



WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet
Issue Date: 30-Mar-2006
C317SC

CHEMWATCH 63551
CD 2006/2 Page 1 of 14

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

WIA AUSTMIG NICRMO

SYNONYMS

"MIG wire", "gas metal arc-welding electrode", GMAW, AS2717.1, "GMAW wire for medium strength steels"

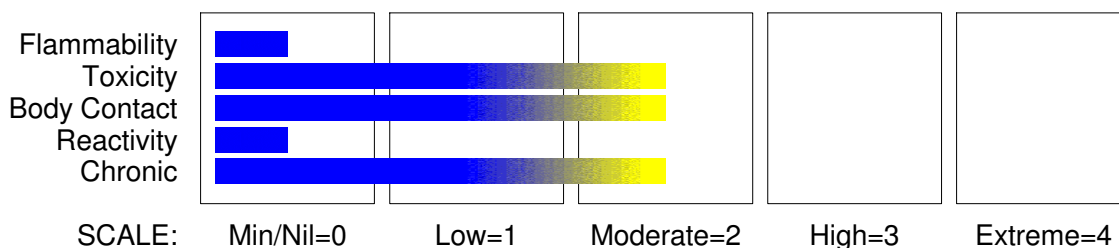
PRODUCT USE

Consumable electrode for gas metal arc welding on high strength steels. Used under shielding gas, typically argon, CO2 or mixtures.

SUPPLIER

Company: Welding Industries Of Australia
Address:
5 Allen Street
Melrose Park
SA, 5039
AUS
Telephone: +61 8 8276 6494
Telephone: 1300 300 884
Fax: 1300 301 884

HAZARD RATINGS



Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

None

RISK

Inhalation and/or ingestion may produce health damage*.
Cumulative effects may result following exposure*.
May produce discomfort of the respiratory system*.
Limited evidence of a carcinogenic effect*.

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet

Issue Date: 30-Mar-2006

C317SC

CHEMWATCH 63551

CD 2006/2 Page 2 of 14

Section 2 - HAZARDS IDENTIFICATION

May affect fertility*.

* (limited evidence).

SAFETY

Keep container in a well ventilated place.

Avoid exposure - obtain special instructions before use.

Take off immediately all contaminated clothing.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
welding wire which upon use generates (with CO2 shield gas)		
welding fumes	Not avail.	
as		
iron oxide fume	1309-37-1	>60
nickel fume	7440-02-0	<1
manganese fume	7439-96-5	<1
silica welding fumes	69012-64-2	<1
copper fume	7440-50-8	<0.1
action of arc may produce		
ozone	10028-15-6	
nitrogen oxides	Mixture	

Note: Fume composition may vary depending on the shielding gas used.

Section 4 - FIRST AID MEASURES

SWALLOWED

Not normally a hazard due to the physical form of product. The material is a physical irritant to the gastro-intestinal tract.

EYE

- Particulate bodies from welding spatter may be removed carefully.
- DO NOT attempt to remove particles attached to or embedded in eye.
- Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye.
- Seek urgent medical assistance, or transport to hospital.
- For "arc eye", i.e. welding flash or UV light burns to the eye:
- Place eye pads or light clean dressings over both eyes.
- Seek medical assistance.

SKIN

If skin or hair contact occurs:

- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet

Issue Date: 30-Mar-2006

C317SC

CHEMWATCH 63551

CD 2006/2 Page 3 of 14

Section 4 - FIRST AID MEASURES

- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

Copper, magnesium, aluminium, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, brazing, galvanising or smelting operations all give rise to thermally produced particulates of smaller dimension than may be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce "metal fume fever" in workers from an acute or long term exposure.

- Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)
- Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.
- Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.
- The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.
- Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.
[Ellenhorn and Barceloux: Medical Toxicology].

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- There is no restriction on the type of extinguisher which may be used.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

- Non combustible.
- Not considered a significant fire risk, however containers may burn.

FIRE INCOMPATIBILITY

Welding electrodes should not be allowed to come into contact with strong acids or other substances which are corrosive to metals.

HAZCHEM

None

Personal Protective Equipment

Breathing apparatus.

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet
Issue Date: 30-Mar-2006
C317SC

CHEMWATCH 63551
CD 2006/2 Page 4 of 14

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

Clean up all spills immediately.
Wear impervious gloves and safety glasses.
Use dry clean up procedures and avoid generating dust.
Place in suitable containers for disposal.

MAJOR SPILLS

Minor hazard.

