Ministry of Employment and Labor	물질안전보건자료 (Material Safety Data Sheet)	Occupational Safety & Health Agency

AA01219-0000000010

1. Product and company identification

a) Product Name: (to indicate the same name or code as shown in label) Lead free bass, Lead free Dezincification Resistance Brass(C4926(C49260),C4934(C49340),C6801,C6802)

b) Recommended use of the chemical and restrictions on use

Recommended use of the chemical: Bolts, nuts, valves, lighters, watches, camera parts, etc.

restrictions on use: N/D

c) Manufacturer/Supplier/Distributor Information

division: producer

Name: DAECHANG CO.,LTD.

Address: 391, Gongdan 1-daero, Siheung-si, Gyeonggi-do, Republic of KOREA

Emergency phone number: 0314963000

d) Manufacturer/Supplier Additional Information

N/D

2. Hazards identification

a) Hazard.Risk Classification

Carcinogenicity : Category 1A

Reproductive toxicity : Category 1A

Specific target organ toxicity(Single exposure) : Category 1

Specific target organ toxicity(Repeated exposure) : Category 2

Acute aquatic toxicity : Category 1

Chronic aquatic toxicity : Category 1

b) Label elements including precautionary statements

Symbol

Signal Word: Risk

Hazard.Risk Statement	H350 : May cause cancer.
	H360 : May damage fertility or the unborn child.
	H373 : May cause damage to organs through prolonged or repeated exposure.
	H400 : Very toxic to aquatic life
	H410 : Very toxic to aquatic life with long lasting effects.

Precautionary Statement	Precautionary	P201 : Obtain special instructions before use.
		P202 : Do not handle until all safety precautions have been read and understood.
		P260 : Handle and store contents under inert gas Protect from moisture.
		P264 : Wash thoroughly after handling.
		P270 : Do not eat, drink or smoke when using this product.
		P273 : Avoid release to the environment.
		P280 : Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
	Response	P308+P311 : IF exposed or concerned: Call a POISON CENTER/doctor
		P308+P313 : IF exposed or concerned: Get medical advice/ attention.
		P314 : Get medical advice/attention if you feel unwell.
		P321 : Specific treatment .
		P391 : Collect spillage.
	Storage	P405 : Store locked up.
	Disposal	P501 : Dispose of contents/container to related regulations.

c) Other risks/hazards that are not included in the main sex/hazard designations (e.g., many dust explosions)

In the case of dust, powder, and fine particles, there is a possibility of an explosion when in contact with an ignition source.

3. Composition/Information on ingredients

Alloy No.	Chemical Name	Other name	CAS number	Content (%)
C4926 (C49260)	Copper	-	7440-50-8	58.0-63.0
	Tin	-	7440-31-5	-
	Bismuth	-	7440-69-9	0.5-1.8
	Zinc	-	7440-66-6	35.2-41.5
C4934 (C49340)	Copper	-	7440-50-8	60.0-63.0
	Tin	-	7440-31-5	0.5-1.5
	Bismuth	-	7440-69-9	0.5-2.0
	Zinc	-	7440-66-6	33.5-39.0
C6801	Copper	-	7440-50-8	57.0-64.0
	Tin	-	7440-31-5	0.1-2.5
	Bismuth	-	7440-69-9	0.5-4.0
	Zinc	-	7440-66-6	29.5-42.4
C6802	Copper	-	7440-50-8	57.0-64.0
	Tin	-	7440-31-5	0.1-3.0
	Bismuth	-	7440-69-9	0.5-4.0
	Zinc	-	7440-66-6	29.0-42.4

4. First aid measures

A. Eye contact

Get medical advice/attention if you feel unwell.

Get emergency medical action.

In case of contact with the substance, immediately flush skin and eyes with running water for at least 20 minutes.

IF exposed or concerned: Get medical advice/attention.

B. Skin contact

Remove contaminated clothing and shoes and restrict entry to contaminated area

In case of minor skin contact, prevent the spread of contaminated areas.

In case of contact with the substance, immediately flush skin and eyes with running water for at least 20 minutes.

