SAFETY DATA SHEET

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Chemical Name	Cupric oxide
Other names	Black copper oxide; Copper (II) oxide; Copper oxide
CAS No.	1317-38-0

1.2 Recommended uses of the substance

Ceramics; Coatings, inks; Cosmetics; Electroplating and Galvanic Fertiliser; Generic formulation; Laboratory chemicals; Lubricants and greases; Raw material for production of other compounds and fine chemicals; Washing and cleaning products; Active substance in wood preservatives; Trace mineral source in animal feeds and fertilizers.

Uses advised against: None

1.3 Details of the supplier of the safety data sheet

Company Identification	ADCHEM (AUSTRALIA) PTY LTD PO Box 103 Linkson Street Burra S.A 5417 Australia
Telephone	+61 8 8892 2200
Fax	+61 8 8892 2008
E-mail	lankathilaka@adchemaust.com.au

1.4 Emergency telephone number

1800 638 556 (within Australia)
0800 154 666 (within New Zealand)
+61 438 465 960 (International)

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

The classification is based on the criteria in the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

2.1.1 Classification according to GHS

Aquatic Acute 1
Aquatic Chronic 1

2.1.2 Additional Information

For full text of hazard hazard statements: See Section:16

2.2 Label elements

Labelling according to GHS

Hazard pictogram(s)

GHS09

Signal word(s)	Warning
Hazard statement(s)	H410: Very toxic to aquatic life with long lasting effects.
Precautionary statement(s)	P273: Avoid release to the environment. P391: Collect spillage. P501: Disposal should be in accordance with local, state or national legislation.
Supplemental Hazard information	Not applicable

2.3 Other hazards

Dust may have irritant effect on skin, eyes and air passages.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Component	%W/W	CAS No.	Hazard statement(s) (GHS Classification)
Cupric oxide	≥ 98.0	1317-38-0	H400: Very toxic to aquatic life. H410: Very toxic to aquatic life with long lasting effects.
Ingredients determined not to be hazardous	Balance		

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

Inhalation	In case of accident by inhalation: remove casualty to fresh air and keep at rest. Symptoms may develop after several hours. Medical observation of breathing may be necessary.
Skin Contact	After contact with skin, wash immediately with plenty of water. If symptoms develop, seek medical attention.
Eye Contact	If substance has got into the eyes, immediately wash out with plenty of water. Seek medical advice.
Ingestion	If swallowed, rinse mouth with water (only if the person is conscious). Do NOT induce vomiting. Give plenty of water to drink. If signs/symptoms continue, get medical attention.

4.2 Most important symptoms and effects, both acute and delayed

Gastro-intestinal symptoms are the first symptoms following high oral intake of copper compounds. Vomiting may occur. The most critical organ for delayed effects of "copper" excess is the liver. Nose/lung irritation may occur after inhalation of dusts.

4.3 Indication of the immediate medical attention and special treatment needed

Treat symptomatically. See Section: 4.1

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Suitable Extinguishing Media	As appropriate for surrounding fire. Extinguish with carbon dioxide, dry chemical, foam or waterspray.
Unsuitable Extinguishing Media	Water jets.

5.2 Special hazards arising from the substance or mixture

In case of fire: Carbon dioxide, carbon monoxide & copper oxides may be released.

5.3 Advice for fire-fighters

Fire fighters should wear complete protective clothing including self-contained breathing apparatus.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Ensure full personal protection (including respiratory protection) during removal of spillages. Avoid generation of dust.

6.2 Environmental precautions

Avoid release to the environment. Do not allow to enter drains, sewers or watercourses.

6.3 Methods and material for containment and cleaning up

Clean up spill immediately. Avoid dust generation. Transfer to a container for disposal. Use appropriate container to avoid environmental contamination.

6.4 Reference to other sections

See Section: 7, 8 & 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Ensure adequate ventilation. Avoid dust generation.

7.2 Conditions for safe storage, including any incompatibilities

Non-combustible. Store in a dry place. Store in a closed container. Store away from foodstuffs.

