POONGSAN	SDS (SAFETY DATA SHEET)		
Product name	Phosphorus Bronze	Date of first creation	2022. 03. 25
		Revision No.	4
Control No.	PS-SDS-14	Date of last revision	2026. 06. 25
MSDS Submission No.	AA07087-0000000010	Date of validation	2026. 06. 25

SECTION 1 Identification of the substance or mixture and of the supplier

A. product name: Phosphorus Bronze
* Product Specification: C5102, C5111, C5191, C5210, C5212, C5240 (Contain : Tin plating material)

B. Recommended use of the chemical and restrictions on use
* Recommended use: Electricity, Socket, Decoration, Structure, Other Parts
* Restrictions on use: Not available

C. Manufacturer / Importer / Distributor Information
* Company name: Poongsan Ulsan Plant
* Address: 94 Sanam-ro Onsan-eup, Ulju-gun, Ulsan
* Emergency phone number: +82) 52 - 231 - 9114 (representative telephone), FAX: +82) 52 - 231 - 9400
* Department in charge: Quality Assurance Team

※ This products are solid metallic products which do generally constitute a non hazardous materials in solid.
However some hazardous elements contained in these products can be emitted under ceratin processing conditions such as but not limited to: burning, melting, cutting, grinding, machining and welding.
The following information is for the hazardous elements which may be released during processing.

SECTION 2 Hazards identification

A. GHS classification of the substance/mixture: Acute aquatic toxicity : Category 1
Chronic aquatic toxicity : Category 1

B. GHS label elements, including precautionary statements
* Pictogram and symbol

* Signal word: Warning
* Hazard statements: H400 Very toxic to aquatic life
H410 Very toxic to aquatic life with long lasting effects
* Precautionary statements
  - Precaution: P273 Avoid release to the environment.
  - Treatment: P391 Collect spillage.
  - Storage: none
  - Disposal: P501 Dispose of contents/container to an approved waste disposal plant.

C. GHS label elements, including precautionary statements: In the case of dust, powder, and fine particles, there is a possibility of an explosion when in contact with an ignition source

SECTION 3 Composition/information on ingredients

Alloy no.	Chemical Name	Common Name(Synonyms)	CAS number	Content (%)
C5102	Copper	-	7440-50-8	Balance
	Tin	-	7440-31-5	4.5 ~ 5.5
	Tricopper phosphide	Copper Phosphide (Cu_3P)	12019-57-7	0.03 ~ 0.35
C5111	Copper	-	7440-50-8	Balance
	Tin	-	7440-31-5	3.5 ~ 4.5
	Tricopper phosphide	Copper Phosphide (Cu_3P)	12019-57-7	0.03 ~ 0.35
C5191	Copper	-	7440-50-8	Balance
	Tin	-	7440-31-5	5.5 ~ 7.0

	Tricopper phosphide	Copper Phosphide (Cu_3P)	12019-57-7	0.03 ~ 0.35
C5210	Copper	-	7440-50-8	Balance
	Tin	-	7440-31-5	7.0 ~ 9.0
	Tricopper phosphide	Copper Phosphide (Cu_3P)	12019-57-7	0.03 ~ 0.35
C5212	Copper	-	7440-50-8	Balance
	Tin	-	7440-31-5	7.0 ~ 9.0
	Tricopper phosphide	Copper Phosphide (Cu_3P)	12019-57-7	0.03 ~ 0.35
C5240	Copper	-	7440-50-8	Balance
	Tin	-	7440-31-5	9.0 ~ 11.0
	Tricopper phosphide	Copper Phosphide (Cu_3P)	12019-57-7	0.03 ~ 0.35

※ In addition to the above ingredients, small amounts of other ingredients may be included as impurities.

SECTION 4 First aid measures

A. Eye contact
Call emergency medical service.
In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes.
Get medical advice/attention if you feel unwell.
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 contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes.

C. Inhalation
Keep victim warm and quiet.
Get medical advice/attention.
Get medical advice/attention if you feel unwell.

D. Ingestion
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.
Get medical advice/attention if you feel unwell.

E. Indication of immediate medical attention
Effects of contact or inhalation may be delayed.
Exposures require specialized first aid with contact and medical follow-up .

