Created on: 04/30/2024
Replaces SDS: 12/11/2023
Version: 1.1

Copper-Cobalt Alloy Powder / CuCo Alloy Powder

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Product identifier
Trade name: Copper-Cobalt Alloy Powder / CuCo Alloy Powder
Synonyms: CuNiCoSi

Relevant identified uses of the substance or mixture and uses advised against
Relevant identified uses: Metal powder for use in additive layer manufacturing.
Uses advised against: All other uses are strongly discouraged.

Details of the supplier of the safety data sheet

Supplier

Responsible Person:	Mike Casella
Phone:	+1 (630) 215-5689
E-Mail:	mike.casella@kmeamerica.com

Emergency telephone number
Giftinformationszentrum Nord, GIZ-Nord
Tel: +4955119240 (24/7, service provided in English)

SECTION 2: Hazards identification

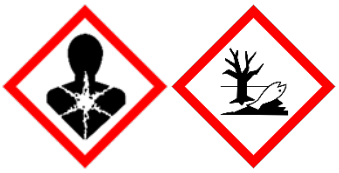
Classification of the substance or mixture
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

GHS – Classification
Skin sensitization, hazard category 1
Respiratory sensitization, hazard category 1
Germ cell mutagenicity, hazard category 2
Carcinogenicity, hazard category 1B
Reproductive toxicity, hazard category 1B
Specific target organ toxicity — repeated exposure, hazard category 2
Hazardous to the aquatic environment — Chronic, hazard category 2

Hazard Statements:
May cause an allergic skin reaction
May cause allergy or asthma symptoms or breathing difficulties if inhaled
Suspected of causing genetic defects
May cause cancer
May damage fertility
May cause damage to organs through prolonged or repeated exposure

Toxic to aquatic life with long lasting effects

Label elements
Signal word: **Danger**
Pictogram: **GHS08, GHS09**



Hazard Statements:
May cause an allergic skin reaction
May cause allergy or asthma symptoms or breathing difficulties if inhaled
Suspected of causing genetic defects
May cause cancer
May damage fertility
May cause damage to organs through prolonged or repeated exposure
Toxic to aquatic life with long lasting effects

Precautionary Statements:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/vapours/spray.
Contaminated work clothing should not be allowed out of the workplace.
Avoid release to the environment.
Wear protective gloves/protective clothing/eye protection/face protection.
Wear respiratory protection.
IF ON SKIN: Wash with soap and water.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF exposed or concerned: Get medical advice/attention.
Get Medical advice/attention if you feel unwell.
If skin irritation or a rash occurs: Get medical advice/attention.
If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
Take off contaminated clothing and wash it before reuse.
Collect spillage.
Store locked up.
Dispose of contents/container to waste disposal in accordance with local/regional/national regulations.

Other hazards
Nickel and cobalt are CMR substances. Nickel and cobalt are skin sensitizing, cobalt is additionally respiratory sensitizing. Copper is suspected to have endocrine disrupting properties.

SECTION 3: Composition/information on ingredients

Mixture

Chemical name	Concentration	CAS No	Classification	H-phrases
Copper	≤ 99,5 %	7440-50-8	Aquatic Chronic 2	H411
Nickel	≤ 3%	7440-02-0	Skin Sens. 1 Carc. 2 STOT RE 1 Aquatic Chronic 3	H317 H351 H372 H412
Cobalt	≤ 2 %	7440-48-4	Skin Sens. 1 Resp. Sens. 1 Muta. 2 Carc. 1B Repr. 1B Aquatic Chronic 4	H317 H334 H341 H350 H360F H413
Silicon	≤ 1,5 %	7440-21-3	-	-

Full text of H-phrases: see Section 16.

Further information

Nickel and cobalt are CMR substances. Nickel and cobalt are skin sensitizing, cobalt is additionally respiratory sensitizing. Copper is suspected to have endocrine disrupting properties.

SECTION 4: First aid measures

Description of first aid measures

General information

First responders: Ensure self-protection. IF exposed or if affected: Seek medical advice/call for medical assistance. Remove affected person from danger area and lie down.