If you are concerned about exposure, consult a medical institution (doctor).

C. Inhalation

Keep victim warm and quiet.

Get medical advice/attention

Move to fresh air.

If not breathing, give artificial respiration.

Get medical advice/attention if you feel unwell.

If breathing is difficult, give oxygen.

D. Ingestion

Get medical advice/attention
Do not use mouth-to-mouth method if victim ingested or inhaled the substance;
give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Get medical advice/attention if you feel unwell.

E. Indication of immediate medical attention and notes for physician

Exposures require specialized first aid with contact and medical follow-up .
Make sure medical personnel are aware of the substance and take protective measures.

5. Fire-Fighting measures

a) Suitable (and unsuitable) extinguishing media

Using dry sand or soil during nitrogen digestion

Using alcohol foam, carbon dioxide or water spray for digestion related to this substance

Unsuitable extinguishing media : high pressure water

b) Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products)

May be ignited by heat, sparks or flames.

Inhalation of material may be harmful.

Containers may explode when heated.

May decompose at high temperatures and produce toxic gases.

c) Special protective equipment and precautions for fire fighters

Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out.

Rescuers should wear appropriate protective equipment.

Fire involving Tanks; Always stay away from tanks engulfed in fire

Runoff from fire control or dilution water may cause pollution.

Dike fire-control water for later disposal; do not scatter the material

Move containers from fire area if you can do it without risk

Extinguish the fire by leaving the area and maintaining a safe distance.
Fire involving Tanks; In case of large fires, use unmanned fire extinguishing equipment and, if this is not possible, try to evacuate and burn.
Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank

Fire involving Tanks; Fire the fire from maximum distance or use unmanned fire extinguishing equipment.

6. Accidental release measures

a) Personal precautions, protective equipment
and emergency procedures
Clean up spills immediately, observing precautions in Protective Equipment section

Keep unnecessary and unprotected personnel from entering.

Restrict entry into contaminated areas.

Wear protective gloves/protective clothing/eye protection/face protection.

Be aware of substances and conditions to avoid.

Cover with plastic sheeting to prevent spread.

b) Environmental precautions and protective procedures

Dig a trench and cover it with wet sand or soil.

c) Methods and materials for containment and cleaning up

Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.

Absorb liquid and flush contaminated area with detergent and water.
Collect spillage.

7. Handling and storage

a) Precautions for safe handling

Please work with reference to engineering controls and personal protective equipment.
Do not handle until all safety precautions have been read and understood.

Please note that materials and conditions to avoid.

Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

Obtain special instructions before use.
Keep away from heat, hot surfaces, sparks, flames, and other sources of ignition. no smoking
Avoid release to the environment
Do not eat, drink or smoke when using this product
Wash thoroughly after handling.
Do not handle until all safety precautions have been read and understood.

b) Conditions for safe storage (including any incompatibilities)

Store in cool and dry place

Empty drums should be completely drained, properly bunged, and promptly returned to a drum control, or properly placed

Store in a closed container.

Keep away from food and drinking water

Store locked up.

8. Exposure controls & personal protection

a) Control parameters (e.g. occupational exposure limit values, biological limit values)

Domestic regulations	Copper - TWA : 1 mg/㎥ , STEL : 2 mg/㎥
	Tin - TWA : 2 mg/㎥ , STEL : -
	Bismuth, elemental - TWA : N/D , STEL : N/D
	Zinc - TWA : N/D , STEL : N/D
ACGIH regulations	Copper - TWA : 0.2mg/m3-Fum, 1mg/m3-Dust , STEL : N/D
	Tin - TWA : 2mg/m3 (metal, inorganic compounds), 0.1mg/m3 (organic compounds)) , STEL :N/D
	Bismuth, elemental - TWA : N/D , STEL : N/D
	Zinc - TWA : N/D , STEL : N/D
Biological exposure index	Copper - N/D
	Tin - N/D
	Bismuth, elemental - N/D
	Zinc - N/D
ohter exposure index	Copper - N/D
	Tin - N/D
	Bismuth, elemental - N/D
	Zinc - N/D

b) Appropriate engineering controls

Use fair separation, local exhaust or keep air levels below exposure standards

c) Personal protective equipmen

Respiratory protection	Wear respiratory protection certified by the Korea Occupational Safety and Health Agency appropriate for the physical and chemical characteristics of the exposed substance.
Eye protection	Use chemical protection glasses and safety glasses.
Hand protection	Wear suitable chemical resistant gloves.
Body protection	Wear suitable chemical-resistant protective clothing.

