

Aluminum-nickel catalyst

sc-239220



The Power is Question

Material Safety Data Sheet

Hazard Alert Code Key: **EXTREME** **HIGH** **MODERATE** **LOW**

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

Aluminum-nickel catalyst

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

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EMERGENCY

ChemWatch
Within the US & Canada: 877-715-9305
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(1-800-CHEMCALL) or call +613 9573 3112

PRODUCT USE

■ Reagent.

SYNONYMS

"aluminum nickel alloy (50Ni/ 50Al)"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	3		
Toxicity:	2		
Body Contact:	2		
Reactivity:	2		
Chronic:	2		

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

May cause SENSITISATION by skin contact.

Harmful: danger of serious damage to health by prolonged exposure through inhalation.

Highly flammable.

Harmful to aquatic organisms.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual.
- Acute toxic responses to aluminum are confined to the more soluble forms.
- Nickel is not well absorbed orally. Excretion in the urine is complete after about 4-5 days.

EYE

- There is some evidence to suggest that this material can cause eye irritation and damage in some persons.
- Contact with the eye, by metal dusts, may produce mechanical abrasion or foreign body penetration of the eyeball.

SKIN

■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

- Contact with aluminas (aluminium oxides) may produce a form of irritant dermatitis accompanied by pruritus.

Though considered non-harmful, slight irritation may result from contact because of the abrasive nature of the aluminium oxide particles.

- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

- Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
- For standard operations (eg. milling, cutting and grinding) aluminium should be treated as a nuisance dust. The material is considered to be a low health risk. Fine particulates are poorly absorbed through the lungs.

If aluminium is welded, prolonged or repeated inhalation of metal fume may cause dizziness, respiratory irritation, nausea. Exposure to oxide fumes from smelting and abrasive manufacture can initiate pulmonary fibrosis.

- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

■ The inhalation of small particles of metal oxide results in sudden thirst, a sweet, metallic or foul taste, throat irritation, cough, dry mucous membranes, tiredness and general unwellness. Headache, nausea and vomiting, fever or chills, restlessness, sweating, diarrhea, excessive urination and prostration may also occur.

- 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.

CHRONIC HEALTH EFFECTS

- Toxic: danger of serious damage to health by prolonged exposure through inhalation.

Toxic: danger of serious damage to health by prolonged exposure through inhalation.

This material can cause serious damage if one is exposed to it for long periods. It can be assumed that it contains a substance which can produce severe defects.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.

Exposure to large doses of Aluminum has been connected with the degenerative brain disease Alzheimer's Disease.

There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.

Metallic dusts generated by the industrial process give rise to a number of potential health problems. The larger particles, above 5 micron, are nose and throat irritants.

Nickel causes a skin sensitization which may produce a chronic eczema. At first an itch appears followed one week later by a red skin eruption with ulcers which discharge and become crusted.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
aluminium nickel alloy (50% Ni+50% Al)	12635-27-7	

as		
aluminium	7429-90-5	50
nickel	7440-02-0	50

Section 4 - FIRST AID MEASURES

SWALLOWED

· If swallowed do NOT induce vomiting. · If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

EYE

■ If this product comes in contact with the eyes: · Wash out immediately with fresh running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. · 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.

SKIN

■ If skin contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN

■ Treat symptomatically.

Copper, magnesium, aluminum, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, galvanizing or smelting operations all give rise to thermally produced particulates of smaller dimension than might 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.

· Manifestation of aluminum toxicity include hypercalcemia, anemia, Vitamin D refractory osteodystrophy and a progressive encephalopathy (mixed dysarthria-apraxia of speech, asterixis, tremulousness, myoclonus, dementia, focal seizures). Bone pain, pathological fractures and proximal myopathy can occur.

· Symptoms usually develop insidiously over months to years (in chronic renal failure patients) unless dietary aluminum loads are excessive.

· In cases of nickel poisoning, dimercaptol delivered by deep intramuscular injection may be a suitable antidote. (Patients should not exhibit renal or hepatic dysfunction.) The use of diethyldithiocarbamate is the subject of ongoing research.