After inhalation

IF INHALED: Remove person to fresh air and ensure unobstructed breathing. Seek medical attention if symptoms occur.

After skin contact

IF ON SKIN: Wash immediately with plenty of water and mild soap. If skin irritation occurs: Seek medical advice/attention.

After eye contact

IF IN EYES: Rinse cautiously with water for several minutes. Remove any contact lenses if possible. Continue to rinse. Consult a doctor.

After ingestion

DO NOT induce vomiting. Rinse out mouth. Never administer anything by mouth to an unconscious person. Seek medical advice/medical assistance.

Most important symptoms and effects, both acute and delayed
Dust may irritate the eyes and respiratory tract. The product is skin sensitizing and respiratory sensitizing.

Indication of any immediate medical attention and special treatment needed
Symptomatic treatment.

SECTION 5: Firefighting measures

Extinguishing media
Copper alloys in their bulk state are normally non-combustible, but fine powders or dusts of the material can pose an additional risk in the event of a fire. Adapt fire-fighting measures to the particular situation.

Suitable extinguishing media
Metal fire extinguishing powder, dry sand, sodium chloride.

Extinguishing media which must not be used for safety reasons
Water, CO_2

Special hazards arising from the substance or mixture
In the event of fire, copper alloys above 400 ° C can form toxic metal oxides that pose a major inhalation hazard.

Advice for firefighters
Adapt fire-fighting measures to the environment. Do not take any measures that involve personal risk or have not been adequately trained. If it is safe to do so, remove the container from the danger zone. Wear self-contained breathing apparatus (SCBA) with full face shield operating in positive pressure mode. Wear appropriate protective clothing/apparel that covers the entire body.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures
Wear protective gloves/protective clothing/eye protection/face protection. Remove contaminated clothing and wash before reuse. Ensure good ventilation. Avoid dust formation. Evacuate non-involved personnel from the area.

Environmental precautions
Avoid release into the environment. Do not allow to enter waters or drains. In case of uncontrolled release of larger quantities of the material into the environment, inform competent authorities and initiate appropriate environmental protection measures.

Methods and material for containment and cleaning up
Contain spillage. Pick up spilled material mechanically and place in a suitable waste container. Use vacuum suction with HEPA filters to clean up spilled material suppressing generation of airborne dust.

Reference to other sections
For information on safe handling see section 7.
For information on personal protection see section 8.
For information on disposal see section 13.

SECTION 7: Handling and storage

Precautions for safe handling

Advice on safe handling
Do not eat, drink, smoke or sniff when handling the product. Prevent contact with skin, eyes and clothing. Observe general workplace hygiene. Wash hands with soap and water before breaks, at the end of work and immediately after handling. Remove contaminated clothing and shoes immediately and do not wear outside of work area. Check gloves regularly for wear, leaks and contamination and replace accordingly. Keep away from food, feed and drink. Never store in containers that are used for, or can be mistaken for, food or beverage containers. Thoroughly clean work areas on a regular basis. Wear protective gloves/protective clothing/eye protection/face protection (see section 8.2). Remove contaminated clothing and wash before reuse.

Advice on fire and explosion protection
Avoid accumulation and swirling up of dust. Collect dust mechanically (e.g. with industrial vacuum cleaner).

Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and containers
Store only in the original container. Store container in a well-ventilated and dark place. Keep container tightly closed. Store in places without fire hazard, away from sources of sparks, ignition and heat. Protect from direct sunlight. Store under lock and key. Keep away from flammable materials. Keep away from food, beverages and animal feed. Observe and comply with all relevant local and national regulations concerning storage of containers.

Advice on combined storage
Keep separate from oxidizing agents.

Further information on storage conditions
Store in a dry place.

Specific end use(s)
Metal powder for use in additive layer manufacturing.