Storage Temperature	Keep in a cool place out of direct sunlight.
Storage Life	Stable under normal conditions.
Incompatible materials	May react violently with: Acids, bases

7.3 Specific end use(s) Industrial chemicals. See Section: 1.2 Identified use(s).

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Occupational Exposure Limits

The following national occupational exposure limit values for copper and copper compounds apply*:

Country	LTEL (8 hr TWA mg/m³)**	STEL (mg/m³) (ca.15 min)	Note:
Australia	1		Copper, Dusts & mists (as Cu)
China	1		Copper, Dusts & mists (as Cu)
France	1	2	Copper, Dusts & mists (as Cu)
Germany	0.01 (Respirable Dust)	0.02 (Respirable Dust)	Copper, Dusts & mists (as Cu)
Netherlands	0.1	0.2	Inhalable aerosol
New Zealand	1		Copper, Dusts & mists (as Cu)
Singapore	1		Copper, Dusts & mists (as Cu)
South Korea	1	2	Copper, Dusts & mists (as Cu)
Spain	1	-	Copper, Dusts & mists (as Cu)
Sweden	1 (Total Dust) 0.2 (Respirable Dust)	-	Copper and inorganic compounds (as Cu).
United Kingdom	1	2	Copper, Dusts & mists (as Cu)
USA (OSHA)	1		

* Sources: GESTIS and AFS 200:17
** TWA is the Time-Weighted Average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.

8.1.2 Biological limit value No information available.

8.2 Exposure controls

8.2.1 Appropriate engineering controls Provide adequate ventilation when using the material and follow the principles of good occupational hygiene to control personal exposures. Avoid generating and inhaling dusts. Use with local exhaust ventilation or wear a dust mask.

8.2.2 Personal protection equipment

Eye/face protection

As a precautionary measure, it is advisable to wear suitable safety glasses with side-shields, goggles, or a full-face shield.

Skin protection (Hand protection/ Other)

As a precautionary measure, it is advisable to wear gloves made of an impervious material such as PVC.
Wear appropriate clothing, including chemical resistant overalls where clothing is likely to be contaminated.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment. (P1 or P2 particulate filter respirator.) Final choice of appropriate breathing protection is dependent upon actual airborne concentrations.

8.2.3 Environmental Exposure Controls Avoid release to the environment. Clean up spill immediately. Transfer to a container for disposal.. See Section: 12

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Powder.
Colour	Black.
Odour	Odourless.
Odour Threshold (ppm)	Not applicable.
pH (Value)	Not applicable. (inorganic solid).
Melting Point (°C)	1326°C .
Boiling point/boiling range (°C):	Not applicable. (Melting point (°C)>300)
Flash Point (°C)	Not applicable. (inorganic solid).
Evaporation rate	Not applicable. (inorganic solid).
Flammability (solid, gas)	Non-flammable.
Flammable Limits (Upper) (%v/v)	Not applicable.
Vapour Pressure (Pascal)	Not applicable. (inorganic solid Melting Point (1326°C)).
Vapour Density (Air=1)	Not applicable. (inorganic solid).
Relative Density	6.31 g/cm³ at 20°C

	Solubility (Water)	>0.230 g/l at 20°C (pH 5.1– 5.5) 0.000394 g/l at 20°C (pH 6) 0.00001 g/l at 20°C (pH 9)
	Partition Coefficient (n-Octanol/water)	Not applicable. (inorganic solid).
	Auto Ignition Temperature (°C)	None
	Decomposition Temperature (°C)	>300ºC at 101.72 kPa
	Viscosity (mPa.s)	Not applicable (inorganic solid)
	Explosive properties	Not explosive.
	Oxidising properties	Not oxidising.
	Percent Volatile by volume (%)	0%
9.2	**Other information**	None