· Irritant contact dermatoses or eczemas may respond to applications of weak antiseptic packs, antibiotic ointments (tetracyclin or erythromycin) or inert pastes and ointments. Systemic antibiotics are advisable in the presence of lymphangitis or lymphadenitis.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible
Upper Explosive Limit (%):	Not Applicable
Specific Gravity (water=1):	Not Available
Lower Explosive Limit (%):	Not Applicable

EXTINGUISHING MEDIA

■ Metal dust fires need to be smothered with sand, inert dry powders.

DO NOT USE WATER, CO2 or FOAM.

· DO NOT use halogenated fire extinguishing agents.

FIRE FIGHTING

· Alert Emergency Responders and tell them location and nature of hazard.

· Wear breathing apparatus plus protective gloves.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

■ With the exception of the metals that burn in contact with air or water (for example, sodium), masses of combustible metals do not represent unusual fire risks because they have the ability to conduct heat away from hot spots so efficiently that the heat of combustion cannot be maintained - this means that it will require a lot of heat to ignite a mass of combustible metal. Generally, metal fire risks exist when sawdust, machine shavings and other metal 'fines' are present.

· Metal powders, while generally regarded as non-combustible, may burn when metal is finely divided and energy input is high.

· May react explosively with water.

· May be ignited by friction, heat, sparks or flame.

· Metal dust fires are slow moving but intense and difficult to extinguish.

· Will burn with intense heat.

· DO NOT disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.

· Containers may explode on heating.

· Dusts or fumes may form explosive mixtures with air.

· May REIGNITE after fire is extinguished.

· Gases generated in fire may be poisonous, corrosive or irritating.

· DO NOT use water or foam as generation of explosive hydrogen may result.

Decomposition may produce toxic fumes of: metal oxides.

- Particle size, coating and dispersion in air determine aluminium reactivity.
- Powdered aluminium must be treated as a flammable solid which can be spontaneously combustible.
- Bulk aluminium is not combustible but at high temperatures, molten aluminium can be ignited and burn.
- Molten aluminium may react violently if it comes into contact with water.

Atomised aluminium dusts are potentially explosive. Electric sparks may ignite the dust cloud even in atmospheres containing low oxygen (7%). In air the dust may be ignited in contact with hot surfaces or flame where temperatures exceed 640 deg C.

When aluminium oxide dust is dispersed in air, firefighters should wear protection against inhalation of dust particles, which can also contain hazardous substances from the fire absorbed on the alumina particles.

FIRE INCOMPATIBILITY

- Reacts with acids producing flammable / explosive hydrogen (H2) gas.
- None known.

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Remove all ignition sources.
- DO NOT touch or walk through spilled material.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure occurs.

RECOMMENDED STORAGE METHODS

- Glass container.

· CARE: Packing of high density product in light weight metal or plastic packages may result in container collapse with product release.

Heavy gauge metal packages / Heavy gauge metal drums.

For low viscosity materials and solids: Drums and jerricans must be of the non-removable head type. Where a can is to be used as an inner package, the can must have a screwed enclosure.

STORAGE REQUIREMENTS

- FOR MINOR QUANTITIES:

- Store in an indoor fireproof cabinet or in a room of noncombustible construction
- Provide adequate portable fire-extinguishers in or near the storage area.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
US - Oregon Permissible Exposure Limits (Z-1)	aluminium nickel alloy (50% Ni+50% Al) (Corundum (A1203))		10						*
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	aluminium nickel alloy (50% Ni+50% Al) (Corundum)		10						
Canada - Alberta Occupational Exposure Limits	aluminium nickel alloy (50% Ni+50% Al) (Emery)		10						

