

# **MG Chemicals UK Limited**

Version No: A-1.00

Safety data sheet according to REACH Regulation (EC) No 1907/2006, as amended by UK REACH Regulations SI 2019/758

Issue Date: 23/02/2022 Revision Date: 23/02/2022 L.REACH.GB.EN

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

### 1.1. Product Identifier

Product name	8463A
Synonyms	SDS-Code: 8463A; 8463A-3ML
Other means of identification	Silver Grease

## 1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Conductive lubricant for switches
Uses advised against	Not Applicable

## 1.3. Details of the supplier of the safety data sheet

Registered company name	MG Chemicals UK Limited	MG Chemicals (Head office)
Address	Hearne House, 23 Bilston Street, Sedgely Dudley DY3 1JA United Kingdom	1210 Corporate Drive Ontario L7L 5R6 Canada
Telephone	+(44) 1663 362888	+(1) 800-340-0772
Fax	Not Available	+(1) 800-340-0773
Website	Not Available	www.mgchemicals.com
Email	sales@mgchemicals.com	Info@mgchemicals.com

## 1.4. Emergency telephone number

Association / Organisation	Verisk 3E (Access code: 335388)
Emergency telephone numbers	+(44) 20 35147487
Other emergency telephone numbers	+(0) 800 680 0425

## **SECTION 2 Hazards identification**

## 2.1. Classification of the substance or mixture

Classified according to GB-CLP Regulation, UK SI 2019/720 and UK SI 2020/1567 [1]	H410 - Hazardous to the Aquatic Environment Long-Term Hazard Category 1
Legend:	1. Classified by Chernwatch; 2. Classification drawn from GB-CLP Regulation, UK SI 2019/720 and UK SI 2020/1567

## 2.2. Label elements

Hazard pictogram(s)	
Signal word	Warning
Hazard statement(s)	
H410	Very toxic to aquatic life with long lasting effects.

# Supplementary statement(s)

Not Applicable

# Precautionary statement(s) Prevention

P273	Avoid release to the environment.
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### Precautionary statement(s) Response

P391 Collect spillage.

### Precautionary statement(s) Storage

### Not Applicable

### Precautionary statement(s) Disposal

P501 Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.

#### 2.3. Other hazards

Inhalation and/or ingestion may produce health damage\*.

Cumulative effects may result following exposure\*.

aluminium powder coated	Listed in the Europe Regulation (EC) No 1907/2006 - Annex XVII (Restrictions may apply)

## **SECTION 3 Composition / information on ingredients**

### 3.1.Substances

See 'Composition on ingredients' in Section 3.2

## 3.2.Mixtures

1.CAS No 2.EC No 3.Index No 4.REACH No	%[weight]	Name	Classified according to GB-CLP Regulation, UK SI 2019/720 and UK SI 2020/1567	SCL / M-Factor	Nanoform Particle Characteristics
1.7429-90-5 2.231-072-3 3.013-001-00-6 013-002-00-1 4.Not Available	30-60	aluminium powder coated	Flammable Solids Category 1, Substances and Mixtures which in Contact with Water Emit Flammable Gases Category 2; H228, H261 <sup>[2]</sup>	Not Available	Not Available
1.7440-22-4 2.231-131-3 3.Not Available 4.Not Available	10-30	silver	Not Applicable	Not Available	Not Available
Legend:	1. Classified by Chemwatch; 2. Classification drawn from GB-CLP Regulation, UK SI 2019/720 and UK SI 2020/1567; 3. Classification drawn from C&L * EU IOELVs available; [e] Substance identified as having endocrine disrupting properties				

## **SECTION 4 First aid measures**

4.1. Description of first aid measures		
Eye Contact	<ul> <li>If this product comes in contact with the eyes:</li> <li>Wash out immediately with fresh running water.</li> <li>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.</li> <li>Seek medical attention without delay; if pain persists or recurs seek medical attention.</li> <li>Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li> </ul>	
Skin Contact	<ul> <li>If skin contact occurs:</li> <li>Immediately remove all contaminated clothing, including footwear.</li> <li>Flush skin and hair with running water (and soap if available).</li> <li>Seek medical attention in event of irritation.</li> </ul>	
Inhalation	<ul> <li>If fumes, aerosols or combustion products are inhaled remove from contaminated area.</li> <li>Other measures are usually unnecessary.</li> </ul>	
Ingestion	<ul> <li>Immediately give a glass of water.</li> <li>First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.</li> </ul>	

## 4.2 Most important symptoms and effects, both acute and delayed

See Section 11

# 4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

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- Manifestation of aluminium toxicity include hypercalcaemia, anaemia, 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 aluminium loads are excessive.
- Serum aluminium levels above 60 ug/ml indicate increased absorption. Potential toxicity occurs above 100 ug/ml and clinical symptoms are present when levels exceed 200 ug/ml.

Deferoxamine has been used to treat dialysis encephalopathy and osteomalacia. CaNa2EDTA is less effective in chelating aluminium.

[Ellenhorn and Barceloux: Medical Toxicology]

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 Firefighting measures**

## 5.1. Extinguishing media

DO NOT use halogenated fire extinguishing agents.

