Infosafe No™	3CH55	Issue Date : March 2018	RE-ISSUED by ACR

Product Name : **DEVARDA'S ALLOY**

Classified as hazardous

1. Identification

GHS Product Identifier DEVARDA'S ALLOY

Company Name AUSTRALIAN CHEMICAL REAGENTS (ACR) (ABN 19 008 264 211)

Address 38 - 50 Bedford Street Gillman
S.A. 5013 Australia

Telephone/Fax Number Tel: (08) 8440 2000
Fax: (08) 8440 2001

Recommended use of the chemical and restrictions on use Analytical reagent (testing for nitrogen) and laboratory reagent.

Other Names

Name	Product Code
DEVARDA'S ALLOY	4906
Alloy according to Devarda	
Reducing alloy	
Copper, Aluminium, and Zinc alloy	
Devarda's metal	

Other Information EMERGENCY CONTACT NUMBER: +61 08 8440 2000
Business hours: 8:30am to 5:00pm, Monday to Friday.

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2. Hazard Identification

GHS classification of the substance/mixture Flammable Solids: Category 1

Signal Word (s) DANGER

Hazard Statement (s) H228 Flammable solid.

Pictogram (s) Flame



Precautionary statement – Prevention
P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting/.../equipment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary statement – Response P370+P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Precautionary statement – Disposal P501 Dispose of contents/container to an approved waste disposal plant.

3. Composition/information on ingredients

Chemical Characterization Solid

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Copper	7440-50-8	49-51 %
Aluminium	7429-90-5	44-46 %
Zinc	7440-66-6	4-6 %

4. First-aid measures

Inhalation If inhaled, remove from contaminated area to fresh air immediately. Apply artificial respiration if not breathing. If breathing is difficult, give oxygen. Consult a physician.

Ingestion Rinse mouth thoroughly with water immediately, repeat until all traces of product have been removed. DO NOT INDUCE VOMITING. Seek medical advice if effects persist.

Skin Wash affected area thoroughly with copious amounts of running water. Remove contaminated clothing and wash before reuse. Seek medical attention in severe cases.

Eye contact If contact with the eye(s) occurs, wash with copious amounts of water for approximately 15 minutes holding eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. If irritation or discolouration of the eye persists, seek medical assistance.

First Aid Facilities Maintain eyewash fountain in work area.

Advice to Doctor Treat symptomatically based on judgement of doctor and individual reactions of the patient.

Other Information For advice, contact a Poisons Information Centre (Phone eg Australia 13 1126; New Zealand 0800 764 766) or a doctor.

5. Fire-fighting measures

Hazards from Combustion Products Toxic metal fumes, aluminium oxide, toxic fumes of zinc oxide, oxides of copper, and possibly hydrogen (in contact with water).

Specific Methods Small fire: Use dry chemical, CO2, water spray or foam.
Large fire: Use water spray, fog or foam.
If safe to do so, move undamaged containers from the fire area. Cool containers with flooding quantities of water until well after the fire is out.

Specific hazards arising from the chemical May burn but do not ignite readily. Runoff may pollute waterways. Fire may produce irritating, poisonous and/or corrosive fumes. Dousing metallic fires with water may generate hydrogen gas, an extremely dangerous explosion hazard. Containers may explode when heated.

Hazchem Code 4[Z]

Precautions in connection with Fire Wear SCBA and structural firefighter's uniform.

6. Accidental release measures

Spills & Disposal Do not touch or walk through spilled material. Stop leak if safe to do so - Prevent entry into waterways, drains, or confined areas. Water spray may be used to knock down or divert vapour clouds. Prevent dust cloud. Avoid inhalation of asbestos dust.
SEEK EXPERT ADVICE ON HANDLING AND DISPOSAL.

Clean-up Methods - Small Spillages Sweep up (avoid generating dust) and using clean non-sparking tools transfer to a clean, suitable, clearly labelled container for disposal in accordance with local regulations.

7. Handling and storage

Precautions for Safe Handling Avoid ingestion and inhalation of dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure. Minimize dust generation and accumulation. Keep locked up. Keep container tightly closed. Use with adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Wear suitable protective clothing. Wash hands and face after working with substance. Protect against physical damage. Avoid exposure to air and moisture. Keep away from incompatibles such as oxidizing agents, acids. Use appropriate containment to avoid environmental contamination. Keep away from heat and all sources of ignition. Ground all equipment containing material. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

Conditions for safe storage, including any incompatabilities Flammable materials should be stored in a separate safety storage cabinet or room. Store in tightly closed containers, in a cool, dry, well-ventilated area, away from incompatible substances. Protect against physical damage. Keep well closed and protected from direct sunlight, air and moisture. Keep from contact with oxidizing materials. Keep away from heat and all sources of ignition. Ground all equipment containing material. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

Corrosiveness Not considered to be corrosive for metals and glass.