9. Physical and chemical properties

product properties

Division		information
a)Appearance	physical state	solid
	color	Yellow
b) Odour		odorless
c) Odour threshold		N/D
d). pH		N/D
e) Meting point/freezing point		N/D
f) Initial boiling point and boiling range		N/D
g) Flash point		N/D
h) Evaporation rate		N/D
i) Flammability (solid, gas)		N/D
j) Upper/lower flammability or explosive limits		N/D
k) Vapor pressure		N/D
l) Solubility		N/D
m) Vapor density		N/D
n) Relative density		N/D
o) Partition coefficient: n-octanol/water		N/D
p) Auto-ignition temperature		N/D
q) Decomposition temperature		N/D
r) Viscosity		N/D
s) Molecular mass		N/D

properties of each component

Ingredients	Division		information
Copper	a)Appearance	physical state	solid
		color	Red
	b) Odour		odorless
	c) Odour threshold		N/D
	d) pH		N/D
	e) Meting point/freezing point		약 1069 ℃
	f) Initial boiling point and boiling range		2,595℃
	g) Flash point		N/D
	h) Evaporation rate		N/D
	i) Flammability (solid, gas)		Not flammable

properties of each component

Ingredients	Division		information
Copper	j) Upper/lower flammability or explosive limits		N/D
	k) Vapor pressure		N/D
	l) Solubility		< 1 ㎎/ℓ (30℃)
	m) Vapor density		N/D
	n) Relative density		8.78
	o) Partition coefficient: n-octanol/water		-0.57 (estimate)
	p) Auto-ignition temperature		N/D
	q) Decomposition temperature		N/D
	r) Viscosity		N/D
	s) Molecular mass		63.55
Tin	a)Appearance	physical state	solid
		color	White
	b) Odour		odorless
	c) Odour threshold		N/D
	d). pH		N/D
	e) Meting point/freezing point		231.9 ℃
	f) Initial boiling point and boiling range		2260 ℃
	g) Flash point		N/D
	h) Evaporation rate		N/D
	i) Flammability (solid, gas)		Combustibility (when exposed to heat in the form of dust or when spontaneously reacting with chemicals (Br2, BrF3, Cl2, ClF3, Cu(NO3), K2O2, S))
	j) Upper/lower flammability or explosive limits		N/D
	k) Vapor pressure		N/D
	l) Solubility		insolubility
	m) Vapor density		N/D
	n) Relative density		7.2
	o) Partition coefficient: n-octanol/water		N/D
	p) Auto-ignition temperature		N/D
	q) Decomposition temperature		N/D
	r) Viscosity		1.85 (240℃)
	s) Molecular mass		118.71

properties of each component

Ingredients	Division		information
Bismuth	a)Appearance	physical state	solid
		color	light ash color
	b) Odour		odorless
	c) Odour threshold		N/D
	d). pH		N/D
	e) Meting point/freezing point		271 ℃
	f) Initial boiling point and boiling range		1559~1569 ℃
	g) Flash point		N/D
	h) Evaporation rate		N/D
	i) Flammability (solid, gas)		- / -4.0 %
	j) Upper/lower flammability or explosive limits		N/D
	k) Vapor pressure		78 ㎜Hg (at 1266 ℃)
	l) Solubility		Insoluble in water
	m) Vapor density		N/D
	n) Relative density		9.78 (at 20 ℃/ 4 ℃)
	o) Partition coefficient: n-octanol/water		N/D
	p) Auto-ignition temperature		N/D
	q) Decomposition temperature		N/D
	r) Viscosity		0.00119 P(g/㎝·s) (at 500 ℃)
	s) Molecular mass		208.9804
Zinc	a)Appearance	physical state	solid
		color	Gray
	b) Odour		odorless
	c) Odour threshold		N/D
	d). pH		N/D
	e) Meting point/freezing point		409℃ (1,013hPa)
	f) Initial boiling point and boiling range		907 ℃
	g) Flash point		N/D
	h) Evaporation rate		N/D
	i) Flammability (solid, gas)		Not flammable
	j) Upper/lower flammability or explosive limits		N/D
	k) Vapor pressure		N/D
	l) Solubility		N/D
	m) Vapor density		N/D