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

## DO NOT USE WATER, CO2 or FOAM.

- Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.
- Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.
- Chemical reaction with CO2 may produce flammable and explosive methane.
- ▶ If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.

## 5.2. Special hazards arising from the substrate or mixture

Fire Incompatibility	Reacts with acids producing flammable / explosive hydrogen (H2) gas
5.3. Advice for firefighters	

Fire Fighting	<ul> <li>Alert Fire Brigade and tell them location and nature of hazard.</li> <li>Wear breathing apparatus plus protective gloves in the event of a fire.</li> <li>Prevent, by any means available, spillage from entering drains or water courses.</li> <li>Use fire fighting procedures suitable for surrounding area.</li> <li>DO NOT approach containers suspected to be hot.</li> <li>Cool fire exposed containers with water spray from a protected location.</li> <li>If safe to do so, remove containers from path of fire.</li> <li>Equipment should be thoroughly decontaminated after use.</li> </ul>
Fire/Explosion Hazard	<ul> <li>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.</li> <li>DO NOT use water or foam as generation of explosive hydrogen may result.</li> <li>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.</li> <li>Metal powders, while generally regarded as non-combustible:</li> <li>May burn when metal is finely divided and energy input is high.</li> <li>May react explosively with water.</li> <li>May react explosively with water.</li> <li>May kei ginited by friction, heat, sparks or flame.</li> <li>Will burn with intense heat.</li> <li>Note:</li> <li>Metal dust fires are slow moving but intense and difficult to extinguish.</li> <li>Containers may explode on heating.</li> <li>Dusts or fumes may form explosive mixtures with air.</li> <li>Gases generated in fire may be poisonous, corrosive or irritating.</li> <li>Hot or burning metals may react violently upon contact with other materials, such as oxidising agents and extinguishing agents used on fires involving ordinary combustibles or flammable liquids.</li> <li>Some metals can continue to burn in carbon dioxide, nitrogen, water, or steam atmospheres in which ordinary combustibles or flammable liquids.</li> <li>Some metals can continue to burn in carbon dioxide, nitrogen, water, or steam atmospheres in which ordinary combustibles or flammable liquids.</li> <li>Some metals can continue to burn in carbon dioxide, nitrogen, water, or steam atmospheres in which ordinary combustibles or flammable liquids.</li> <li>Bocomposition may produce toxic fumes of: metal oxides&lt;</li></ul>

### **SECTION 6 Accidental release measures**

### 6.1. Personal precautions, protective equipment and emergency procedures See section 8

## 6.2. Environmental precautions

See section 12

## 6.3. Methods and material for containment and cleaning up

Minor Spills	<ul> <li>Environmental hazard - contain spillage.</li> <li>Clean up all spills immediately.</li> <li>Avoid contact with skin and eyes.</li> <li>Wear impervious gloves and safety goggles.</li> <li>Trowel up/scrape up.</li> <li>Place spilled material in clean, dry, sealed container.</li> <li>Flush spill area with water.</li> </ul>
Major Spills	Environmental hazard - contain spillage. Minor hazard. Clear area of personnel. Alert Fire Brigade and tell them location and nature of hazard.

Control personal contact with the substance, by using protective equipment as required.
Prevent spillage from entering drains or water ways.
Contain spill with sand, earth or vermiculite.
Collect recoverable product into labelled containers for recycling.
Absorb remaining product with sand, earth or vermiculite and place in appropriate containers for disposal.
Wash area and prevent runoff into drains or waterways.
If contamination of drains or waterways occurs, advise emergency services.
<ul> <li>Absorb remaining product with sand, earth or vermiculite and place in appropriate containers for disposal.</li> <li>Wash area and prevent runoff into drains or waterways.</li> <li>If contamination of drains or waterways occurs, advise emergency services.</li> </ul>

# 6.4. Reference to other sections

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

# SECTION 7 Handling and storage

7.1. Precautions for safe handling	

Safe handling	<ul> <li>Avoid all personal contact, including inhalation.</li> <li>Wear protective clothing when risk of exposure occurs.</li> <li>Use in a well-ventilated area.</li> <li>Prevent concentration in hollows and sumps.</li> <li>DO NOT enter confined spaces until atmosphere has been checked.</li> <li>DO NOT allow material to contact humans, exposed food or food utensils.</li> <li>Avoid contact with incompatible materials.</li> <li>When handling, DO NOT eat, drink or smoke.</li> <li>Keep containers securely sealed when not in use.</li> <li>Avoid physical damage to containers.</li> <li>Always wash hands with soap and water after handling.</li> <li>Work clothes should be laundered separately. Launder contaminated clothing before re-use.</li> <li>Use good occupational work practice.</li> <li>Observe manufacturer's storage and handling recommendations contained within this SDS.</li> <li>Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.</li> </ul>
Fire and explosion protection	See section 5
Other information	<ul> <li>Store in original containers.</li> <li>Keep containers securely sealed.</li> <li>Store in a cool, dry, well-ventilated area.</li> <li>Store away from incompatible materials and foodstuff containers.</li> <li>Protect containers against physical damage and check regularly for leaks.</li> <li>Observe manufacturer's storage and handling recommendations contained within this SDS.</li> </ul>