SECTION 8: Exposure controls/personal protection

Control parameters

Substance	CAS No.	Regulatory Limits			Recommended Limits	
		OSHA PEL		Cal/OSHA PEL	NIOSH REL	ACGIH® TLV
		ppm	mg/m³	8-hour TWA	Up to 10-hour TWA	

				(ST) STEL (C) Ceiling	(ST) STEL (C) Ceiling	
Cobalt metal, dust, and fume (as Co)	7440-48-4		0.1	0.02 mg/m3	0.05 mg/m3	See table below
Copper Fume (as Cu)	7440-50-8		0.1	0.1 mg/m³	0.1 mg/m³	See table below
Copper Dusts and mists (as Cu)	7440-50-8		1	1 mg/m³	1 mg/m³	See table below
Nickel, metal and insoluble compounds (as Ni)	7440-02-0		1	metal 0.5 mg/m³ insoluble 0.1 mg/m³	Ca 0.015 mg/m³	See table below
Silicon Total dust	7440-21-3		15	10 mg/m3	10 mg/m3	
Silicon Respirable fraction	7440-21-3		5	5 mg/m3	5 mg/m3	

Substance	ACGIH® TLV
Cobalt and inorganic compounds	TLV-TWA, 0.02 mg/m³, as Co, inhalable particulate matter Dermal sensitization (DSEN) and respiratory sensitization (RSEN) A3 – confirmed animal carcinogen with unknown relevance to human
Copper	TLV-TWA, 0.2 mg/m³ - fume, as Cu TLV-TWA, 1 mg/m³ - dusts and mists, as Cu
Nickel and inorganic compounds, including nickel subsulfide	TLV-TWA, 1.5 mg/m³, inhalable nickel particulate mass – elemental/metal A5 – not suspected as a human carcinogen TLV-TWA, 0.1 mg/m³, inhalable nickel particulate mass – soluble compounds A4 – not classifiable as a human carcinogen TLV-TWA, 0.2 mg/m³, inhalable nickel particulate mass – insoluble compounds A1 – confirmed human carcinogen

Exposure controls

Protective and hygiene measures
General precautions to be observed when handling the product. Avoid contact with eyes. Avoid contact with skin. Wash hands before breaks and at the end of work. Avoid dust formation. Technical protective measures always take precedence over all other personal protective measures. The use of mechanical equipment such as mechanical extraction methods always take precedence over manual work.

Respiratory protection
In case of dust formation: Wear respiratory protection against dust particles. Observe wearing time and manufacturer's instructions for use. Recommended respiratory protection: Half/quarter masks with multi-purpose filter ABEK/P3. All PPE must be NIOSH approved.

Hand protection
Use gloves made of nitrile rubber, butyl rubber or PVC (NIOSH approved). The glove material must be impermeable and resistant to the substance. The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer. When selecting gloves, mechanical risks and cut hazards must also be taken into account.

Eye protection
Select safety goggles with side shields or full safety goggles. In case of high risk, wear additional face shield.

Further skin protection
Wear suitable long-sleeved protective clothing when working. Full protective suit, if necessary. Body protective equipment must be selected in its design depending on the concentration and quantity of hazardous substances specific to the workplace. The personal protective equipment used must comply with respective national requirements.

Environmental exposure controls
Observe national emission regulations. Prevent product from entering drains, watercourses and soil.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance: Color Aggregate state	 Copper-red Solid
Particle Properties:	Particle size 5 - 200 µm
Odor:	odorless
Odor threshold:	Not applicable.
pH:	Not applicable.
Melting point/freezing point:	1075 °C to 1085 °C
Initial boiling point and boiling range:	Not determined.
Flashpoint:	Not applicable.
Evaporation rate:	Not applicable.
Flammability (solid, gaseous):	The material in solid form not flammable.

Upper/Lower flammability and explosion limits:	Material not flammable or explosive in solid form.
Vapor pressure:	Not applicable.
Vapor density:	Not applicable.
Relative density:	No data available.
Density:	approx. 8.9 g/cm3 as solid metal, approx. 4.9 g/cm3 as alloy powder
Solubility (in water):	Not applicable.
Partition coefficient: n-octanol / water:	No data available.
Auto ignition temperature: Solid:	Not applicable.
Decomposition temperature:	Not applicable.
Viscosity:	Not applicable.
Explosive Properties:	Non-explosive in solid form.
Oxidizing Properties:	No oxidizing properties.