properties of each component

Ingredients	Division	information
Zinc	m) Vapor density	N/D
	n) Relative density	7.1
	o) Partition coefficient: n-octanol/water	N/D
	p) Auto-ignition temperature	460 ℃ (Applicable to fine powder, etc.)
	q) Decomposition temperature	N/D
	r) Viscosity	N/D
	s) Molecular mass	N/D

10. Stability and reactivity

a) Chemical stability and possibility of hazardous reactions

May decompose at high temperatures into forming toxic gases

Stable at room temperature, normal pressure and normal use

In case of fire, irritating and toxic gas may be generated.

Inhalation of material may be harmful.

Containers may explode when heated

b) Conditions to avoid (e.g. static discharge, shock or vibration, etc)

Ignition sources (heat, sparks or flames)

Non-flammable, the material itself does not burn, but may decompose when heated, generating corrosive/toxic fumes.

c) Incompatible materials

Combustible substances, acids, oxidizing agents, alkalis

d) Hazardous decomposition products

Corrosive/toxic fumes

Irritating, corrosive and/or toxic gases

11. Toxicological information

a) Information on the likely routes of exposure

product	N/D
Copper	N/D
Tin	N/D
Bismuth	N/D
Zinc	N/D

b) Health hazards information

Acute toxic	oral	product	N/D
		Copper	LD50 >2500mg/kg rat(male)(OECD Guideline 423)(read-aross: Copper oxide)(ECHA)
		Tin	LD50 >2000mg/kg rat(female)(OECD Guideline 423)(ECHA)
		Bismuth	LD50 5000 mg/kg Rat(Corporate Solution From Thomson Micromedex)
		Zinc	LD50 >2000 mg/kg bw rat (OECD Guideline 401)(ECHA)
Acute toxic	Percutaneous	product	N/D
		Copper	LD50 >2000mg/kg rat(OECD Guideline 402)(read-aross: Copper oxide)(ECHA)
		Tin	LD50 >2000mg/kg species: rat (OECD Guideline 402)(ECHA)
		Bismuth	N/D
		Zinc	N/D
	Inhalation	product	N/D
		Copper	Dust/mist LC50 >5.11mg/L 4hr rat (OECD Guideline 436)(Coated copper flakes)(ECHA)
		Tin	Dust LC50 >4.75mg/L 4hr rat (OECD Guideline 403)(ECHA)
		Bismuth	N/D
		Zinc	Dust LC50 >5.41mg/L 4hr rat (OECD Guideline 403)(ECHA)
Skin corrosive/irritant		product	N/D
		Copper	No irritation observed (Species: rabbit) (OECD Guideline 404)(read-aross: Copper oxide)(ECHA)
		Tin	In vivo- Skin corrosion/irritation test results showed no irritation (species: rabbit) (EU MethodB.4) (ECHA)
		Bismuth	N/D
		Zinc	Not classified as an irritant (Species: rabbit) (ECHA)
Serious eye damage/eye irritation		product	N/D
		Copper	No irritation observed (Species: rabbit) (OECD Guideline 405) (read-aross: Copper oxide) (ECHA
		Tin	In vivo - Serious eye damage/irritation test results: No irritation (species: rabbit) (OECD Guideline 405) (ECHA)
		Bismuth	N/D
		Zinc	Not classified as an irritant (species: rabbit) (OECD Guideline 405) (ECHA)
Respiratory sensitization		product	N/D
		Copper	N/D
		Tin	N/D
		Bismuth	N/D
		Zinc	N/D