# 7.2. Conditions for safe storage, including any incompatibilities

Suitable container	<ul> <li>Polyethylene or polypropylene container.</li> <li>Packing as recommended by manufacturer.</li> <li>Check all containers are clearly labelled and free from leaks.</li> <li>CARE: Packing of high density product in light weight metal or plastic packages may result in container collapse with product release</li> <li>Heavy gauge metal packages / Heavy gauge metal drums</li> </ul>
Storage incompatibility	The material is described as an electronegative metal. The activity or electromotive series of metals is a listing of the metals in decreasing order of their reactivity with hydrogen-ion sources such as water and acids. In the reaction with a hydrogen-ion source, the metal is oxidised to a metal acin. and the hydrogen ion is reduced to H2. The ordering of the activity series can be related to the standard reduction potential of a metal acin. The more positive the standard reduction potential of the activity series can be related to the standard reduction potential of a metal acin. The more positive the standard reduction potential of the activity series can be related to the standard reduction potential of a metal acin. The more difficult it is to oxidise the metal to a hydrated metal cation and the later that metal falls in the series Three notable groups comprise the series • very electropositive metals electronegative metals Electronegative metals Electronegative metals Electronegative metals have electronegativities that fall between 1.9 and 2.5 Cations of these metals generally have positive standard reduction potentials. They: • are good oxidising agents • oxidised by H+ (acids) • are good oxidising agents • oxidise H2 producing H+ and depositing the metals from an aqueous solution • produce cations that will oxidise more active metals to the cation - the less active metal is deposited as the metal Electronegative metals are not corroded by oxygen. They are called 'nobel metals' and are used in coinage and jewelry. Some in this group are slowly oxidised. The oxides formed are not very stable and can be decomposed by heating. Metals in this group can be obtained by thermal decomposition of their oxides. Although non-oxidising acids can't attack electronegative metals, oxidising acids (such as nitric acid) often dissolve them. http://www.wou.edu/las/physci/ch412/activity.htm The material is described as an electropositive metal. The advity or electromotive series of metals is a li