Storage Regulations	Refer Australian Standard AS/NZS 5026-2012 'The storage and handling of Class 4 dangerous goods'.
Storage Temperatures	Store at room temperature (15 to 25 °C recommended).

8. Exposure controls/personal protection

Occupational exposure limit values

Name	STEL		TWA		
	mg/m3	ppm	mg/m3	ppm	Footnote
Copper			1		Copper, dusts & mists (as Cu)
Aluminium			10		(metal dust) (elemental)

Other Exposure Information	A time weighted average (TWA) has been established for Aluminium (metal dust) [7429-90-5] (Safe Work Australia) of 10 mg/m³, for Aluminium, alkyls (NOC+) (as Al) [7429-90-5] (Safe Work Australia) of 2 mg/m³, for Aluminium, pyro powders (as Al) [7429-90-5] (Safe Work Australia) of 5 mg/m³, for Copper, dusts & mists (as Cu) [7440-50-8] (Worksafe Aust) of 1 mg/m³, and for Copper (fume) [7440-50-8] (Safe Work Australia) of 0.2 mg/m³. The exposure value at the TWA is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week.
Appropriate engineering controls	In industrial situations maintain the concentrations values below the TWA. This may be achieved by process modification, use of local exhaust ventilation, capturing substances at the source, or other methods.
Respiratory Protection	Where ventilation is not adequate, respiratory protection may be required. Avoid breathing dust, vapours or mists. Respiratory protection should comply with AS 1716 - Respiratory Protective Devices and be selected in accordance with AS 1715 - Selection, Use and Maintenance of Respiratory Protective Devices. Filter capacity and respirator type depends on exposure levels. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.
Eye Protection	The use of a face shield, chemical goggles or safety glasses with side shield protection as appropriate. Must comply with Australian Standards AS 1337 and be selected and used in accordance with AS 1336.
Hand Protection	Hand protection should comply with AS 2161, Occupational protective gloves - Selection, use and maintenance.
Personal Protective Equipment	Final choice of personal protective equipment will depend on individual circumstances and/or according to risk assessments undertaken.
Body Protection	Clean clothing or protective clothing should be worn. Clothing for protection against chemicals should comply with AS 3765 Clothing for Protection Against Hazardous Chemicals.
Hygiene Measures	Always wash hands before smoking, eating or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

9. Physical and chemical properties

Form	Solid
Appearance	Metallic grey powder or granules.
Odour	Odourless.
Melting Point	550 °C; 859.47 °C (weighted average); 1082.9 °C (based on data for copper).
Boiling Point	1700 °C
Solubility in Water	Insoluble.
Solubility in Organic Solvents	Insoluble in methanol, diethyl ether, n-octanol and acetone.
Specific Gravity	4.36 (weighted average); ~5.8.
Coefficient Water/Oil Distr.	The product is insoluble in water and oil.
Volatile Component	0 %vol @ 21 °C

Flash Point	The lowest known value is Closed cup: 644.9°C (Aluminium).
Flammability	Not readily combustible.
Auto-Ignition Temperature	The lowest known value is 460 °C (Zinc).
Explosion Properties	Not considered to be an explosion hazard. Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Dousing metallic fires with water may generate hydrogen gas, an extremely dangerous explosion hazard. Reactions with incompatibles may pose an explosion hazard.
Other Information	Bulk density: ~2 g/ml. Dispersion Properties: Very slightly dispersed in n-octanol. Is not dispersed in cold water, hot water, methanol, diethyl ether, acetone.