Other information
No further information available.

SECTION 10: Stability and reactivity

Reactivity
The alloys have no known reactivity in their solid form when used under intended conditions.

Chemical stability
The product is stable when used as intended.

Possibility of hazardous reactions
Contact with incompatible materials will result in a corrosion reaction.

Conditions to avoid
Sources of ignition, open light. Avoid contact with incompatible materials. Metal oxides may form in extreme heat.

Incompatible materials
Strong oxidizing agents, acids, bases, halogens, mercury, ammonia, acetylene.

Hazardous decomposition products
Various hazardous decomposition products may be formed upon contact with incompatible materials. In case of fire, formation of toxic metal oxides possible.

SECTION 11: Toxicological information

Information on the likely routes of exposure

Acute toxicity

Acute toxicity Oral:

Cobalt	LD50 oral rat Value: 6171 mg/kg

Skin corrosion / irritation
Based on the available data, the classification criteria are not met.

Serious eye damage / irritation
Mechanical eye irritation possible.

Sensitization of respiratory tract / skin
The product is skin sensitizing and respiratory sensitizing: May cause an allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Germ cell mutagenicity
Cobalt is suspected of being germ cell mutagenic.

Carcinogenicity
The product is classified as carcinogenic.

Reproductive toxicity
Cobalt is toxic to reproduction.

Specific target organ toxicity single exposure
Dust may irritate the eyes and respiratory tract.

Specific target organ toxicity repeated exposure
May cause damage to organs through prolonged or repeated exposure.

Aspiration risk
Based on the available data, the classification criteria are not met.

Other information
Copper is suspected of having endocrine-disrupting properties.

SECTION 12: Ecological information

Toxicity
Copper alloys pose a general ecotoxicological risk to the environment.

Acute Toxicity Fish:

Copper	LC50 Fish (96 Hours) Minimum: 0.0087 mg/l Maximum: 21 mg/l Median: 0.665 mg/l
Nickel	LC50 Fish (96 Hours) Minimum: 0.0000475 mg/l Maximum: 350 mg/l Median: 40 mg/l

Acute Toxicity Algae:

Copper	EC50 Algae (72 or 96 Hours) Testing time: 72 Hours Minimum: 0.01 mg/l Maximum: 0.91 mg/l Median: 0.57 mg/l EC50 Algae (72 or 96 Hours) Testing time: 96 Hours Minimum: 0.04 mg/l Maximum: 9.2 mg/l Median: 7.9 mg/l

Acute Toxicity Crustaceans:

Copper	LC50 Crustaceans (48 Hours) Minimum: 0.000072 mg/l Maximum: 5.36 mg/l Median: 0.044 mg/l EC50 Crustaceans (48 Hours) Minimum: 0.0016 mg/l Maximum: 0.34 mg/l Median: 0.02 mg/l
Nickel	LC50 Crustaceans (48 Hours) Minimum: 1.28 mg/l Maximum: 9.28 mg/l Median: 8.85 mg/l EC50 Crustaceans (48 Hours) Minimum: 1 mg/l Maximum: 1 mg/l Median: 1 mg/l

Persistence and degradability
Not applicable for inorganic substances.

Bioaccumulative potential
Copper is an essential basic element; it is not accumulated but merely stored by some organisms for later use.

Mobility in soil
Copper alloys are practically insoluble in water.

Other adverse effects
Copper is suspected of having endocrine-disrupting properties.

SECTION 13: Disposal considerations

Waste treatment methods

Waste management
During waste handling, attention must be paid to the safety instructions for handling the product. The waste product must be disposed of through a licensed operator or sent to a metal recovery facility capable of handling fine waste. Contaminated packaging must be disposed of according to local guidelines.

Disposal methods
Dispose of waste and residues in accordance with local government regulations and in compliance with all local, national, and international regulations.