US - Michigan Exposure Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Emery, Total dust)	10	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	aluminium nickel alloy (50% Ni+50% Al) (Emery)	(See Table 11)	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	aluminium nickel alloy (50% Ni+50% Al) (Emery)	10	20
US - Michigan Exposure Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Emery, Respirable dust)	5	
US - Minnesota Permissible Exposure Limits (PELs)	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al) Metal - Respirable fraction)	5	
US - Minnesota Permissible Exposure Limits (PELs)	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al) Metal - Total dust)	15	
US OSHA Permissible Exposure Levels (PELs) - Table Z1	aluminium nickel alloy (50% Ni+50% Al) (Aluminum, metal (as Al) - Respirable fraction)	5	
US OSHA Permissible Exposure Levels (PELs) - Table Z1	aluminium nickel alloy (50% Ni+50% Al) (Aluminum, metal (as Al) - Total dust)	15	
US ACGIH Threshold Limit Values (TLV)	aluminium nickel alloy (50% Ni+50% Al) (Aluminum - Metal)	1	TLV Basis: Pneumoconiosis; lower respiratory tract irritation; neurotoxicity
US NIOSH Recommended Exposure Limits (RELs)	aluminium nickel alloy (50% Ni+50% Al) (Aluminum)	5	(TWA (resp))
US NIOSH Recommended Exposure Limits (RELs)	aluminium nickel alloy (50% Ni+50% Al) (Aluminum)	10	(TWA (total))
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al) - Total dust)	15	
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al) - Respirable fraction)	5	

US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al) - Respirable fraction)	5		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (As al) Metal Respirable fraction)	5		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (As al) Metal Total dust)	15		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al) - Total dust)	15		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al): Welding fumes)	5		
US - Washington Permissible exposure limits of air contaminants	aluminium nickel alloy (50% Ni+50% Al) (Corundum (Aluminum oxide)-Respirable fraction)	5	10	
US - Hawaii Air Contaminant Limits	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al) - Welding fumes)	5		
US - Alaska Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum metal (as Al) Metal - Respirable fraction)	5		
US - Alaska Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum metal (as Al) Metal - Total dust)	15		
US - Washington Permissible exposure limits of air contaminants	aluminium nickel alloy (50% Ni+50% Al) (Corundum (Aluminum oxide)-Total particulate)	10	20	
Canada - Prince Edward Island Occupational Exposure Limits	aluminium nickel alloy (50% Ni+50% Al) (Aluminum - Metal)	1		TLV Basis: Pneumoconiosis; lower respiratory tract irritation; neurotoxicity
Canada - Nova Scotia Occupational Exposure Limits	aluminium nickel alloy (50% Ni+50% Al) (Aluminum - Metal)	1		TLV Basis: Pneumoconiosis; lower respiratory tract irritation;

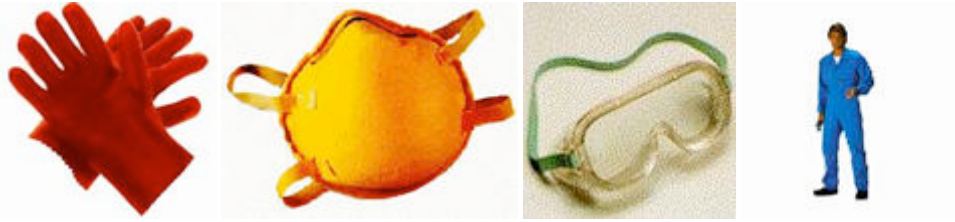
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum Metal (as Al)- Total dust)	15	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum Metal (as Al)- Respirable fraction)	5	
Canada - Northwest Territories Occupational Exposure Limits (English)	aluminium nickel alloy (50% Ni+50% Al) (Aluminum welding fumes)	5	10
US - Michigan Exposure Limits for Air Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum (as Al) Metals - Total dust)	15	
US - Oregon Permissible Exposure Limits (Z-1)	aluminium nickel alloy (50% Ni+50% Al) (Aluminum Metal Dust Respirable Fraction)	5	*
US - California Permissible Exposure Limits for Chemical Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum welding fumes)	5	
Canada - British Columbia Occupational Exposure Limits	aluminium nickel alloy (50% Ni+50% Al) (Aluminum metal and insoluble compounds, Respirable, Revised 2008)	10	
US - California Permissible Exposure Limits for Chemical Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum metal and oxide Respirable fraction)	5	(n)
US - California Permissible Exposure Limits for Chemical Contaminants	aluminium nickel alloy (50% Ni+50% Al) (Aluminum metal and oxide Total dust)	10	
Canada - Ontario Occupational Exposure Limits	aluminium nickel alloy (50% Ni+50% Al) (Specified (PNOS))	3 (R)	
Canada - British Columbia Occupational Exposure Limits	aluminium nickel alloy (50% Ni+50% Al) (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))	10 (N)	
Canada - Ontario Occupational Exposure Limits	nickel (Nickel Elemental/metal)	1 (I)	