10. Stability and reactivity

Chemical Stability	Stable under ordinary temperatures, pressures and conditions of use and storage. Copper becomes dull when exposed to air; on exposure to moist air it gradually converts to the carbonate. On long standing, a white, highly explosive peroxide deposit may form. Moist zinc dust can react exothermically and ignite spontaneously in air.
Conditions to Avoid	Exposure to air, water and moisture, ignition sources, combustible and incompatible materials.
Incompatible Materials	Acids, acetylene, actylenic compounds, alkalis (generation of hydrogen), ammonium nitrate, ammonium persulfate, antimony trichloride, arsenic trichloride, barium bromate, barium chlorate, barium iodate, barium sulfate, bismuth trioxide, bromates, 1-bromo-2-propyne, calcium bromate, calcium chlorate, calcium iodate, calcium sulfate, carbon disulfide, carbon tetrachloride, chlorates, chlorinated hydrocarbons, chlorine trifluoride, and hydrazinum nitrate (above 70 °C), chlorofluorohydrocarbons, chloroform, chromic anhydride, copper oxide, diborane, dichlorodifluoromethane, 1,2-dichloro-1,1,2,2,-tetrafluroethane, dimethyl sulfoxide plus trichloroacetic acid, ethylene dichloride, ethylene oxide, propylenedichloride, and orthodichlorobenzene, fluorochloro-libricants, halogens, halogenated hydrocarbons, hydrogen peroxide, hydrogen sulfide plus air, and lead azide, iodates, iodine monochloride, iron oxide, lead oxides, magnesium and potassium perchlorate, magnesium bromate, magnesium chlorate, magnesium iodate, manganese and air, mercury, methyl bromide, methyl chloride, monobromotrifluoromethane, monochlorotrifluoro-methane, momofluorotrichloro-methane, niobium oxide and sulfur, nitrate-nitrite and organic matter, nitrates, nitric oxide, nitrogen peroxide, nitrosyl chloride, nitrous oxide, oxidizing agents, oxygen, palladium, performic acid, phosgene, phosphorus, phosphorus trichloride, potassium bromate, potassium chlorate, potassium dioxide, potassium iodate, potassium oxide, potassium peroxide, potassium sulfate, propylene dichloride, silicon and lead oxide, silver chloride, sodium azide, sodium bromate, sodium carbide, sodium carbonate, sodium chlorate, sodium hydroxide, sodium iodate, sodium peroxide, sodium peroxide and carbon dioxide, sodium sulfate, sulfate, sulfur dichloride, sulfur dioxide, sulfur plus chlorates, sulfur plus halogens, sulfuric acid, tetrafluoromethane, trichloroetylene, 1,1,2-trichloro-1,2,2-trifluoroethane, water (with bulk powder), zinc bromate, zinc chlorate, zinc iodate, and zinc peroxide.
Hazardous Decomposition Products	Toxic metal fumes, aluminium oxide, toxic fumes of zinc oxide, oxides of copper.
Possibility of hazardous reactions	Reactive with oxidizing agents, alkalis. Slightly reactive to reactive with moisture. Highly reactive with acids. Copper reacts violently with ammonium nitrate, bromates, iodates, chlorates, ethylene oxide, hydrozoic acid, potassium oxide, dimethyl sulfoxide plus trichloroacetic acid, hydrogen peroxide, sodium peroxide, sodium azide, sulfuric acid, hydrogen sulfide plus air, and lead azide. A potentially explosive reaction occurs with copper and actylenic compounds. Copper ignites on contact with chlorine, fluorine (above 121 °C), chlorine trifluoride, and hydrazinum nitrate (above 70 °C). An incandescent reaction occurs with copper and potassium dioxide. Zinc powder can react violently with water, sulfur and halogens. Dangerous or potentially dangerous reaction may occur with zinc powder and strong oxidizing agents, lower molecular weight chlorinated hydrocarbons, strong acids and alkalis. Aluminium is air sensitive.
Hazardous Polymerization	Will not occur.

11. Toxicological Information

Ingestion	May be harmful if swallowed. Ingestion of copper causes nausea, vomiting, abdominal pain, metallic taste, and diarrhoea. Ingestion of large doses may cause gastrointestinal irritation, stomach and