- Clear area of personnel.
- Alert Fire Brigade and tell them location and nature of hazard.
- Control personal contact by using protective equipment if risk of overexposure exists.
- Prevent, by any means available, spillage from entering drains or water courses.
- Contain spill/secure load if safe to do so.
- Bundle/collect recoverable product and label for recycling.
- Collect remaining product and place in appropriate containers for disposal.
- Clean up/sweep up area. Water may be required.
- If contamination of drains or waterways occurs, advise emergency services.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:
iron oxide fume 500 mg/m³

irreversible or other serious effects or symptoms which could
impair an individual's ability to take protective action is:
iron oxide fume 25 mg/m³

other than mild, transient adverse effects
without perceiving a clearly defined odour is:
iron oxide fume 15 mg/m³

The threshold concentration below which most people
will experience no appreciable risk of health effects:
iron oxide fume 10 mg/m³

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+ + + + + +

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet
Issue Date: 30-Mar-2006
C317SC

CHEMWATCH 63551
CD 2006/2 Page 5 of 14

Section 6 - ACCIDENTAL RELEASE MEASURES

- +: May be stored together
O: May be stored together with specific preventions
X: Must not be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

Earth all lines and equipment.

- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

Packaging as recommended by manufacturer.
spools

STORAGE INCOMPATIBILITY

Segregate from strong acids.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL m5/m ³	Peak ppm	Peak mg/m ³
Australia Exposure Standards	iron oxide fume		5				
Australia Exposure Standards	iron oxide fume		10				
Australia Exposure Standards	nickel fume		1				
Australia Exposure Standards	manganese fume		1		3		

continued...

WIA AUSTMIG NiCrMo

Chemwatch Material Safety Data Sheet
 Issue Date: 30-Mar-2006
 C317SC

CHEMWATCH 63551
 CD 2006/2 Page 6 of 14

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL m5/m ³	Peak ppm	Peak mg/m ³
Australia Exposure Standards	manganese fume		1				
Australia Exposure Standards	copper fume		1				
Australia Exposure Standards	copper fume		0.2				
Australia Exposure Standards	ozone					0.1	0.2

The following materials had no OELs on our record under the following CAS or Chemwatch (CW) numbers
 WIA AUSTMIG NiCrMo: No data available for CW:63551
 welding fumes: No data available for CW:35201
 manganese fume: No data available for CAS:7439-96-5
 silica welding fumes: No data available for CAS:69012-64-2
 copper fume: No data available for CAS:7440-50-8
 nitrogen oxides: No data available for
 Mixture: No data available for

EMERGENCY EXPOSURE LIMITS

Material	Original IDLH Value (ppm)	Original IDLH Value (mg/m ³)	Revised IDLH Value (mg/m ³)	Revised IDLH Value (ppm)
iron oxide fume	N.E.	N.E.	2,500	
nickel fume	N.E.	N.E.	10	
manganese fume	N.E.	N.E.	500	
copper fume	N.E.	N.E.	100	
ozone	10			5

None assigned. Refer to individual constituents.

INGREDIENT DATA

WELDING FUMES:

In addition to complying with any individual exposure standards for specific contaminants, where current manual welding processes are used, the fume concentration inside the welder's helmet should not exceed 5 mg/m³, when collected in accordance with the appropriate standard (AS 3640, for example).

ES* TWA: 5 mg/m³

TLV* TWA: 5 mg/m³, B2 (a substance of variable composition)

OES* TWA: 5 mg/m³

Most welding, even with primitive ventilation, does not produce exposures inside the welding helmet above 5 mg/m³. That which does should be controlled (ACGIH).

Inspirable dust concentrations in a workers breathing zone shall be collected and measured in accordance with AS 3640, for example. Metal content can be analytically determined by OSHA Method ID25 (ICP-AES) after total digestion of filters and dissolution of captured metals. Sampling of the Respirable Dust fraction requires cyclone separator devices (elutriators) and procedures to comply with AS 2985 (for example).

IRON OXIDE FUME:

ES* TWA: 5 mg/m³ (as Fe in fumes and gases from welding and cutting)

TLV* TWA: 5 mg/m³ (as Fe) A4

NOTE: This substance has been classified by the ACGIH as A4 NOT classifiable as causing Cancer in humans.

OES* TWA: 5 mg/m³; STEL: 10 mg/m³ (as Fe)

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet

Issue Date: 30-Mar-2006

C317SC

CHEMWATCH 63551

CD 2006/2 Page 7 of 14

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

NICKEL FUME:

TLV* TWA: 1.5 mg/m³ A5 (as Ni elemental)

NOTE: This substance has been classified by the ACGIH as A5 NOT suspected of causing Cancer in humans.