Canada - Alberta Occupational Exposure Limits	nickel (Nickel - Elemental/metal)	1.5		
US ACGIH Threshold Limit Values (TLV)	nickel (Nickel - Elemental / Metal)	1.5		TLV Basis: dermatitis; pneumoconiosis
US - California Permissible Exposure Limits for Chemical Contaminants	nickel (Nickel metal, as Ni)	0.5		
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	nickel (NICKEL)	9e-005		
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	nickel (NICKEL)	0.0002		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	nickel (Nickel, (as Ni): Elemental (inhalable fraction++))	1.5	3	T20
US - Hawaii Air Contaminant Limits	nickel (Nickel sulfide roasting, fume & dust, (as Ni))	1		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	nickel (Nickel sulphide roasting, fume and dust as (Ni))	(See Table 14)		
Canada - Yukon Carcinogens with a Permitted Exposure	nickel (Nickel sulfide roasting (fume and dust) as Ni)	1		
Canada - Prince Edward Island Occupational Exposure Limits	nickel (Nickel - Elemental / Metal)	1.5		TLV Basis: dermatitis; pneumoconiosis
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	nickel (Nickel: Metal)	1		
Canada - Northwest Territories Occupational Exposure Limits (English)	nickel (Nickel metal)	1	2	
Canada - Nova Scotia Occupational Exposure Limits	nickel (Nickel - Elemental / Metal)	1.5		TLV Basis: dermatitis; pneumoconiosis

US - Idaho - Limits for Air Contaminants
 nickel (Nickel, metal and insoluble compounds, (as Ni)) 1

ENDOELTABLE

PERSONAL PROTECTION



RESPIRATOR

Particulate
 Consult your EHS staff for recommendations

EYE

- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET

■ NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

- Protective gloves eg. Leather gloves or gloves with Leather facing.

Wear physical protective gloves, eg. leather.

OTHER

- Overalls.
- Eyewash unit.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

ENGINEERING CONTROLS

■ For large scale or continuous use:

- Spark-free, earthed ventilation system, venting directly to the outside and separate from usual ventilation systems
- Provide dust collectors with explosion vents.

Metal dusts must be collected at the source of generation as they are potentially explosive.

- Vacuum cleaners, of flame-proof design, should be used to minimize dust accumulation.
- Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimizes the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminum, zinc, magnesium or titanium.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

State	Divided Solid	Molecular Weight	Not Applicable
Melting Range (°F)	Not Available	Viscosity	Not Applicable
Boiling Range (°F)	Not Applicable	Solubility in water (g/L)	Reacts
Flash Point (°F)	Not Applicable	pH (1% solution)	Not Applicable
Decomposition Temp (°F)	Not Applicable	pH (as supplied)	Not Applicable
Autoignition Temp (°F)	Not Available	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not Applicable	Specific Gravity (water=1)	Not Available

Lower Explosive Limit (%)	Not Applicable	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not Applicable

APPEARANCE

Light-grey powder; reacts with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.