b) Health hazards information

Skin sensitization		product	N/D
		Copper	Not sensitizing (species: guinea pig) (OECD Guideline 406) (analog: Copper oxide) (ECHA)
		Copper	Does not indicate sensitization (species: guinea pig)(OECD Guideline 406)(analog: Copper oxide)(ECHA)
		Tin	Skin sensitization test results showed that the substance did not cause sensitization (ECHA)
		Zinc	N/D
Carcinogenicity	IARC	product	N/D
		Copper	N/D
		Tin	N/D
		Bismuth	N/D
		Zinc	N/D
	NTP	product	N/D
		Copper	N/D
		Tin	N/D
		Bismuth	N/D
		Zinc	N/D
	OSHA	product	N/D
		Copper	N/D
		Tin	N/D
		Bismuth	N/D
		Zinc	N/D
	ACGIH	product	N/D
		Copper	N/D
		Tin	N/D
		Bismuth	N/D
		Zinc	N/D
	OCCUPATIONAL SAFETY AND HEALTH ACT	product	N/D
		Copper	N/D
		Tin	N/D
		Bismuth	N/D
		Zinc	N/D
	Notification of Ministry of Employment	product	N/D
		Copper	N/D
		Tin	N/D
		Bismuth	N/D
		Zinc	N/D

b) Health hazards information

Carcinogenicity	EU CLP	product	N/D
		Copper	N/D
		Tin	N/D
		Bismuth	N/D
		Zinc	N/D
Germ Cell Mutagenicity		product	N/D
		Copper	in vitro- gene mutation study in bacteria results :NEGATIVE(Species: S. typhimurium TA 1535, TA 1537, TA 98 and TA 100 and S. typhimurium TA 1538)(OECDGuideline 471)(ECHA)(read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA) in vivo- mammalian somatic cell study: cytogenicity / erythrocyte micronucleus results NEGATIVE(Species: mouse)(EU Method B.12)(read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA)
		Tin	in vitro - Bacterial in vitro gene mutation study result was negative (Test species: S. typhimurium TA 1535, TA 1537, TA 98, TA 100 and TA 102) (OECD Guideline 471) (ECHA) in vitro - Mammalian cells In vitro cell production / Chromosome abnormality study result was negative (Test species: Chinese hamster Ovary (CHO))(OECD Guideline 473)(ECHA) in vitro- Mammalian cells In vitro genetic mutation study result was negative (Test species: Chinese hamster Ovary (CHO))(OECD Guideline 476 (ECHA)
		Bismuth	N/D
		Zinc	N/D
Reproductive toxicity		product	N/D
		Copper	As a result of the second generation reproductive toxicity test, no reproductive toxicity was observed at any concentration (species: rat) (OECD Guideline 416) (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8) (ECHA) As a result of the developmental toxicity test, the mean fetal weight was slightly lower and the incidence of skeletal mutation was slightly increased, but was not related to teratogenesis, preimplantation loss, or fetal death 6 mg/kg (Species: rabbit) (OECD Guideline 414) (read-across: copper (1+) hydroxide CAS No. 1344-69-0) (ECHA)
		Tin	Reproductive toxicity test results showed that no treatment occurred when citrus powder was administered to the test species by gavage for up to 56 days, and no significant effects were observed at this dose. F1 NOEL >1000mg/kg (test species: rat) (OECD Guideline) 421) (ECHA) Developmental toxicity test results: No effect at the relevant dose NOEL 1000 mg/kg (Test species: rat) (OECD Guideline 414) (ECHA)
		Bismuth	N/D
		Zinc	N/D