Reaction is reduced in the messive form (sheat, rod, or droj), compared with finely divided forms. The less active metals will not burn in air but: • can react asymptotic metal optimized by the observation packs to form involvious pases. • Elemental metals may react with azoldiazo compounds to form explosive products • Finely divided metal powers develop pyrophoricity when a critical specific surface area is exceeded; this is ascribed to high heat of oxide formation on exposure to air. • Safe handling is possible in relatively low concentrations of oxygen in an inert gas • Safe handling is possible in relatively low concentrations of oxygen in an inert gas • Safe handling is possible in relatively low concentrations of oxygen in an inert gas • Safe handling is possible in relatively low concentrations of oxygen in an inert gas • Safe handling the soft of the rest with this cast of the rest with this cast of the rest with the active service of concentrations of oxygen in an inert gas • Safe handling the metals is in contact with both oxygen and water, corrosion can occur. In corrosion, the metal acts as an anode and is oxidised Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid. Many metals may incandesce, react violently, and upper the assisted. • Interpretative of Group 11 metal. • For alumina (datum) and of the developed of the or sate with halocathons and an exothermic reaction at ambient temperatures with halocathons in the presence of chrome tributes? • Produmina (datum) and object models. • Any form application with a biggent object with a dist and bases, such a hydrofluoric acid and sodium hydroide, aciding as another or proportion. • Any form application with a biggent object. • Any form application with a biggent object. • Any form application with abiggent object. • Any form application with a biggent object. • Any form application with abiggent object. • Any form application with abiggent object. • Any form application with abiggent obje	Electropositive metals do not burn in air as readily as do very electropositive metals. The surfaces of these metals will tarnish in the presence of oxygen forming a protective oxide coating. This coating protects the bulk of the metal against further oxidation (the metal is passivated).
<ul> <li>catalyse polymerisation and other reactions, particularly when finely divided</li> <li>react with halogenated hydrocatoos (for example, copper dissolves when heated in carbon tetrachioride), sometimes forming explosive compounds.</li> <li>Elemental metals may react with azoidiazo compounds to form explosive products</li> <li>Elemental metals in powders develop pyrophoricity when a critical specific surface area is exceeded; this is ascribed to high heat of oxide formation on exposure to air.</li> <li>Safe handling is possible in relatively two concentrations of oxygen in an inert gas</li> <li>Several pyrophoric metals, stored in glass bottles have ignited when the container is broken on impact. Storage of these materials moist and in metal containers is recommended.</li> <li>The reaction residues from various metal syntheses (involving vacuum evaporation and co-deposition with a ligand) are often pyrophoric</li> <li>If the surface of the metal is in contact with both oxygen and water, corrosion can occur. In corrosion, the metal acts as an anode and is oxidised</li> <li>Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.</li> <li>Some electropositive metals do not react with initic acid because they are passivated.</li> <li>http://www.wou.edu/las/physic/h412/acivity.htm</li> <li>Inoroganic derivative of Group 11 metal.</li> <li>Foraluminas (aluminim oxide):</li> <li>Produces exotheme reaction abygen difluoride.</li> <li>-May initiate explosive polymerisation of defin oxides including athylane oxide.</li> <li>-Produces exothemic reaction abygen difluoride.</li> <li>-May kinitate explosive polymerisation of define materials mitate.</li> <li>-React vigorously with winy acettac.</li> <li>-Produces exothemic reaction abysen difluoride.</li> <li>-May kinitate explosive oxidum nitrate.</li> <li>-React vigorously with winy acettac.</li> <li>-Produces exothemic</li></ul>	Reaction is reduced in the massive form (sheet, rod, or drop), compared with finely divided forms. The less active metals will not burn in air but: can react exothermically with oxidising acids to form noxious gases.
<ul> <li>Elemental metals may react with azoidazo compounds to form explosive products</li> <li>Finely divided metal powders develop prophoricity when a critical specific surface area is exceeded; this is ascribed to high heat of oxide formation or explosive to air.</li> <li>Safe handling is possible in relatively low concentrations of oxygen in an inert pas.</li> <li>Several prophorion reals, aroid in glass bottles have ignited when the container is broken on impact. Storage of these matterials moist and in metal actitaters is recommended.</li> <li>The reaction residues from various metal syntheses (involving vacuum evaporation and co-deposition with a ligand) are often pyrophoric</li> <li>If the surface of the metal is in contact with both oxygen and water, corrosion can occur. In corrosion, the metal acts as an anode and is oxidised.</li> <li>Mary metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.</li> <li>Some effectropositive metals do not react with nitric acid because they are passivated.</li> <li>http://www.wou.edu/las/physcl/ch412/activity.htm</li> <li>Inorganic derivative of Group 11 metal.</li> <li>Incompatible with hot chiorinated rubber.</li> <li>Incompatible with hot chiorinated rubber.</li> <li>Incompatible with hot oxygen difluoride.</li> <li>-Produces exothermic reaction above 200°C with halocarbons and an exothermic reaction at ambient temperatures with halocarbons in the presence of chiorin effluoride.</li> <li>-Produces exothermic reaction with oxygen difluoride.</li> <li>-Reacts vigorously with vinyl actate.</li> <li>-Reacts vigorously with vinyl actate.</li> <li>-Reacts vigorously with vinyl actate.</li> <li>-Wark INIGK. Avoid or control reaction with provides. Autornation metal peroxides nay decompose explosively.</li> <li>Yurak Piloty compatible with a base and a base with an acid, neutralising the other and poducing a salt.</li> <li>-Reacts vigo</li></ul>	<ul> <li>catalyse polymerisation and other reactions, particularly when finely divided</li> <li>react with halogenated hydrocarbons (for example, copper dissolves when heated in carbon tetrachloride), sometimes forming explosive compounds.</li> </ul>
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<ul> <li>The reaction residues from various metal syntheses (involving vacuum evaporation and co-deposition with a ligand) are often pyrophoric</li> <li>If the surface of the metal is in contact with both oxygen and water, corrosion can occur. In corrosion, the metal acts as an anode and is oxidised.</li> <li>Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.</li> <li>Some electropositive metals do not react with nitric acid because they are passivated.</li> <li>http://www.wou.edu/las/physci/ch412/activity.htm</li> <li>Inorganic derivative of Group 11 metal.</li> <li>For atuminas (aluminium oxide):</li> <li>In the presence of chlorine tifluoride may react violently and ignite.</li> <li>May initiate explosive polymerisation of olefin oxides including ethylene oxide.</li> <li>Produces exothermic reaction above 200° with halcocarbons and an exothermic reaction at ambient temperatures with halcocarbons in the presence of othor metals.</li> <li>Produces exothermic reaction with oxygen difluoride.</li> <li>May form explosive mixtures with oxygen difluoride.</li> <li>Reacts vigorously with vingl acetate.</li> <li>Aluminium oxide is an amphoteric substance, meaning it can react with both acids and bases, such as hydrofluoric acid and sodium hydroxide, acting as an anold with a base and a base with an acid, neutralising the other and producing a salt.</li> <li>WARNING: Avoid or control reaction with peroxides. Ma ransition metals (halcarene-metal complexes) alkely hydrogenoids may decompose explosivey.</li> <li>The piccomplexes forme between chromium(0), vanadum(0) and other transition metals (halcarene-metal complexes) and mono-or poly-fi-fivoroberneen shore with peroxides may decompose explosive.</li> <li>Avoid reaction with borohydrides or cyanoborohydrides</li> <li>Silver and its compounds and salts may also form explosive orgonous in the presence of acetylene and nintromethane.<th><ul> <li>Several pyrophoric metals, stored in glass bottles have ignited when the container is broken on impact. Storage of these materials moist and in metal containers is recommended.</li> </ul></th></li></ul>	<ul> <li>Several pyrophoric metals, stored in glass bottles have ignited when the container is broken on impact. Storage of these materials moist and in metal containers is recommended.</li> </ul>
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<ul> <li>Aluminium oxide is an amphoteric substance, meaning it can react with both acids and bases, such as hydrofluoric acid and sodium hydroxide, acting as an acid with a base and a base with an acid, neutralising the other and producing a salt.</li> <li>WARNING: Avoid or control reaction with peroxides. All <i>transition metal</i> peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.</li> <li>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.</li> <li>Avoid reaction with borohydrides or cyanoborohydrides</li> <li>Silver or silver salts readily form explosive silver fulminate in the presence of both nitric acid and ethanol. The resulting fulminate is much more sensitive and a more powerful detonator than mercuric fulminate.</li> <li>Silver and its compounds and salts may also form explosive compounds in the presence of acetylene and nitromethane.</li> <li>Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.</li> <li>Reacts slowly with water.</li> <li>CAUTION contamination with moisture will liberate explosive hydrogen gas, causing pressure build up in sealed containers.</li> <li>Segregate from alcohol, water.</li> <li>Avoid strong acids, bases.</li> <li>Avoid strong acids, bases.</li> <li>Avoid reaction with oxidising agents</li> </ul>	-Reacts vigorously with vinyl acetate.
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	· Avoid reaction with oxidising agents