SECTION 10: STABILITY AND REACTIVITY

10.1	**Reactivity**	Thermally stable.
10.2	**Chemical stability**	Stable under normal conditions.
10.3	**Possibility of hazardous reactions**	Will not occur.
10.4	**Conditions to avoid**	Avoid dust generation and extremes of temperature.
10.5	**Incompatible materials**	May react with: Acids, bases
10.6	**Hazardous Decomposition Product(s)**	In the event of a fire; Carbon dioxide, carbon monoxide and copper oxides may be released.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

11.1.1 Substances

Comparative bioavailability	Solubility and toxicity studies show that sparingly soluble copper oxide is less bioavailable than more soluble copper salts, e.g. copper sulphate. Therefore, in order to reduce animal testing, all long- term studies have been conducted on soluble copper salts.
Absorption	Copper is an essential element, and therefore its concentration in the body is strictly and efficiently regulated by homeostatic mechanisms.
Oral	An oral absorption of 25% is used, based on studies in the rat.
Inhalation	The “respirable” and “inhalable” fraction is assumed by default to be 100%. If necessary, the Multiple Path Model of Particle Deposition (MPPD) can be used to quantify particle size dependent absorption of the “inhalable” fraction.
Dermal	A dermal absorption of 0.3% has been adopted for soluble and insoluble copper substances in solution or suspension, based on in- vitro percutaneous tests with human skin. For dry exposure, a dermal absorption value of 0.03% applies.
Acute toxicity	
Oral	LD_{50} > 2500 mg/kg bw (male rats). Test guideline OECD 423 [Sanders, 2002]. Cupric oxide does not meet the criteria for classification.
Dermal	LD_{50} > 2000 mg/kg (male and female rats). Test guideline OECD 402 [Sanders, 2002]. Cupric oxide does not meet the criteria for classification.
Inhalation	Copper oxide showed little/no toxicity when administered to test animals by other routes. Furthermore, information on the particle size distribution and low water solubility of copper oxide indicate a low potential for inhalation exposure. Cupric oxide does not meet the criteria for classification.
Skin corrosion/irritation	No skin irritation was seen in test animals (rabbits). Test guideline OECD 404 [Sanders, 2002]. Cupric oxide does not meet the criteria for classification.
Serious eye damage/irritation	A test carried out in 3 male rabbits resulted in scattered or diffuse corneal opacity in one treated eye up to 72 hours and iridial inflammation up to 48 hours. Test guideline 405 [Sanders, 2002]. Cupric oxide does not meet the criteria for classification.
Respiratory or skin sensitization	No sensitisation reaction was seen in any test animals in a guinea pig Maximisation test. Test guideline OECD 406 [Sanders, 2002]. Cupric oxide does not meet the criteria for classification as a skin sensitiser.
Germ cell mutagenicity	Negative results were obtained for copper sulphate in vitro in a bacterial cell reverse mutation assay (OECD 471). An in vivo unscheduled DNA synthesis test (equivalent to OECD 486) and a mouse micronucleus test (EC method B.12) performed on copper sulphate also gave negative results [Ballantyne, 1994; Ward, 1994; Riley, 1994]. Cupric oxide does not meet the criteria for classification.
Carcinogenicity	Based on a weight of evidence approach, it was concluded that copper compounds do not have carcinogenic potential. Cupric oxide does not meet the criteria for classification.