SECTION 14: Transport information

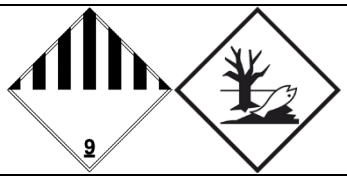
UN number

UN number	3077

UN proper shipping name

DOT	Environmentally hazardous substance, solid, n.o.s. (copper)
ADR / RID	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper)
IATA / IMDG	Environmentally hazardous substance, solid, n.o.s. (copper)

Transport hazard class(es).

DOT	No information available.
ADR / RID	
Class	9
Danger number	90
Labels	
Classification	M7
Tunnel code	-
Limited quantity Exempted quantity	5 kg E1
IMDG	
Class	9
EmS	F-A, S-F
Limited quantity Exempted quantity	5 kg E1
Packing instructions IMDG	P002 LP02
IBC instructions	IBC08

Packaging group

DOT	No information available.
ADR / RID	III
IMDG	III

Environmental hazards
Environmentally hazardous ingredients: copper, nickel, cobalt.

Special precautions for user
For information on safe handling see section 7.
For information on personal protection see section 8.
For information on disposal see section 13.

Transport in bulk according to Annex II of Marpol and the IBC Code
Not applicable.

SECTION 15: Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372.

Substance	CAS No.	Quantity
Cobalt	7440-48-4	≤ 2 %
Copper	7440-50-8	≤ 99,5 %
Nickel	7440-02-0	≤ 3%

Nickel (7740-02-2) is Listed on IARC (International Agency for Research on Cancer) Listed as carcinogen on NTP (National Toxicology Program).

US State Regulations
The following substances are listed on California Proposition 65 - Safe Drinking Water and Toxic Enforcement Act of 1986: Nickel (metallic), Cobalt.

U.S. - New Jersey - Right to Know Hazardous Substance List

Substance	CAS No.	Quantity
Cobalt	7440-48-4	≤ 2 %
Copper	7440-50-8	≤ 99,5 %
Nickel	7440-02-0	≤ 3%
Silicon	7440-21-3	≤ 1,5 %

All national and local legislation and regulations must be complied with.

SECTION 16: Other information

Changes to the previous version
Version 1 – creation – 12/11/2023
Version 1.1 – update – 04/30/2024.
Section 1.4 was updated.

Phrase meaning

Aquatic Chronic 2	Hazardous to the aquatic environment — Chronic hazard category 2
Aquatic Chronic 3	Hazardous to the aquatic environment — Chronic hazard category 3
Aquatic Chronic 4	Hazardous to the aquatic environment — Chronic hazard category 4
Carc. 1B	Carcinogenicity, hazard category 1B
Carc. 2	Carcinogenicity, hazard category 2
Muta. 2	Germ cell mutagenicity, hazard category 2
Repr. 1B	Reproductive toxicity, hazard category 1B
Resp. Sens. 1	Respiratory sensitization, hazard category 1
Skin Sens. 1	Skin sensitization, hazard category 1
STOT RE 1	Specific target organ toxicity — repeated exposure, hazard category 1
STOT RE 2	Specific target organ toxicity — repeated exposure, hazard category 2
H317	May cause an allergic skin reaction
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
H341	Suspected of causing genetic defects
H350	May cause cancer
H351	Suspected of causing cancer
H360F	May damage fertility
H372	Causes damage to organs through prolonged or repeated exposure
H373	May cause damage to organs through prolonged or repeated exposure
H411	Toxic to aquatic life with long lasting effects
H412	Harmful to aquatic life with long lasting effects
H413	May cause long lasting harmful effects to aquatic life

Acronyms

CAS	Chemical Abstracts Service
CMR	Substance classified as carcinogenic, mutagenic and toxic for reproduction
DOT	Department of Transportation
LC50	Lethal Concentration 50 %
LD50	Lethal Dose 50 %
UN	United Nations

Further information
This safety data sheet provides information on the safety precautions required. All information provided in this safety data sheet is to the best of our current knowledge and cannot be taken as a general or legal reference for specific product properties.