# 7.3. Specific end use(s)

See section 1.2

# SECTION 8 Exposure controls / personal protection

# 8.1. Control parameters

Ingredient	DNELs Exposure Pattern Worker	PNECs Compartment
aluminium powder coated	Inhalation 3.72 mg/m³ (Systemic, Chronic) Inhalation 3.72 mg/m³ (Local, Chronic) Oral 3.95 mg/kg bw/day (Systemic, Chronic) *	74.9 μg/L (Water (Fresh)) 20 mg/L (STP)
silver	Inhalation 0.1 mg/m³ (Systemic, Chronic) Inhalation 0.04 mg/m³ (Systemic, Chronic) * Oral 1.2 mg/kg bw/day (Systemic, Chronic) *	0.04 µg/L (Water (Fresh)) 0.86 µg/L (Water - Intermittent release) 438.13 mg/kg sediment dw (Sediment (Fresh Water)) 438.13 mg/kg sediment dw (Sediment (Marine)) 1.41 mg/kg soil dw (Soil) 0.025 mg/L (STP)

\* Values for General Population

# Occupational Exposure Limits (OEL)

# INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
UK Workplace Exposure Limits (WELs)	aluminium powder coated	Aluminium metal: inhalable dust	10 mg/m3	Not Available	Not Available	Not Available
UK Workplace Exposure Limits (WELs)	aluminium powder coated	Aluminium metal: respirable dust	4 mg/m3	Not Available	Not Available	Not Available
UK Workplace Exposure Limits (WELs)	silver	Silver, metallic	0.1 mg/m3	Not Available	Not Available	Not Available

#### **Emergency Limits**

Ingredient	TEEL-1	TEEL-2		TEEL-3
silver	0.3 mg/m3	170 mg/m3		990 mg/m3
Ingredient	Original IDLH		Revised IDLH	
aluminium powder coated	Not Available		Not Available	
silver	10 mg/m3		Not Available	

#### MATERIAL DATA

For aluminium oxide and pyrophoric grades of aluminium:

Twenty seven year experience with aluminium oxide dust (particle size 96% 1,2 um) without adverse effects either systemically or on the lung, and at a calculated concentration equivalent to 2 mg/m3 over an 8-hour shift has lead to the current recommendation of the TLV-TWA.

The limit should also apply to aluminium pyro powders whose toxicity is reportedly greater than aluminium dusts and should be protective against lung changes.

For aluminium oxide:

The experimental and clinical data indicate that aluminium oxide acts as an 'inert' material when inhaled and seems to have little effect on the lungs nor does it produce significant organic disease or toxic effects when exposures are kept under reasonable control.

[Documentation of the Threshold Limit Values], ACGIH, Sixth Edition

The adopted TLV-TWA for silver dust and fumes is 0.1 mg/m3 and for the more toxic soluble silver compounds the adopted value is 0.01 mg/m3. Cases of argyria (a slate to blue-grey discolouration of epithelial tissues) have been recorded when workers were exposed to silver nitrate at concentrations of 0.1 mg/m3 (as silver). Exposure to very high concentrations of silver fume has caused diffuse pulmonary fibrosis. Percutaneous absorption of silver compounds is reported to have resulted in allergy. Based on a 25% retention upon inhalation and a 10 m3/day respiratory volume, exposure to 0.1 mg/m3 (TWA) would result in total deposition of no more than 1.5 gms in 25 years.