SECTION 5 Fire fighting measures

A. Suitable (and unsuitable) extinguishing media
Suitable extinguishing media: Covered fire extinguishers and powder fire extinguishers for dry sand, expanded vermiculite, expanded pearlite, water spray etc.
Unsuitable extinguishing media : high pressure water

B. Specific hazards arising from the chemical
May be ignited by heat, sparks or flames.
Containers may explode when heated.
Inhalation of material may be harmful.

C. Special protective equipment and precautions for fire-fighters
Move containers from fire area if you can do it without risk.
Runoff from fire control or dilution water may cause pollution.
Dike fire-control water for later disposal; do not scatter the material.
Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out.
Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
In case or fire: Use personal protective equipment as required.
Fire involving Tanks; Always stay away from tanks engulfed in fire.

SECTION 6 Accidental release measures

A. Personal precautions, protective equipmen and emergency procedures
Clean up spills immediately, observing precautions in Protective Equipment section.
Keep unnecessary and unprotected personnel from entering.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wear protective gloves/protective clothing/eye protection/face protection.

B. Environmental precautions and protective
Prevent entry to waterways

procedures

C. The methods of purification and removal

Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
Absorb the liquid and scrub the area with detergent and water.
Avoid release to the environment.
Collect spillage.

SECTION 7 Handling and storage

A. Precautions for safe handling

Obtain special instructions before use.
Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
Avoid release to the environment.
Please note that materials and conditions to avoid.
Please work with reference to engineering controls and personal protective equipment.
Do not handle until all safety precautions have been read and understood.
Do not eat, drink or smoke when using this product.
Wash the handling area thoroughly after handling.

B. Conditions for safe storage

Store locked up.
Store in a closed container.
Store in cool and dry place.
Empty drums should be completely drained, properly bunged, and promptly returned to a drum control, or properly placed.
Keep away from food and drinking water.

SECTION 8 Exposure controls/personal protection

A. Occupational Exposure limits

* Domestic regulations

Copper	TWA 1mg/m^3, STEL 2mg/m^3 (dust and mist) TWA 0.1mg/m^3 (fume)
Tin	TWA 2mg/m^3 (metal) TWA 0.1mg/m^3 (organic compound)

* ACGIH regulation

Copper	TWA 0.2mg/m^3 (fume) TWA 1mg/m^3 (metal dust)
Tin	TWA 2mg/m^3 (metal) TWA 0.1mg/m^3 (organic compound)

* Biological exposure index: Not available(No Data)

B. Appropriate engineering controls

Provide local exhaust ventilation system or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

C. Personal protective equipment

* Respiratory protection

Wear NIOSH or European Standard EN 149 approved full or half face piece (with goggles) respiratory protective equipment when necessary.
In case exposed to particulate material, the respiratory protective equipments as follow are recommended. ; facepiece filtering respirator or air-putifying respirator, high-efficiency particulate air(HEPA) filter media or respirator equipped with powered fan, filter media of use(dust, fume)
In lack of oxygen(< 19.6%), wear the supplied-air respirator or self-contained breathing apparatus.

* Eye protection

Wear safety goggles as follow if eye irritation or other disorder occur.
- In case of gaseous state organic material: enclosed safety goggles
- In case of vapour state organic material: safety goggles or breathable safety goggles
- In case of particulate material: breathable safety goggles

An eye wash unit and safety shower station should be available nearby work place.

* Hand protection

Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

* Body protection

Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

SECTION 9 Physical and chemical properties

A. Appearance	
* Description	Solid
* Color	Red
B. Odor	Odorless
C. Odor threshold	Not available(No Data)
D. pH	Not available(No Data)
E. Melting point/freezing point	1027 ℃
F. Initial boiling point and boiling range	Not available(No Data)
G. Flash point	Not available(No Data)
H. Evaporation rate	Not available(No Data)
I. Flammability (solid, gas)	Not available(No Data)
J. Upper/lower flammability or explosive limits	Not available(No Data)
K. Vapor pressure	Not available(No Data)
L. Solubility (ies)	Insoluble
M. Vapor density	Not available(No Data)
N. Specific gravity	8.80 (Water=1)
O. Partition coefficient n-octanol/water	Not available(No Data)
P. Auto ignition temperature	Not available(No Data)
Q. Decomposition temperature	Not available(No Data)
R. Viscosity	Not available(No Data)
S. Molecular weight	Not available(No Data)