Reproductive toxicity	NOAEL for toxicity to reproduction of copper sulphate pentahydrate in rats is > 1500 ppm in food. Test guideline OECD 416 [Mylchreest, 2005]. The NOAEL for maternal toxicity and developmental effects in rabbits in a study according to OECD 414 was 6 mg Cu/kg/bw/day [Munley, 2003]. Cupric oxide does not meet the criteria for classification.
STOT-single exposure	Cupric oxide is not classified on the basis of acute oral, inhalation or dermal toxicity. Cupric oxide does not meet the criteria for classification as STOT for a single exposure.
STOT-repeated exposure	A 90-day oral repeat dose study (Hébert, 1993) conducted with copper sulphate pentahydrate in rats and mice in accordance with a test method equivalent to EU B.26 gave the following results: Forestomach lesions: NOAEL in the rat: 16.7 mg Cu/kg bw/day NOAEL in male mice: 97 mg Cu/kg bw/day NOAEL in female mice: 126 mg Cu/kg bw/day Liver and kidney damage: 16.7 mg Cu/kg bw/day The NOAEL rat study was used to calculate an oral and systemic DNEL of 0.041 mg Cu/kg bw/day (including a Safety factor of 100 and an oral absorption of 25%). Cupric oxide does not meet the criteria for classification.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Acute aquatic toxicity test results and environmental classification	Acute toxicity of copper ions was assessed using 451 L(E)C_{50} values from studies on soluble copper compounds. The lowest species-specific geometric mean reference value of 25.0 µg Cu/L was an L(E)C_{50} obtained for Daphnia magna at pH 5.5 - 6.5 [Van Sprang et al., 2010]. See section 2 for environmental hazards classification.
Chronic Freshwater toxicity test results and PNEC derivation	Chronic toxicity of copper ions was assessed using 139 NOEC/EC_{10} values from 27 species representing different trophic levels. Species-specific NOECs were normalised using Biotic Ligand Models and used to derive Species Sensitivity Distributions (SSD) and a lowest HC_5 (median fifth percentile of the SSD) of 7.8 µg dissolved Cu/L. Applying an assessment factor of 1, a chronic freshwater PNEC of 7.8 µg dissolved Cu/L is assigned to assess local risks.
Chronic marine waters toxicity test results and PNEC derivation	Chronic toxicity of copper ions was assessed using 51 NOEC/EC_{10} values from 24 species representing different trophic levels. Species-specific NOECs were calculated after normalizing to dissolved organic carbon (DOC) and were used to derive SSDs and HC_5 values. Normalization at a typical DOC for coastal waters of 2 mg/l resulted in an HC_5 of 5.2 µg dissolved Cu/L. Applying an assessment factor of 1, a default chronic marine PNEC of 5.2 µg dissolved Cu/L is assigned to assess local risks.
Chronic freshwater sediment toxicity test results and PNEC derivation	Toxicity of copper ions was assessed using 62 NOEC values from 6 benthic species. The NOECs were related to DOC and Acid Volatile Sulphide (AVS) and were used to derive SSDs and HC_5 values. An HC_5 of 1741 mg Cu/kg OC, corresponding to 87 mg Cu/kg dry weight, was calculated for a low AVS sediment with a default OC of 5%. Applying an assessment factor of 1, a default chronic freshwater sediment PNEC of 87 mg Cu/kg dry weight is assigned to assess local risks.
Chronic marine sediment toxicity test results and PNEC derivation	Toxicity of copper ions from soluble copper compounds was assessed using 62 NOEC values from 6 benthic species. The NOECs were related to DOC and Acid Volatile Sulphide (AVS) and were used to derive SSDs and HC_5 values. An HC_5 of 1741 mg Cu/kg OC, corresponding to 87 mg Cu/kg dry weight, was calculated for a low AVS sediment with a default OC of 5%. Applying an assessment factor of 1, a default chronic marine water sediment PNEC of 676 mg Cu/kg dry weight is assigned to assess local risks.
Chronic terrestrial toxicity test results and PNEC derivation	Toxicity of copper ions was assessed using 252 NOEC/EC_{10} values from 28 different species representing different trophic levels. NOEC values were adjusted to account for differences between lab-spiked soils and field-contaminated soils by the addition of a leaching ageing factor of 2. The adjusted values were then normalized to a range of EU soils using regression bio-availability models and used to derive SSDs and a lowest HC_5 value of 65.5 mg Cu/kg dry weight [Oorts et al., 2010]. Applying an assessment factor of 1, a default chronic soil PNEC of 65.5 mg Cu/kg dry weight is assigned.
Toxicity to Sewage Treatment Plant (STP) micro-organisms	The toxicity of copper ions was assessed using NOEC and EC_{50} values from high quality studies with STP bacteria and protozoa. The NOEC was 0.23 mg Cu/L in the STP [Cha et al., 2004]. Applying an assessment factor of 1, a PNEC of 0.23 mg Cu/L is assigned for Sewage Treatment Plant.
12.2 Persistence and degradability	Cupric oxide does not meet the criteria for “persistent”. Copper ions derived from cupric oxide cannot be degraded.