#### 8.2. Exposure controls

8.2.1. Appropriate engineering controls	<ul> <li>Metal dusts must be collected at the source of generation as they are potentially explosive.</li> <li>Avoid ignition sources.</li> <li>Good housekeeping practices must be maintained.</li> <li>Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.</li> <li>Do not use compressed air to remove settled materials from floors, beams or equipment</li> <li>Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation.</li> <li>Use non-sparking handling equipment, tools and natural bristle brushes. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations.</li> <li>Do not allow chips, fines or dusts to contact water, particularly in enclosed areas.</li> <li>Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimises the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminium, zinc, magnesium or titanium.</li> <li>Work-shops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible.</li> <li>Wet scrubbers are preferable to dry dust collectors.</li> <li>Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors.</li> <li>Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the workre, of 0.5 metre/sec.</li> <li>Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the workre, of 0.5 metre/sec.</li> <li>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.</li> <li>Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the workre</li></ul>				
	welding, brazing fumes (released at relatively low velocity	into moderately still air)	0.5-1.0 m/s (100-200 f/min.)		
	Within each range the appropriate value depends on:	Upper end of the range			
	1: Room air currents minimal or favourable to capture	1: Disturbing room air c	urrents		
	2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high	n toxicity		
	3: Intermittent, low production.	3: High production, hea	vy use		
	4: Large hood or large air mass in motion	4: Small hood-local con	trol only		
	Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.				
8.2.2. Personal protection					
Eye and face protection	<ul> <li>Safety glasses with side shields.</li> <li>Chemical gogles.</li> <li>Contact lenses may pose a special hazard; soft contact the wearing of lenses or restrictions on use, should be and adsorption for the class of chemicals in use and article should be and adsorption for the class of chemicals in use and article should be and adsorption for the class of chemicals in use and article should be and adsorption for the class of chemicals in use and article should be and adsorption for the class of chemicals in use and article should be and adsorption for the class of chemicals in use and article should be and adsorption for the class of chemicals in use and article should be and adsorption for the class of chemicals in use and article should be added and adsorption for the class of chemicals article should be added at the should be adde</li></ul>	t lenses may absorb and created for each workpla n account of injury experi	concentrate irritants. A written ce or task. This should include ence. Medical and first-aid pers	policy document, describing a review of lens absorption sonnel 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], [AS/NZS 1336 or

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## 8463A Silver Grease

	national equivalent]
Skin protection	See Hand protection below
Hands/feet protection	<ul> <li>Wear chemical protective gloves, e.g. PVC.</li> <li>Wear safety footwear or safety gumboots, e.g. Rubber</li> <li>NOTE:</li> <li>The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.</li> <li>Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.</li> <li>Protective gloves eg. Leather gloves or gloves with Leather facing</li> </ul>
Body protection	See Other protection below
Other protection	<ul> <li>Overalls.</li> <li>P.V.C apron.</li> <li>Barrier cream.</li> <li>Skin cleansing cream.</li> <li>Eye wash unit.</li> </ul>

## **Respiratory protection**

Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator	
up to 10 x ES	P1 Air-line*	-	PAPR-P1 -	
up to 50 x ES	Air-line**	P2	PAPR-P2	
up to 100 x ES	-	P3	-	
		Air-line*	-	
100+ x ES	-	Air-line**	PAPR-P3	

\* - Negative pressure demand \*\* - Continuous flow

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

· Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.

• The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).

Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.

Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
 Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)

Use approved positive flow mask if significant quantities of dust becomes airborne.

· Try to avoid creating dust conditions.

Class P2 particulate filters are used for protection against mechanically and thermally generated particulates or both.

P2 is a respiratory filter rating under various international standards, Filters at least 94% of airborne particles

Suitable for:

· Relatively small particles generated by mechanical processes eg. grinding, cutting, sanding, drilling, sawing.

· Sub-micron thermally generated particles e.g. welding fumes, fertilizer and bushfire smoke.

· Biologically active airborne particles under specified infection control applications e.g. viruses, bacteria, COVID-19, SARS

## 8.2.3. Environmental exposure controls

See section 12

### **SECTION 9** Physical and chemical properties

# 9.1. Information on basic physical and chemical properties

Appearance	Light brown/silver			
Physical state	Non Slump Paste	Relative density (Water = 1)	1.84	
Odour	Not Available	Partition coefficient n-octanol / water	Not Available	
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available	
pH (as supplied)	Not Available	Decomposition temperature	Not Available	
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available	
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Available	
Flash point (°C)	Not Available	Taste	Not Available	
Evaporation rate	<1 BuAC = 1	Explosive properties	Not Available	

Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water	Immiscible	pH as a solution (Not Available%)	Not Available
Vapour density (Air = 1)	>1	VOC g/L	Not Available
Nanoform Solubility	Not Available	Nanoform Particle Characteristics	Not Available
Particle Size	Not Available		

# 9.2. Other information

Not Available

# **SECTION 10 Stability and reactivity**

10.1.Reactivity	See section 7.2
10.2. Chemical stability	<ul> <li>Unstable in the presence of incompatible materials.</li> <li>Product is considered stable.</li> <li>Hazardous polymerisation will not occur.</li> </ul>
10.3. Possibility of hazardous reactions	See section 7.2
10.4. Conditions to avoid	See section 7.2
10.5. Incompatible materials	See section 7.2
10.6. Hazardous decomposition products	See section 5.3

# **SECTION 11 Toxicological information**

# 11.1. Information on toxicological effects

Inhaled	The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting. Not normally a hazard due to non-volatile nature of product 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. Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
Ingestion	Acute toxic responses to aluminium are confined to the more soluble forms. The material has <b>NOT</b> been classified by EC Directives or other classification systems as 'harmful by ingestion'. This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern. Accidental ingestion of the material may be damaging to the health of the individual.
Skin Contact	The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives 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, puncture wounds 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.
Eye	Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.
Chronic	Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals. Substances that can cause occupational asthma (also known as asthmagens and respiratory sensitisers) can induce a state of specific airway hyper-responsiveness via an immunological, irritant or other mechanism. Once the airways have become hyper-responsive, further exposure to the substance, sometimes even to tiny quantities, may cause respiratory symptoms. These symptoms can range in severity from a runny nose to

asthma. Not all workers who are exposed to a sensitiser will become hyper-responsive and it is impossible to identify in advance who are likely to become hyper-responsive.