ES* TWA: 1 mg/m³ Sensitiser (Under review)

NOTE: Detector tubes for nickel, measuring in excess of 0.25 mg/m³ (as Ni), are commercially available.

MANGANESE FUME:

ES* TWA: 1 mg/m³ STEL: 3 mg/m³

OES* TWA: 1 mg/m³; STEL: 3 mg/m³ (as Mn)

SILICA WELDING FUMES:

Not available. Refer to individual constituents.

COPPER FUME:

IDLH Level: 100 mg/m³

OZONE:

NOTE: Detector tubes for ozone, measuring in excess of 0.05 ppm, are commercially available.

Exposure at 0.2 ppm appears to produce mild acute but not cumulative effects. It is thought that exposures of the order of 0.1 ppm will be tolerated by most workers including asthmatics. Chronic exposure at 0.1 ppm or more can induce significant adverse effects in the lower respiratory tract of both normal and atopic individuals.

Human exposure for 2 hours at an average concentration of 1.5 ppm ozone resulted in a 20% reduction in timed vital capacity of the lung and other effects. Concentrations of ozone in excess of a few tenths ppm cause occasional discomfort to exposed individuals manifest as headache, dryness of the throat and mucous membranes of the eyes and nose following exposures of short duration.

Exposure to ozone during moderate to heavy work loads results in significantly decreased forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) at 0.12 ppm; this effect is greater at higher concentrations.

NITROGEN OXIDES:

Data for nitrogen dioxide:

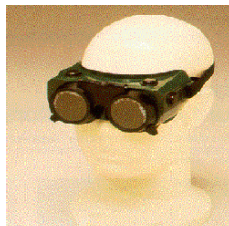
TLV TWA: 3 ppm 6 mg/m³ STEL: 5 ppm 10 mg/m³

ES TWA: 3 ppm 5.6 mg/m³ STEL: 5 ppm 9.4 mg/m³

IDLH Level: 50 ppm

NOTE: Detector tubes for nitrogen dioxide, measuring in excess of 0.5 ppm, are commercially available.

PERSONAL PROTECTION



EYE

Welding helmet with suitable filter. Welding hand shield with suitable filter.

- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet

Issue Date: 30-Mar-2006

C317SC

CHEMWATCH 63551

CD 2006/2 Page 8 of 14

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

For most open welding/brazing operations, goggles, even with appropriate filters, will not afford sufficient facial protection for operators. Where possible use welding helmets or handshields corresponding to AS 1336 and AS 1338 which provide the maximum possible facial protection from flying particles and fragments. [WRIA-WTIA Technical Note 7].

HANDS/FEET

Welding Gloves
Safety footwear.

OTHER

Overalls.

- Eyewash unit.

Aprons, sleeves, shoulder covers, leggings or spats of pliable flame resistant leather or other suitable materials may also be required in positions where these areas of the body will encounter hot metal.

ENGINEERING CONTROLS

For gas welding and cutting operations the nature of ventilation is determined by the location of the work.

- For outdoor work, natural ventilation is generally sufficient.
- For indoor work, conducted in either open or limited spaces, use mechanical (general exhaust or plenum) ventilation. (Open work spaces exceed 300 cubic metres per welder)
- For work conducted in confined spaces, mechanical ventilation, using local exhaust systems, is required. (In confined spaces always check that oxygen has not been depleted by excessive rusting of steel or snowflake corrosion of aluminium)

Mechanical or local exhaust ventilation may not be required where the process working time does not exceed 24 mins. (in an 8 hr. shift) provided the work is intermittent (a maximum of 5 mins. every hour). Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec.

If risk of inhalation or overexposure exists, wear SAA approved respirator or work in fume hood.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Copper coated solid low alloy steel wire. No odour. Insoluble in water.

PHYSICAL PROPERTIES

Does not mix with water.

Sinks in water.

Molecular Weight: Not applicable.

Melting Range (°C): >1500

Solubility in water (g/L): Immiscible

Boiling Range (°C): Not applicable

Specific Gravity (water=1): >7

pH (as supplied): Not applicable

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet
Issue Date: 30-Mar-2006
C317SC

CHEMWATCH 63551
CD 2006/2 Page 9 of 14

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

pH (1% solution): Not applicable.
Volatile Component (%vol): Not applicable
Relative Vapour Density (air=1): Not available.
Lower Explosive Limit (%): Not applicable
Autoignition Temp (°C): Not applicable
State: Manufactured

Vapour Pressure (kPa): Not applicable
Evaporation Rate: Not applicable
Flash Point (°C): Not applicable
Upper Explosive Limit (%): Not applicable
Decomposition Temp (°C): Not available.