12.3	**Bioaccumulative potential**	Copper is an essential nutrient regulated by homeostatic mechanisms and does not bioaccumulate.
12.4	**Mobility in soil**	Copper ions bind strongly to soil. The median water-soil partitioning coefficient (kp) is 2120 l/kg.
12.5	**Other adverse effects**	Cupric oxide does not contribute to ozone depletion, ozone formation, global warming or acidification.
	Other information	See Section: 8.1.3

SECTION 13: DISPOSAL CONSIDERATIONS

13.1	**Waste treatment methods**	Dispose surplus or waste materials in accordance with local or national regulatory guidelines.
13.2	**Additional Information**	Avoid release to the environment. Do not allow to enter drains, sewers or watercourses. Dispose of surplus and contaminated materials (including sawdust) at an approved landfill or in accordance with other national or regional provisions. European Waste Catalogue 06 11 99 Wastes not otherwise classified

SECTION 14: TRANSPORT INFORMATION

AUSTRALIA:

Under the Australian Code for the Transport of Dangerous Goods by road and rail (ADG) this product is not classified as a Dangerous Good within Australia.

		Land transport (ADR/RID)	**Sea transport (IMDG)**	**Air transport (ICAO/IATA)**
		ADR/RID Class 9 (M7) Miscellaneous dangerous substances and articles	IMDG Class 9	ICAO/IATA Class 9
14.1	**UN number**	UN3077	UN3077	UN3077
14.2	**UN Proper Shipping Name**	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper oxide).	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper oxide).	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper oxide).
14.3	**Transport hazard class(es)**	9 	9 	9 
14.4	**Packing Group**	III	III	III
14.5	**Environmental hazards**	Environmentally hazardous substance	Environmentally hazardous substance. Classified as a Marine Pollutant.	Environmentally hazardous substance
14.6	**Special precautions for user**	No information available	No information available	No information available
	Additional Information	IERG number: 47		Goods packaging method: #5.9.9

SECTION 15: REGULATORY INFORMATION

15.1	**Safety, health and environmental regulations/legislation specific for the substance or mixture**	
	Authorisations and/or restrictions on use	None known
	International Inventories (Listed)	EC inventory (EU); United States (TSCA); Canada (DSL/NDSL); AICS (Australia); NZIoC (New Zealand); Japan (ENCS); ECL (Korea); Philippines (PICCS); China (IECSC)
15.2	**Other information**	Cupric oxide is not an ozone-depleting substance and not a persistent organic pollutant.
	US EPA (FIFRA)	This chemical is a pesticide product registered by the US Environmental Protection Agency and is subject to certain labelling requirements under US federal pesticide law.

These requirement differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the registration information and hazard information as required on the pesticide label:
Technical Grade Cupric Oxide EPA Reg. No. 56248-1
EPA Est. No. 56248-AU-001
CAUTION

- Harmful if inhaled or absorbed through skin
- Causes moderate eye and skin irritation
- Avoid breathing dust and contact with eyes or skin

SECTION 16: OTHER INFORMATION

Revision: 1
Date of Revision: 25-03-2019

LEGEND

LTEL	Long Term Exposure Limit
STEL	Short Term Exposure Limit
STOT	Specific Target Organ Toxicity
DNEL	Derived No Effect Level
PNEC	Predicted No Effect Concentration

Hazard statement(s) / Precautionary statement(s)
H400: Very toxic to aquatic life.
H410: Very toxic to aquatic life with long lasting effects.
P273: Avoid release to the environment.
P391: Collect spillage.
P501: Disposal should be in accordance with local, state or national legislation.

Additional Information:
A full list of references can be provided upon request.