Substances than can cuase occupational asthma should be distinguished from substances which may trigger the symptoms of asthma in people with pre-existing air-way hyper-responsiveness. The latter substances are not classified as asthmagens or respiratory sensitisers Wherever it is reasonably practicable, exposure to substances that can cuase occupational asthma should be prevented. Where this is not possible the primary aim is to apply adequate standards of control to prevent workers from becoming hyper-responsive.

Activities giving rise to short-term peak concentrations should receive particular attention when risk management is being considered. Health surveillance is appropriate for all employees exposed or liable to be exposed to a substance which may cause occupational asthma and there should be appropriate consultation with an occupational health professional over the degree of risk and level of surveillance. Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.

Serious damage (clear functional disturbance or morphological change which may have toxicological significance) is likely to be caused by repeated or prolonged exposure. As a rule the material produces, or contains a substance which produces severe lesions. Such damage may become apparent following direct application in subchronic (90 day) toxicity studies or following sub-acute (28 day) or chronic (two-year) toxicity tests.

Chronic exposure to aluminas (aluminium oxides) of particle size 1.2 microns did not produce significant systemic or respiratory system effects in workers. Epidemiologic surveys have indicated an excess of nonmalignant respiratory disease in workers exposed to aluminum oxide during abrasives production.

Very fine Al2O3 powder was not fibrogenic in rats, guinea pigs, or hamsters when inhaled for 6 to 12 months and sacrificed at periods up to 12 months following the last exposure.

When hydrated aluminas were injected intratracheally, they produced dense and numerous nodules of advanced fibrosis in rats, a reticulin network with occasional collagen fibres in mice and guinea pigs, and only a slight reticulin network in rabbits. Shaver's disease, a rapidly progressive and often fatal interstitial fibrosis of the lungs, is associated with a process involving the fusion of bauxite (aluminium oxide) with iron, coke and silica at 2000 deg. C.

The weight of evidence suggests that catalytically active alumina and the large surface area aluminas can induce lung fibrosis(aluminosis) in experimental animals, but only when given by the intra-tracheal route. The pertinence of such experiments in relation to workplace exposure is doubtful especially since it has been demonstrated that the most reactive of the aluminas (i.e. the chi and gamma forms), when given by inhalation, are non-fibrogenic in experimental animals. However rats exposed by inhalation to refractory aluminium fibre showed mild fibrosis and possibly carcinogenic effects indicating that fibrous aluminas might exhibit different toxicology to non-fibrous forms. Aluminium oxide fibres administered by the intrapleural route produce clear evidence of carcinogenicity.

Saffil fibre an artificially produced form alumina fibre used as refractories, consists of over 95% alumina, 3-4 % silica. Animal tests for fibrogenic, carcinogenic potential and oral toxicity have included in-vitro, intraperitoneal injection, intrapleural injection, inhalation, and feeding. The fibre has generally been inactive in animal studies. Also studies of Saffil dust clouds show very low respirable fraction.

There is general agreement that particle size determines that the degree of pathogenicity (the ability of a micro-organism to produce infectious disease) of elementary aluminium, or its oxides or hydroxides when they occur as dusts, fumes or vapours. Only those particles small enough to enter the alveolii (sub 5 um) are able to produce pathogenic effects in the lungs.

Occupational exposure to aluminium compounds may produce asthma, chronic obstructive lung disease and pulmonary fibrosis. Long-term overexposure may produce dyspnoea, cough, pneumothorax, variable sputum production and nodular interstitial fibrosis; death has been reported. Chronic interstitial pneumonia with severe cavitations in the right upper lung and small cavities in the remaining lung tissue, have been observed in gross pathology. Shaver's Disease may result from occupational exposure to fumes or dusts; this may produce respiratory distress and fibrosis with large blebs. Animal studies produce no indication that aluminium or its compounds are carcinogenic.

Because aluminium competes with calcium for absorption, increased amounts of dietary aluminium may contribute to the reduced skeletal mineralisation (osteopenia) observed in preterm infants and infants with growth retardation. In very high doses, aluminium can cause neurotoxicity, and is associated with altered function of the blood-brain barrier. A small percentage of people are allergic to aluminium and experience contact dermatitis, digestive disorders, vomiting or other symptoms upon contact or ingestion of products containing aluminium, such as deodorants or antacids. In those without allergies, aluminium cookware has not been shown to lead to aluminium toxicity in general, excessive consumption of antacids containing aluminium compounds and excessive use of aluminium-containing antiperspirants provide more significant exposure levels. Studies have shown that consumption of aluminium in nervous and osseus tissue. Furthermore, aluminium increases oestrogen-related gene expression in human breast cancer cells cultured in the laboratory These salts' estrogen-like effects have led to their classification as a metalloestrogen. Some researchers have expressed concerns that the aluminium in antiperspirants may increase the risk of breast cancer.