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Not normally a hazard due to physical form of product.
Considered an unlikely route of entry in commercial/industrial environments.

EYE

Fumes from welding/brazing operations may be irritating to the eyes.

SKIN

Skin contact does not normally present a hazard, though it is always possible that occasionally individuals may be found who react to substances usually regarded as inert.

INHALED

Regular exposure to nickel fume, as the oxide, may result in "metal fume fever" a sometimes debilitating upper respiratory tract condition resembling influenza.

Symptoms include malaise, fever, weakness, nausea and may appear quickly if operations occur in closed or poorly ventilated areas. Pulmonary oedema, pulmonary fibrosis and asthma has been reported in welders using nickel alloys; level of exposure are generally not available and case reports are often confounded by mixed exposures to other agents.

Inhalation of freshly formed metal oxide particles sized below 1.5 microns and generally between 0.02 to 0.05 microns may result in "metal fume fever". Symptoms may be delayed for up to 12 hours and begin with the sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalised feeling of malaise. Mild to severe headache, nausea, occasional vomiting, fever or chills, exaggerated mental activity, profuse sweating, diarrhoea, excessive urination and prostration may also occur. Tolerance to the fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours following removal from exposure. Harmful levels of ozone may be found when working in confined spaces. Symptoms of exposure include irritation of the upper membranes of the respiratory tract and lungs as well as pulmonary (lung) changes including irritation, accumulation

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet
Issue Date: 30-Mar-2006
C317SC

CHEMWATCH 63551
CD 2006/2 Page 10 of 14

Section 11 - TOXICOLOGICAL INFORMATION

of fluid (congestion and oedema) and in some cases haemorrhage. Exposure may aggravate any pre-existing lung condition such as bronchitis, asthma or emphysema.

Shielding gases may act as simple asphyxiants if significant levels are allowed to accumulate. Oxygen monitoring may be necessary.

Effects on lungs are significantly enhanced in the presence of respirable particles.

CHRONIC HEALTH EFFECTS

Principal route of exposure is inhalation of welding fumes from electrodes and workpiece. Reaction products arising from electrode core and flux appear as welding fume depending on welding conditions, relative volatilities of metal oxides and any coatings on the workpiece. Studies of lung cancer among welders indicate that they may experience a 30-40% increased risk compared to the general population. Since smoking and exposure to other cancer-causing agents, such as asbestos fibre, may influence these results, it is not clear whether welding, in fact, represents a significant lung cancer risk. Whilst mild steel welding represents little risk, the stainless steel welder, exposed to chromium and nickel fume, may be at risk and it is this factor which may account for the overall increase in lung cancer incidence among welders. Cold isolated electrodes are relatively harmless. Welding fume with high levels of ferrous materials may lead to particle deposition in the lungs (siderosis) after long exposure. This clears up when exposure stops. Chronic exposure to iron dusts may lead to eye disorders. severe disorders of the nervous system, has been reported in welders working on Mn steels in confined spaces. Ozone is suspected to produce lung cancer in laboratory animals; no reports of this effect have been documented in exposed human populations. Other welding process exposures can arise from radiant energy UV flash burns, thermal burns or electric shock The welding arc emits ultraviolet radiation at wavelengths that have the potential to produce skin tumours in animals and in over-exposed individuals, however, no confirmatory studies of this effect in welders have been reported.

TOXICITY AND IRRITATION

Not available. Refer to individual constituents.

MATERIAL	CARCINOGEN	SENSITISER	SKIN	REPROTOXIN
iron oxide fume	IARC:Group 3: Not classifiable as to "carcinogenicity" to humans			
nickel fume	IARC:Group 2B: Possibly carcinogenic to humans NTPB	AUOEL		ILOM ILOEI
manganese fume				ILOM ILOEI

CARCINOGEN

IARC: International Agency for Research on Cancer (IARC)

Carcinogens: iron oxide fume Category: Group 3: Not classifiable as to carcinogenicity to humans

CARCINOGEN

IARC: International Agency for Research on Cancer (IARC)

Carcinogens: nickel fume Category: Group 2B: Possibly carcinogenic to humans

CARCINOGEN

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet

Issue Date: 30-Mar-2006

C317SC

CHEMWATCH 63551

CD 2006/2 Page 11 of 14

Section 11 - TOXICOLOGICAL INFORMATION

NTPB: US National Toxicology Program (NTP) 11th Report Part B.