b) Health hazards information

Specific Target Organ Toxicity (Single Exposure)	product	N/D
	Copper	As a result of the dermal acute toxicity test, no clinical signs indicative of harmful or serious toxicity were observed, no deaths were found (read-across: Copper sulphate pentahydrate) (ECHA)
	Lead	No clinical observations related to acute toxicity test (ECHA)
	Zinc	N/D
	product	N/D
	Copper	N/D
	Tin	Fine particles may cause physical irritation to the respiratory tract (ICSC) (not applicable to this classification due to irritation due to the physical properties of metal particles) Acute toxicity No signs of toxic reactions are evident after inhalation exposure (ECHA)
	Bismuth	The general toxic effects of bismuth and bismuth compounds on humans include causing encephalopathy, renal failure, osteoarthrosis, gingivitis, stomatitis, colitis, etc. Neurotoxicity of inorganic bismuth (PATY (5th, 2001)). A statement that the clinical symptoms of acute poisoning are similar to those of mercury or lead, which cause neurological abnormalities with encephalopathy and renal dysfunction with nephrosis syndrome (PATY (5th, 2001)). In fact, there was a case of death due to neurotoxicity and necrosis of the cerebrum or cerebellum was observed (HSDB (2002)), and a case of acute renal failure after ingestion (HSDB (2002))
	Zinc	N/D
Specific Target Organ Toxicity (Repeated Exposure)	product	N/D
	Copper	Oral (subchronic)- LOAELs for liver damage were 1000 ppm (cancer) and 2000 ppm (male),and results for kidney damage were considered toxicologically insignificant due to their species-specific tendencies (species: rat). (EU Method B.26) (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8) (ECHA)Inhalation (subacute)- Not classified as no serious effects were observed as a result of the test (Species: rat) (OECD Guideline 412) (read-across: Copper oxide) (ECHA)
	Tin	Oral (subacute) - Administration of tin powder to test species for 28 days at dose levels of 30, 300, and 1000 mg/kg showed no relevant toxicity (test species: rat) (OECD Guideline 407) (ECHA) Respiratory When exposed to dust or fume, it is deposited by physical action and causes benign pneumoconiosis in humans. This form of pneumoconiosis occurs as long as exposure continues, but there is no characteristic fibrosis or complication factor (ICSC, NLM_HSDB)
	Bismuth	The brain, kidneys, and bones are listed as major target organs, and there are numerous case reports showing neurological symptoms resulting in encephalopathy due to chronic exposure to the substance. There have been numerous reports (PATY) that osteoarthrosis, pathological fractures, and osteoporosis accompanied by osteomalacia were recognized after chronic ingestion or treatment with the substance.
	Zinc	N/D

b) Health hazards information

Aspiration Hazard	product	N/D
	Copper	N/D
	Tin	N/D
	Bismuth	N/D
	Zinc	N/D

12. Ecological information

a) Aquatic and terrestrial ecotoxicity

Fish	product	N/D
	Copper	LC50 38.4~256.2μg/L 96hr Pimephales promelas (read-across: copper sulfate CAS No. 7758-98-7)(ECHA)
	Tin	LC50 >12.4mg/L 96hr Pimephales promelas(OECD Guideline 203)(ECHA)
	Bismuth	N/D
	Zinc	LC50 439μg/L 96hr (ECHA)
Crustacean	product	N/D
	Copper	48hr-EC50 7.7~430ug/L Daphnia magna (OECD202) (Copper(II)chloride dihydrate)
	Tin	N/D
	Bismuth	N/D
	Zinc	48hr-LC50 0.413mg/L Daphnia magna (US EPA EPA 821-R-02-012)
Algae	product	N/D
	Copper	EC50 32~245μg/L 72hr Pseudokirchneriella subcapitata (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA)
	Tin	EC50 >19.2μg/L 72hr Pseudokirchneriella subcapitata (OECD Guideline 201)(ECHA)
	Bismuth	N/D
	Zinc	N/D

b) Persistence and degradability

Persistence	product	N/D
	Copper	N/D
	Bismuth	N/D
	Zinc	N/D
	Zinc	N/D

b) Persistence and degradability

degradability	product	N/D
	Copper	N/D
	Bismuth	N/D
	Zinc	N/D
	Zinc	N/D

c) Bioaccumulative potential

bioaccumulation	product	N/D
	Copper	N/D
	Bismuth	N/D
	Zinc	N/D
	Zinc	N/D
biodegradability	product	N/D
	Copper	N/D
	Bismuth	N/D
	Zinc	N/D
	Zinc	N/D