STORAGE INCOMPATIBILITY

■ Aluminium powder:

- when finely divided is a flammable solid
- dusts clouds form explosive mixtures with air.
- explodes on contact with manganese dust
- bulk dust heats spontaneously on contact with moisture
- is rapidly oxidised by water at 180 deg. C.
- is a strong reducing agent
- ignites on contact with gases and vapours of oxygen, arsenic chloride, chlorine, hydrogen chloride, phosphorus pentachloride, sulfur dichloride
- in contact with caustics, such as sodium hydroxide, releases explosive hydrogen gas
- reacts violently with many compounds, including oxidisers, strong acids, alcohols, mercury and mercury compounds, metal oxides (such as oxides of copper, iron (rust) and lead), nitrates (eg., ammonium nitrate and fertilisers containing ammonium nitrate), nitromethane, phosphorus, selenium, sulfates, sulfides, sulfur
- ignites and / or explodes in thermit reactions and in contact with barium peroxide, barium pentafluoride, carbon disulfide, chloroformamidinium nitrate, copper(II) oxide, formic acid, iodine(V) oxide, iron oxide, lead monoxide, methyl chloride, nitrates, oxygen difluoride, manganese dioxide, potassium iodate, sodium carbonate, sodium peroxide, trichloroethylene
- forms pyrophoric or sensitive explosive mixtures with diborane, hypochlorite, and other halogen sources, many oxidisers, palladium, peroxides, potassium chlorate, potassium perchlorate, sodium acetylide, sodium nitrate
- may accumulate static electrical charges from friction or stirring and may ignite

NOTE: Thermit reactions attain high temperatures (>2482 C), supply their own oxygen and are extremely difficult to stop.

The welding of aluminium may produce carbon monoxide, carbon dioxide, nitrogen oxide and ozone.

Nickel

- is a strong reducing agent
- may be pyrophoric when dry (dependent on particle size); powders or dusts may ignite spontaneously in air
- reacts with acids, evolving flammable hydrogen gas
- reacts violently with ammonia, ammonium nitrate, fluorine, hydrazine, hydrazoic acid, strong oxidisers, nitric acid, peroxyformic acid, potassium, potassium perchlorate, selenium, sulfur (evolves heat, incandescence), titanium and other materials
- is incompatible with organic solvents, sulfur compounds
- in reducing atmosphere furnace can react with carbon monoxide forming highly toxic nickel carbonyl gas; under fire conditions may also react in similar manner
- Raney alloys, containing aluminium, may react with moisture.
- WARNING: Avoid or control reaction with peroxides. All transition metal peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.
- The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono- or poly-fluorobenzene show extreme sensitivity to heat and are explosive.
- Avoid reaction with borohydrides or cyanoborohydrides.
- Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
- These trifluorides are hypergolic oxidisers. They ignites on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
- The state of subdivision may affect the results.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

ALUMINIUM NICKEL ALLOY (50% NI+50% AL)

TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
- Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type.

ALUMINIUM:

ALUMINIUM NICKEL ALLOY (50% NI+50% AL):

- No significant acute toxicological data identified in literature search.

NICKEL:

TOXICITY	IRRITATION
Oral (rat) LDLo: 5000 mg/kg	
Intravenous (dog) LD50: 40 mg/kg	

■ **WARNING:** This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.
 Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen
 [National Toxicology Program: U.S. Dep. of Health & Human Services 2002].
 Oral (rat) TDLo: 500 mg/kg/5D-I
 Inhalation (rat) TCLo: 0.1 mg/m³/24H/17W-C

CARCINOGEN

METALS	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC
NICKEL	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
NICKEL SULFIDE ROASTING, FUME & DUST, AS NI	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65-MC
NICKEL	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65
NICKEL SULFIDE ROASTING, FUME & DUST, AS NI	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC
Nickel (and compounds)	US Air Toxics Hot Spots TSD for Describing Available Cancer Potency Factors	IARC Class	1,2B(N2)

REPROTOXIN

nickel	ILO Chemicals in the electronics industry that have toxic effects on reproduction	Reduced fertility or sterility	A
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Section 12 - ECOLOGICAL INFORMATION

Harmful to aquatic organisms.
 This material and its container must be disposed of as hazardous waste.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
nickel			LOW	

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information
 Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
 † Puncture containers to prevent re-use and bury at an authorized landfill.
 Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
 A Hierarchy of Controls seems to be common - the user should investigate:
 · Reduction
 · Reuse
 · Recycling
 · Disposal (if all else fails)
 This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
 DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
 · Recycle wherever possible.
 · Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:
 Symbols: None Hazard class or Division: 4.1
 Identification Numbers: UN3089 PG: II
 Label Codes: 4.1 Special provisions: IB8, IP2, IP4, T3, TP33
 Packaging: Exceptions: 151 Packaging: Non- bulk: 212
 Packaging: Exceptions: 151 Quantity limitations: 15 kg
 Passenger aircraft/rail:
 Quantity Limitations: Cargo 50 kg Vessel stowage: Location: B

aircraft only:

Vessel stowage: Other: None

Hazardous materials descriptions and proper shipping names:

Metal powders, flammable, n.o.s.