Reasonably Anticipated to be a Human Carcinogen: nickel fume

Category:

SENSITISER

AUOEL: Australia Exposure Standards - Sensitisers: nickel fume

REPROTOXIN

ILOM: ILO Agents toxic to the male reproductive system: nickel fume

REPROTOXIN

ILOEI: ILO Chemicals in the electronics industry that have toxic effects on reproduction: nickel fume

REPROTOXIN

ILOM: ILO Agents toxic to the male reproductive system: manganese fume

REPROTOXIN

ILOEI: ILO Chemicals in the electronics industry that have toxic effects on reproduction: manganese fume

Section 12 - ECOLOGICAL INFORMATION

No data for WIA AUSTMIG NiCrMo.

Refer to data for ingredients, which follows:

SILICA WELDING FUMES:

No data

COPPER FUME:

The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards:

1993 Commission of the European Communities.

Copper is unlikely to accumulate in the atmosphere due to a short residence time for airborne copper aerosols. Airborne coppers, however, may be transported over large distances. Copper accumulates significantly in the food chain.

Drinking Water Standards:

3000 ug/l (UK max)

2000 ug/l (WHO provisional Guideline)

1000 ug/l (WHO level where individuals complain)

Soil Guidelines: Dutch Criteria

36 mg/kg (target)

190 mg/kg (intervention)

Air Quality Standards: no data available.

The toxic effect of copper in the aquatic biota depends on the bio-availability of copper in water which, in turn, depends on its physico-chemical form (ie.speciation). Bioavailability is decreased by complexation and adsorption of copper by natural organic matter, iron and manganese hydrated oxides, and chelating agents excreted by algae and other aquatic organisms. Toxicity is also affected by pH and hardness. Total copper is rarely useful as a predictor of toxicity. In natural sea water, more than 98% of copper is organically bound and in river waters a high percentage is often organically bound, but the actual percentage depends on the river water and its pH.

Copper exhibits significant toxicity in some aquatic organisms. Some algal species are very sensitive to copper with EC50 (96 hour) values as low as 47

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet
 Issue Date: 30-Mar-2006
 C317SC

CHEMWATCH 63551
 CD 2006/2 Page 12 of 14

Section 12 - ECOLOGICAL INFORMATION

ug/litre dissolved copper whilst for other algal species EC50 values of up to 481 ug/litre have been reported. However many of the reportedly high EC50 values may arise in experiments conducted with a culture media containing copper-complexing agents such as silicate, iron, manganese and EDTA which reduce bioavailability.

Toxic effects arising following exposure by aquatic species to copper are typically:

Algae EC50 (96 h)	Daphnia magna LC50 (48-96 h)	Amphipods LC50 (48-96 h)	Gastropods LC50 (48-96 h)	Crab larvae LC50 (48-96 h)
47-481 *	7-54 *	37-183 *	58-112 *	50-100 *

* ug/litre

Exposure to concentrations ranging from one to a few hundred micrograms per litre has led to sublethal effects and effects on long-term survival. For high bioavailability waters, effect concentrations for several sensitive species may be below 10 ug Cu/litre.

In fish, the acute lethal concentration of copper ranges from a few ug/litre to several mg/litre, depending both on test species and exposure conditions. Where the value is less than 50 ug Cu/litre, test waters generally have a low dissolved organic carbon (DOC) level, low hardness and neutral to slightly acidic pH. Exposure to concentrations ranging from one to a few hundred micrograms per litre has led to sublethal effects and effects on long-term survival. Lower effect concentrations are generally associated with test waters of high bioavailability.

In summary:

TABLE BORDER><TD>RESPONSES EXPECTED FOR HIGH CONCENTRATION RANGES OF COPPER *

/TABLE

Total dissolved Cu concentration range (ug/litre)	Effects of high availability in water
1-10	Significant effects are expected for diatoms and sensitive "invertebrates " notably cladocerans. Effects on fish could be significant in freshwaters with low pH and hardness.
10-100	Significant effects are expected on various species of "microalgae " some species of "macroalgae " and a range of "invertebrates " including "crustaceans " gastropods and sea urchins. Survival of sensitive fish will be affected and a variety of fish show sublethal effects.
100-1000	Most taxonomic groups of macroalgae and invertebrates will be severely affected. Lethal levels for most fish species will be reached.
>1000	Lethal concentrations for most tolerant organisms are reached.