SECTION 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. Inhalation of material may be harmful. Containers may explode when heated.
B. Conditions to avoid	Ignition sources (heat, sparks or flames)
C. Incompatible materials	Flammable material, acids, oxidizing agents, alkalis
D. Hazardous decomposition products	Irritating, corrosive and/or toxic gases

SECTION 11 Toxicological information

A. Information of Health Hazardous

* Acute toxicity

- Oral **ATEmix >2000 (mg/kg) → Not classified**

Copper	LD50 >2500mg/kg rat(male)(OECD Guideline 423)(read-aross: Copper oxide)(ECHA)
Tin	LD50 >2000mg/kg rat(female)(OECD Guideline 423)(ECHA)
Tricopper phosphide	Not available(No Data)

- Dermal **ATEmix >2000 (mg/kg) → Not classified**

Copper	LD50 >2000mg/kg rat(OECD Guideline 402)(read-aross: Copper oxide)(ECHA)
Tin	LD50 >2000mg/kg rat (OECD Guideline 402)(ECHA)
Tricopper phosphide	Not available(No Data)

- Inhalation **Dust/mist ATEmix >5 (mg/L) → Not classified**

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)
Tricopper phosphide	Not available(No Data)

* Skin corrosion/ irritation **Not classified**

Copper	No irritation observed (Species: rabbit) (OECD Guideline 404) (read-aross: Copper oxide) (ECHA)
Tin	In vivo- No irritant results from skin corrosion/irritation test (Species: rabbit) (EU Method B.4) (ECHA)
Tricopper phosphide	Not available(No Data)

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

Copper	No irritation observed (Species: rabbit) (OECD Guideline 405) (read-aross: Copper oxide) (ECHA)
Tin	In vivo- No irritation as a result of severe eye damage/irritation (Species: rabbit)(OECD Guideline 405)(ECHA)
Tricopper phosphide	Not available(No Data)

* Respiratory sensitization Not available(No Data)

* Skin sensitization **Not classified**

Copper	Not sensitizing (species: guinea pig) (OECD Guideline 406) (analog: Copper oxide) (ECHA)
Tin	As a result of skin sensitization test, the substance does not show sensitization (ECHA)
Tricopper phosphide	Not available(No Data)

* Carcinogenicity **Not classified**

- ACGIH Tin: A4 (Tin and organic compounds, as Sn)

* Mutagenicity **Not classified**

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- gene mutation study in bacteria results : NEGATIVE(Species: S. typhimurium TA 1535, TA 1537, TA 98, TA 100 and TA 102)(OECD Guideline 471)(ECHA) in vitro- cytogenicity / chromosome aberration study in mammalian cells results : NEGATIVE(Species: Chinese hamster Ovary (CHO))(OECD Guideline 473)(ECHA) in vitro- cytogenicity / chromosome aberration study in mammalian cells results : NEGATIVE(Species: Chinese hamster Ovary (CHO))(OECD Guideline 476)(ECHA)
Tricopper phosphide	Not available(No Data)

* Reproductive toxicity **Not classified**

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	As a result of the reproductive toxicity test, no treatment was achieved when the drug was administered by gavage to the test species for up to 56 days F1 NOEL >1000mg/kg (species: rat) (OECD Guideline) 421) (ECHA) As a result of developmental toxicity test, the dose was not affected NOEL 1000mg/kg (Species: Rat)(OECD Guideline 414)(ECHA)
Tricopper phosphide	Not available(No Data)

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

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)

Tin	Fine particles may cause physical irritation of the respiratory tract (ICSC) (Irritation due to the physical properties of metal particles does not apply to this classification) Acute toxicity Signs of toxic reactions not evident after inhalation exposure (ECHA)
Tricopper phosphide	Not available(No Data)

