ 2.0
U. Specific heat	9.6 cal/deg/mole at 25℃

10. Stability & Reactivity

A Chemical sability and Possibility of hazardous reactions.

Some of them can burn, but they don't ignite easily.

Container can explode when heated

In case of fire, irritating, corrosive, and toxic gases can be generated

The material itself does not burn due to non-flammability, but it may decompose when heated and cause corrosive/toxic fume

B Conditions to Avoid

Heat

C Materials to Avoid

No data available

D Hazardous Decomposition Products

Corrosive/toxic fume irritable, corrosive, and toxic gas

11. Toxicological Information

A Information for highly possible exposure route:

May cause irritation, metal fume heat, difficulty in breathing

May cause nausea, diarrhea, and constipation

May cause irritation

B Health hazardous information

- O Acute toxicity:
  - Oral: LD50 > 5000mg/kg (Rat) : Not classified as an acute oral toxic substance
  - Dermal: No data available
  - Inhalation: LC50 >5700 ㎎/ m3 (Rat) : Not classified as an acute oral toxic substance
- O Skin corrosive or irritation effect:

  From the results of skin irritation test using rabbit, it is no classified as Skin corrosive substance
- O Severe eye damage or irritation:

  From the results of skin irritation test using rabbit, it is no classified as eye damage or irritation
- O Respiratory sensitization: No data available
- O Skin sensitization:

  From the results of skin irritation test using Guinea pig, it is no classified as Skin sensitization
- O Carcinogenesis effect:

  Exposure of zinc sulfate to a concentration of up to 22 g/L (zinc 5,000 ppm) in mice for 1 year was not

classified toxic substance because carcinogenicity due to exposure was not observed.

Occupation Safety and Health Acts	No data available
Notification by the Ministry of Labor	No data available
IARC	No data available
OSHA	No data available
ACGIH	No data available
NTP	No data available
EU CLP	No data available

- O Mutagenicity effect on reproductive cell : Classification 2
  Weak positive is observed in tests using animals, and positive (in vitro) tests using reproductive cells,
  Reproductive toxicity: Not classified
  As a result of oral exposure of zinc chloride to Rat up to 30 mg/kg bw/day to be confirmed reproductive toxicity, a decrease in baby size, viability (0, 4th day), and a decrease in baby weight were observed in the postural zone, but the symptoms were only confirmed at a high concentration of 30 mg/kg bw/day. (OECD TG 403)
- O Specific target organ toxicity (1 time exposure) : Not classified
  When exposed to inhalation steam to Rat, symptoms of dusty hair in the head were observed, and there were no other significant effects, so it was not classified (OECD TG 403).
- O Specific target organ toxicity (repeated exposure) : Not classified
  Repeated oral exposure to Rat for 90 days did not show any effect to the concentration of 31.52 mg/kg bw/day, and increased plasma ALAT, alkaline phosphoric acid hydrolyzate and creatine kinase were observed in the 0.2% (127.52 mg/kg) exposure group. But that is not that significant toxic effect, it is not classified (OECD TG 408).
- O Aspiration hazards: No data available

12. Ecological Information

A Ecological toxicity

Acute toxicity : classification 1.

(Acute toxicity values for fish, crustaceans, and birds are less than 1 mg/L)

- O Fish: LC50 = 0.112 ㎎/ℓ (Thymallus arcticus, 96Hr, ASTM E-729-88, Zinc chloride)
- O Crustacean: EC 50 = 0.416㎎/ℓ ((Daphnia magna, 48Hr, OECD TG 202, Zinc))
- O Algae: IC50 = 0.136 ㎎/ℓ ((Pseudokirchnerella subcapitata, 72Hr, OECD TG 201))

Chronic toxicity : classification 1

If the value of chronic toxicity (NOEC) is less than 0.1 mg/L and there is no data on resolution, but there is no available resolution data, it is considered non-decomposable (UNGHS Rev. 7 part 4, 2017)

- O Fish: NOEC = 0.039 ㎎/ℓ (Oncorhynchus mykiss, 30days, OECD TG 215, Zinc chloride)

- O Crustacean: NOEC = 0.039㎎/ℓ ((Daphnia magna, 21days, OECD TG 211, Zinc chloride)

B Residue property and Resolvability

- O Residue property: No data available
- O Resolvability: No data available

C Bio-accumulative potential

- O Biodegradation: No data available
- O Accumulative potential: BCF= 2.92~69.48 (Capoeta fusca, Fresh water, Zinc sulfate)

D Movement in soil: No data available

E Other hazardous effects: No data available

13. Disposal Considerations

A Disposal method

Avoid or minimize waste generation as much as possible

These substances, solutions, and by-products must always comply with the local Environmental Protection Act and waste disposal regulations

B Disposal considerations

When disposing of empty containers (packaging materials), completely remove the contents

If significant amount of product waste, should not be disposed of through sewage, but through suitable effluent treatment plants.

14. Transport information

A UN Number: 3077

B UN adequate shipping name: : Environmentally hazardous substance, solid, n.o.s.

C Transportation hazard class: 9

D Container class: III

E Marine Pollutant: Yes

F Special safety measures related to transportation or transportation means and required to user to aware

- O Emergency procedure type for fire: F-A
- O Emergency procedure type for leakage: S-F

G [IATA] This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.

H [IMDG] This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.

15. Regulatory Information

A Regulation by Occupation Safety and Health Act:

Working environment measurement substances (measuring cycle: 6 months)

Special health diagnosis substance (diagnostic cycle: 12 months)

Hazardous substances to be managed.

Exposure standard setting substance

B Korea Chemicals Control Act: Not applicable

C Regulation by Safety Control of Dangerous Substances Act: Not applicable

D Regulation by Wastes Control Act: No data available

E Act on registration and evaluation of chemical substances

- O Existing chemical substances
- O Registered target chemicals

F Regulation by other domestic and foreign acts

O Domestic regulations

Persistent Organic Pollutants Control Act	Not applicable

O Foreign regulations

US control information (OSHA regulation)	Not applicable
US control information (CERCLA regulation)	Not applicable
US control information (EPCRA 302 regulation)	Not applicable
US control information (EPCRA 304 regulation)	Not applicable
US control information (EPCRA 313 regulation)	Not applicable
US control information (Substance in Rotterdam convention)	Not applicable
US control information(Substance in Stockholm convention)	Not applicable
US control information (Substance in Montreal Protocol)	Not applicable
EU classification information (Confirmed classification result)	N; R50-53
EU classification information (Hazardous phrase)	R50/53
EU classification information (Safety phrase)	S60, S61

16. Other Information

A Data Source

IUCLID Chemical Data Sheet, EC-ECB

Corporate Solution from Thomson Micromedex (http://csi.micromedex.com)

Industrial poisoning handbook, Shingwang publisher

TOXNET, U.S. National Library of Medicine(http://toxnet.nlm.nih.gov)

Chemicals Information System, National Institute of Environmental Research(http://ncis.nier.go.kr)

Dangerous Substances Information Management System, National Emergency Management Agency(http://hazmat.nema.go.kr)

ECOTOX Database, EPA(http://cfpub.epa.gov/ecotox)

ECB-ESIS(European chemical Substances Information System)(http://ecb.jrc.it/esis)

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

The Chemical Database,

The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)

B TAEKYUNG SBC Co., Ltd reconstituted this MSDS according to MSDS format regulated by the Occupation Safety and Health Acts, using the Korean version of this MSDS.