* Sites chosen have moderate to high bioavailability similar to water used in most toxicity tests.

In soil, copper levels are raised by application of fertiliser, fungicides, from deposition of highway dusts and from urban, mining and industrial sources. Generally, vegetation rooted in soils reflects the soil copper levels in its

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet

Issue Date: 30-Mar-2006

C317SC

CHEMWATCH 63551

CD 2006/2 Page 13 of 14

Section 12 - ECOLOGICAL INFORMATION

foliage. This is dependent upon the bioavailability of copper and the physiological requirements of species concerned.

Typical foliar levels of copper are:

Uncontaminated soils (0.3-250 mg/kg) 6.1-25 mg/kg	Contaminated soils (150-450 mg/kg) 80 mg/kg	Mining/smelting soils 300 mg/kg
---	---	--

Plants rarely show symptoms of toxicity or of adverse growth effects at normal soil concentrations of copper. Crops are often more sensitive to copper than the native flora, so protection levels for agricultural crops range from 25 mg Cu/kg to several hundred mg/kg, depending on country. Chronic and or acute effects on sensitive species occur at copper levels occurring in some soils as a result of human activities such as copper fertiliser addition, and addition of sludge.

When soil levels exceed 150 mg Cu/kg, native and agricultural species show chronic effects. Soils in the range 500-1000 mg Cu/kg act in a strongly selective fashion allowing the survival of only copper-tolerant species and strains. At 2000 Cu mg/kg most species cannot survive. By 3500 mg Cu/kg areas are largely devoid of vegetation cover. The organic content of the soil appears to be a key factor affecting the bioavailability of copper.

On normal forest soils, non-rooted plants such as mosses and lichens show higher copper concentrations. The fruiting bodies and mycorrhizal sheaths of soil fungi associated with higher plants in forests often accumulate copper to much higher levels than plants at the same site. International Programme on Chemical Safety (IPCS): Environmental Health Criteria 200.

OZONE:

The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards:

1993 Commission of the European Communities.

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM

None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN,IATA,IMDG

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE

None

continued...

WIA AUSTMIG NICRMO

Chemwatch Material Safety Data Sheet

Issue Date: 30-Mar-2006

C317SC

CHEMWATCH 63551

CD 2006/2 Page 14 of 14

Section 15 - REGULATORY INFORMATION

REGULATIONS

welding fumes (CAS No:Not avail):

No regulations applicable

iron oxide fume (CAS: 1309-37-1) is found on the following regulatory lists;

Australia High Volume Industrial Chemical List (HVICL)

Australia Inventory of Chemical Substances (AICS)

International Agency for Research on Cancer (IARC) Carcinogens

International Council of Chemical Associations (ICCA) - High Production Volume List

OECD Representative List of High Production Volume (HPV) Chemicals

nickel fume (CAS: 7440-02-0) is found on the following regulatory lists;

Australia - Western Australia Hazardous Substances Prohibited for Specified Uses or Methods of Handling

Australia High Volume Industrial Chemical List (HVICL)

Australia Inventory of Chemical Substances (AICS)

International Agency for Research on Cancer (IARC) Carcinogens

OECD Representative List of High Production Volume (HPV) Chemicals

manganese fume (CAS: 7439-96-5) is found on the following regulatory lists;

Australia Inventory of Chemical Substances (AICS)

OECD Representative List of High Production Volume (HPV) Chemicals

silica welding fumes (CAS: 69012-64-2) is found on the following regulatory lists;

Australia Inventory of Chemical Substances (AICS)

OECD Representative List of High Production Volume (HPV) Chemicals

copper fume (CAS: 7440-50-8) is found on the following regulatory lists;

Australia High Volume Industrial Chemical List (HVICL)

Australia Inventory of Chemical Substances (AICS)

OECD Representative List of High Production Volume (HPV) Chemicals

No data available for welding fumes as CAS: Not avail.

No data available for ozone as CAS: 10028-15-6.

No data available for nitrogen oxides as CAS: Mixture.

Section 16 - OTHER INFORMATION

This document is copyright. Apart from any fair dealing for the purposes of private study, research, review or criticism, as permitted under the Copyright Act, no part may be reproduced by any process without written permission from CHEMWATCH. TEL (+61 3) 9572 4700.

Issue Date: 30-Mar-2006

Print Date: 10-Jul-2006