d. Mobility in soil

product	N/D
Copper	N/D
Tin	N/D
Bismuth	N/D
Zinc	N/D

e. Other hazardous effect

product	N/D
Copper	Fish: NOEC 57.8, 109μg/L 96hr 32day Cyprinodon variegatus (OECD Guideline 210) (read-across: Copper (II) chloride dihydrate CAS No. 10125-13-0)(ECHA) Crustacean: NOEC 21.5~181μg/L 21day Daphnia magna (OECD Guideline 211) (read-across: Copper sulphate CAS No. 7758-98-7)(ECHA) Algae: NOEC 37.6~170.8μg/L 72hr Pseudokirchneriella subcapitata (read-across: copper chloride)(OECD Guideline 201)(ECHA)
Tin	shellfish: NOEC 100μg/L 7day Ceriodaphnia dubia (ECHA
Bismuth	N/D
Zinc	Fish: NOEC 50μg/L 5month Phoxinus phoxinus (ECHA) Crustacean: NOEC 25μg/L 1week Ceriodaphnia dubia (ECHA) Algae: NOEC 50μg/L 3day Pseudokirchneriella subcapitata (OECD Guideline 201)(ECHA)

13. Disposal considerations

a) Disposal method

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

b) Disposal precaution (including the disposal method of contaminated container and packaging)

Dispose of contents/container in accordance with relevant regulation.
Refer to manufacturer or supplier for information on recovery or recycling.

14. Transport information

a) UN number

N/D

b) UN proper shipping name

N/D

c) Transport hazard class

N/D

d) Packing group

e) Marine pollution

Not applicable

f) Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises

Emergency measures in case of fire N/D

Emergency measures in case of spill N/D

15. Regulatory information

a) Industrial Safety and Health Act

Hazardous substances subject to management (mixtures containing more than 1% of hazardous substances subject to management) (Copper,Tin ,Bismuth,Zinc)
Substances subject to work environment measurement (mixtures containing more than 1% of substances subject to work environment measurement)(Copper,Tin ,Bismuth,Zinc)
Harmful factors subject to special medical examination (mixture containing 1% or more of harmful factors subject to special medical examination) (Copper,Tin ,Bismuth,Zinc)
Substances for which exposure standards are set (Copper)

b) Toxic Chemical Control Act

Restricted Substance (06-5-8: Contains lead and concealed silver of 0.06% or more)Restricted Substance (06-5-8: Contains lead and silver of 0.06% or more of silver)(Lead)

c) Dangerous Material Safety Control Act

Not applicable

d) Wastes Management Act

industrial waste

e) Other requirements in domestic and other countries

Domestic regulations N/D

foreign regulations	U.S.A Regulatory information OSHA regulation : N/A CERCLA regulation : Copper(2270 kg(5000 lb)),Zinc(454 kg (1000 lb)) EPCRA regulation: N/A EPCRA 304 regulation : N/A EPCRA 313 regulation : Copper(regulated),Zinc(regulated) Rotterdam Convention : N/A Stockholm Convention : N/A Montreal Protocol : N/A EU Classification information : Copper(Aquatic Chronic 2(H411))

16. Other information

a) Information source and references

9. Physical and chemical properties: CAMEO Chemicals (vapor pressure), ECHA Registered substances (specific gravity, properties), melting point/freezing point, spontaneous ignition temperature, EPISUITE (n-octanol/water partition coefficient (Kow)), HSDB (odor, color) , initial boiling point and boiling point range), ICSC (solubility), pubchem (molecular weight), Zinc (flammability, pyrophoric, water reactivity) (ECHA)

11. Information on toxicity: ECHA (reproductive toxicity, oral, dermal, other adverse effects, germ cell mutagenicity, serious eye damage or irritation, specific target organ toxicity (repeated exposure), skin sensitization, skin corrosion or irritation, inhalation)

12. Environmental impact: ECHA (crustaceans, fish, Algae)

b) Issuing date

2013-07-08

c) Revision number and date

Revision number : 2 date : 2023-12-15

d) others

N/D