	intestine ulceration, jaundice, and kidney and liver damage. Extremely large oral dosages may produce gastrointestinal disturbances, due both to mechanical effects and the possibility of reaction with gastric juice to produce zinc chloride. Pain, stomach cramps and nausea could occur in aggravated cases.
Inhalation	May be harmful if inhaled. Dusts and fumes of metallic copper cause irritation of the upper respiratory tract, congestion of nasal mucous membranes, ulceration and perforation of the nasal septum, and pharyngeal congestion. Dusts of aluminium cause irritation to mucous membranes and to the respiratory tract. Inhalation of fumes may give rise to metal fume fever (flu-like symptoms, high temperature, metallic taste, nausea, fever, chills, coughing, general weakness, chest pain, muscle aches, muscle pain, exhaustion and increased white blood cell count).
Skin	Causes irritation to skin. Symptoms include redness, itching, pain, scaling, or, occasionally, blistering. Exposure to copper dust may cause a greenish-black skin discolouration. Prolonged and/or repeated contact may cause dermatitis.
Eye	Causes eye irritation, with redness, watering, and itching. Small copper particles in the eyes may cause discolouration, and damage. Aluminium particles may cause corneal necrosis.
Carcinogenicity	Not listed in the IARC Monographs.
Reproductive Toxicity	Copper and zinc are Suspected Developmental Toxicants. Copper [resp]: human-direct contact is toxic to sperm, low motility counts; Aluminium [resp]: animal-neurotoxin mid to late term (from: ôReproductive Hazards of the Workplace” by Linda M. Frazier, MD, MPH & Marvin L. Hage, MD).
Chronic Effects	Prolonged or repeated exposure to copper can discolour skin and hair and irritate the skin; may cause mild dermatitis, runny nose, and irritation of the mucous membranes. Repeated skin contact has been associated with bleeding into the tissue, delayed hypersensitivity and granulomas. Repeated ingestion may damage the liver and kidneys. Repeated inhalation can cause chronic respiratory disease. Chronic inhalation of finely divided powder has been reported to cause pulmonary fibrosis and emphysema. Chronic exposure may cause damage to the eye, lens or cornea. Chronic copper poisoning is typified by hepatic cirrhosis, enlargement of the liver, jaundice, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to haemolytic anaemia and accelerates arteriosclerosis.

12. Ecological information

Ecotoxicity	Toxic for aquatic organisms. May cause long-term adverse effects in the aquatic environment.
Environmental Protection	Do not allow to enter waters, waste water, or soil!

13. Disposal considerations

Disposal Considerations	Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and disposed of according to relevant local, state and federal government regulations.

14. Transport information

Transport Information	Dangerous Goods of Class 4.1 Flammable Solids, are incompatible in a placard load with any of the following: - Class 1, Class 2.1, Class 4.2, Class 5 and Class 7
U.N. Number	3089
UN proper shipping name	METAL POWDER, FLAMMABLE, N.O.S.
Transport hazard class(es)	4.1
Hazchem Code	4[Z]
Packaging Method	3.8.4.1
Packing Group	II
EPG Number	4A1
IERG Number	29

15. Regulatory information

Regulatory Information	Listed in the Australian Inventory of Chemical Substances (AICS). Not listed under WHS Regulation 2011, Schedule 10 - Prohibited carcinogens, restricted carcinogens and restricted hazardous chemicals.
Poisons Schedule	S6

16. Other Information

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Classified as hazardous

Literature References	'Standard for the Uniform Scheduling of Medicines and Poisons .', Commonwealth of Australia. Lewis, Richard J. Sr. 'Hawley's Condensed Chemical Dictionary 13th. Ed.', Rev., John Wiley and Sons, Inc., NY, 1997. National Road Transport Commission, 'Australian Code for the Transport of Dangerous Goods by Road and Rail 7th. Ed.', 2007. Safe Work Australia, 'National Code of Practice fot the Preparation of Safety Data Sheets for Hazardous Chemicals', 2011. Standards Australia, 'SAA/SNZ HB 76:2010 Dangerous Goods - Initial Emergency Response Guide', Standards Australia/Standards New Zealand, 2010. Safe Work Australia, 'Approved Criteria for Classifying Hazardous Substances [NOHSC:1008 (2004)]'. Safe Work Australia, 'Hazardous Substances Information System, 2005'. Safe Work Australia, 'National Code of Practice for the Labelling of Safe Work Hazardous Substances (2011)'. Safe Work Australia, 'National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003(1995) 3rd Edition]'.
Contact Person/Point	Paul McCarthy Ph. (08) 8440 2000 DISCLAIMER STATEMENT: All information provided in this data sheet or by our technical representatives is compiled from the best knowledge available to us. However, since data, safety standards and government regulations are subject to change and the conditions of handling and use, or misuse, are beyond our control, we make no warranty either expressed or implied, with respect to the completeness or accuracy to the information contained herein. Australian Chemical Reagents (ACR) accepts no responsibility whatsoever for its accuracy or for any results that may be obtained by customers from using the data and disclaims all liability for reliance on information provided in this data sheet or by our technical representatives.
Empirical Formula & Structural Formula	Mixture of Cu, Al and Zn.

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