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

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)- no associated toxicity was observed in test species administered at dose levels of 30, 300 and 1000 mg/kg for 28 days (species: rat) (OECD Guideline 407) (ECHA) When exposed to respiratory dust or fumes, it is deposited by physical action and causes benign pneumoconiosis in humans.
Tricopper phosphide	Not available(No Data)

* Aspiration Hazard Not available(No Data)

SECTION 12 Ecological information

A. Ecological toxicity

* Fish

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)
Tricopper phosphide	Not available(No Data)

* Crustacean

Copper	EC50 31.8μg/L 48hr Ceriodaphnia dubia(ECHA)
Tin	Not available(No Data)
Tricopper phosphide	EC50 > 0.03 mg/L 48 h (Daphnia magna)(OECD Guideline 202)(ECHA)

* Algae

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)
Tricopper phosphide	Not available(No Data)

B. Persistence and degradability

* Persistence Not available(No Data)
* Degradability Not available(No Data)

C. Bioaccumulative potential

* Bioaccumulation Not available(No Data)
* Biodegradation Not available(No Data)

D. Mobility in soil Not available(No Data)

E. Other hazardous effect

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	Crustacean: NOEC 100μg/L 7day Ceriodaphnia dubia (ECHA)
Tricopper phosphide	Not available(No Data)

SECTION 13 Disposal considerations

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

B. Disposal precaution Dispose of contents/container in accordance with relevant regulation.

Refer to manufacturer or supplier for information on recovery or recycling.

SECTION 14	Transport information
A. UN Number	Not regulated
B. UN Proper shipping name	Not regulated
C. Transport Hazard class	Not regulated
D. Packing group	Not regulated
E. Environmental hazards	Not regulated
F. Special precautions * in case of fire * in case of leakage	Not regulated

SECTION 15	Regulatory information
A. Korea Regulatory information	
- Regulations under the Occupational Safety and Health Act	Hazardous substances subject to management (Mixtures containing 1% or more of hazardous substances subject to management) Substances subject to work environment monitoring (Mixtures containing 1% or more of substances subject to work environment monitoring) Hazardous factors subject to special health examinations (Mixtures containing 1% or more of hazardous factors subject to special health examinations) Substances with established exposure limits (Copper, Tin)
- Regulations under the Chemicals Control Act	Not applicable
- Regulations under the Act on Registration and Evaluation of Chemicals	Not applicable
- Regulations under the Dangerous Substances Safety Management Act	Not applicable
- Regulations under the Waste Control Act	Industrial waste
B. U.S.A Regulatory information & Other regulations	
* U.S.A Regulatory information	
- U.S.A management information (CERCLA Regulation)	Copper(2270 kg (5000 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)
* Other regulations	
- Substance of Rotterdam Convention	Not regulated
- Substance of Stockholm Convention	Not regulated
- Substance of Montreal Protocol	Not regulated
- Harmonised classification Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation)	Copper(Aquatic Chronic 2(H411))

SECTION 16	Other information
A. Information source and references	CAMEO Chemicals (steam pressure) ECHA (Generative toxicity, crustaceans, epigrams, percutaneous, other harmful effects, melting points/fish points, reproductive cell mutation, severe eye damage or irritation, fish, spontaneous combustion temperature, algae, specific target organ toxicity (repetitive exposure), dermatologic toxicity, skin corrosion or irritation, inhalation) ECHA Registered substances(Weight, characteristics)

	EPISUITE(Partition coefficient n-octanol / water (kow)) HSDB(Odor, color, initial boiling point and boiling point range)) ICSC(solubility) pubchem(molecular weight) Self test analysis data (Ulsan site Quality Assurance Team)
B. Issuing date	March 25, 2022
C. Revision number and date	
* revision number	Ver. 4
* date of the latest revision	June 25, 2026
D. Others	This Material Safety Data Sheet (SDS) is prepared according to the GHS (Globally Harmonized System of Classification and Labeling of Chemicals) standards of Korea. This data does not guarantee product quality, but describes safety, health and environmental issues for handling under normal conditions. If the properties of the product are changed due to heating or processing according to the usage method, please check the additional safety and health information before use. In addition, this information may be revised without prior notice, and materials can be provided through our website (www.poongsan.co.kr). For other details, please contact our Safety Environment Team or Quality Assurance Team.