Air Transport IATA:

ICAO/IATA Class: 4.1 ICAO/IATA Subrisk: None

UN/ID Number: 3089 Packing Group: II

Special provisions: A3

Cargo Only

Packing Instructions: 417 Maximum Qty/Pack: 50 kg

Passenger and Cargo Passenger and Cargo

Packing Instructions: 415 Maximum Qty/Pack: 15 kg

Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity

Packing Instructions: Y415 Maximum Qty/Pack: 5 kg

Shipping Name: METAL POWDER, FLAMMABLE, N.O.S.(CONTAINS

ALUMINIUM NICKEL ALLOY (50% NI+50% AL))

Maritime Transport IMDG:

IMDG Class: 4.1 IMDG Subrisk: None

UN Number: 3089 Packing Group: II

EMS Number: F-G , S-G Special provisions: None

Limited Quantities: 1 kg

Shipping Name: METAL POWDER, FLAMMABLE, N.O.S.

Section 15 - REGULATORY INFORMATION

aluminium nickel alloy (50% Ni+50% Al) (CAS: 12635-27-7) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Oregon Permissible Exposure Limits (Z-1)"

Regulations for ingredients

aluminium (CAS: 7429-90-5) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada Domestic Substances List (DSL)","Canada Environmental Quality Guidelines (EQGs) Water: Aquatic life","Canada Environmental Quality Guidelines (EQGs) Water: Community","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","OECD Representative List of High Production Volume (HPV) Chemicals","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - Hawaii Air Contaminant Limits","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Oregon Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)","US CERCLA Priority List of Hazardous Substances","US Department of Transportation (DOT), Hazardous Material Table","US Department of Transportation (DOT), Hazardous Material Table : Goods Forbidden for Transport","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA National Priorities List - Superfund Chemical Data Matrix (SCDM) - Hazard Ranking System - Hazardous Substance Benchmarks","US EPCRA Section 313 Chemical List","US FDA CFSAN Color Additive Status List 5","US FDA CFSAN Color Additive Status List 6","US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act","US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion","US NFPA 499 Combustible Dusts","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide","US Postal Service (USPS) Numerical Listing of Proper Shipping Names by Identification (ID) Number","US -Texas Air Monitoring Comparison Values for Evaluating Metals","US Toxic Substances Control Act (TSCA) - Inventory","WHO Guidelines for Drinking-water Quality - Chemicals for which guideline values have not been established"

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

"Canada - Alberta Ambient Air Quality Objectives","Canada - Alberta Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Carcinogens with a Permitted Exposure","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","Canada Environmental Quality Guidelines (EQGs) Water: Aquatic life","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","OECD Representative List of High Production Volume (HPV) Chemicals","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous

Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Proposition 65 - Carcinogens", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Maine Chemicals of High Concern List", "US - Massachusetts Oil & Hazardous Material List", "US - New Jersey Right to Know Hazardous Substances", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Vermont Hazardous Constituents", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US CERCLA Priority List of Hazardous Substances", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA National Priorities List - Superfund Chemical Data Matrix (SCDM) - Hazard Ranking System - Hazardous Substance Benchmarks", "US EPCRA Section 313 Chemical List", "US Food Additive Database", "US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US National Toxicology Program (NTP) 11th Report Part B. Reasonably Anticipated to be a Human Carcinogen", "US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards", "US -Texas Air Monitoring Comparison Values for Evaluating Metals", "US Toxic Substances Control Act (TSCA) - Inventory", "WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

Section 16 - OTHER INFORMATION

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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