After absorption, aluminium distributes to all tissues in animals and humans and accumulates in some, in particular bone. The main carrier of the aluminium ion in plasma is the iron binding protein, transferrin. Aluminium can enter the brain and reach the placenta and foetus. Aluminium may persist for a very long time in various organs and tissues before it is excreted in the urine. Although retention times for aluminium appear to be longer in humans than in rodents, there is little information allowing extrapolation from rodents to the humans.

At high levels of exposure, some aluminium compounds may produce DNA damage in vitro and in vivo via indirect mechanisms. The database on carcinogenicity of aluminium compounds is limited. No indication of any carcinogenic potential was obtained in mice given aluminium potassium sulphate at high levels in the diet.

Aluminium has shown neurotoxicity in patients undergoing dialysis and thereby chronically exposed parenterally to high concentrations of aluminium. It has been suggested that aluminium is implicated in the aetiology of Alzheimer s disease and associated with other neurodegenerative diseases in humans. However, these hypotheses remain controversial. Several compounds containing aluminium have the potential to produce neurotoxicity (mice, rats) and to affect the male reproductive system (dogs). In addition, after maternal exposure they have shown embryotoxicity (mice) and have affected the developing nervous system in the offspring (mice, rats). The available studies have a number of limitations and do not allow any dose-response relationships to be established. The combined evidence from several studies in mice, rats and dogs that used dietary administration of aluminium compounds produce lowest-observed-adverse-effect levels (LOAELs) for effects on neurotoxicity, testes, embryotoxicity, and the developing nervous system of 52, 75, 100, and 50 mg aluminium/kg bw/day, respectively. Similarly, the lowest no-observed-adverse-effect levels (NOAELs) for effects on these endpoints were reported at 30, 27, 100, and for effects on the developing nervous system, between 10 and 42 mg aluminium/kg bw per day, respectively.

Controversy exists over whether aluminium is the cause of degenerative brain disease (Alzheimer's disease or AD). Several epidemiological studies show a possible correlation between the incidence of AD and high levels of aluminium in drinking water. A study in Toronto, for example, found a 2.6 times increased risk in people residing for at least 10 years in communities where drinking water contained more than 0.15 mg/l aluminium compared with communities where the aluminium level was lower than 0.1 mg/l. A neurochemical model has been suggested linking aluminium exposure to brain disease. Aluminium concentrates in brain regions, notably the hippocampus, cerebral cortex and amygdala where it preferentially binds to large pyramid-shaped cells - it does not bind to a substantial degree to the smaller interneurons. Aluminium displaces magnesium in key metabolic reactions in brain cells and also interferes with calcium metabolism and inhibits phosphoinositide metabolism. Phosphoinositide normally controls calcium in levels at critical concentrations.

Under the microscope the brain of AD sufferers show thickened fibrils (neurofibrillary tangles - NFT) and plaques consisting of amyloid protein deposited in the matrix between brain cells. Tangles result from alteration of 'tau' a brain cytoskeletal protein. AD tau is distinguished from normal tau because it is hyperphosphorylated. Aluminium hyperphosphorylates tau in vitro. When AD tau is injected into rat brain NFT-like aggregates form but soon degrade. Aluminium stabilises these aggregates rendering them resistant to protease degradation. Plaque formation is also enhanced by aluminium which induces the accumulation of amyloid precursor protein in the thread-like extensions of nerve cells (axons and dendrites). In addition aluminium has been shown to depress the activity of most neuro-transmitters similarly depressed in AD (acetylcholine, norepinephrine, glutamate and GABA).

Aluminium enters the brain in measurable quantities, even when trace levels are contained in a glass of tap water. Other sources of bioavailable aluminium include baking powder, antacids and aluminium products used for general food preparation and storage (over 12 months, aluminium levels in soft drink packed in aluminium cans rose from 0.05 to 0.9 mg/l). [Walton, J and Bryson-Taylor, D. - Chemistry in Australia, August 1995]

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### 8463A Silver Grease

	Silver is one of the most physically and physiologically cumulat permanent ashen-grey discolouration of the skin, conjunctiva a The respiratory tract may also be a site of local argyria (followin obvious symptom. Sub-chronic exposure to a substance containing silver results i organs. These effects are commonly observed in studies on sil Organ and tissue pigmentation appears to be an intrinsic prope therefore taken into consideration for the derivation of toxicicol The lowest NOAELs for the medium- and long-term toxicity of silver sodium hydrogen and zirconium phosphate and on the 1 NOAELs were recalculated to take account of the silver conten In order to derive the toxicological reference values, an oral ab inter-species variability) were used. In the absence of any observed acute toxicity effect, it is not por conservative approach set out in the European assessment is This value is based on the no observed effect level in rats expo · Short/medium-term AEL = 0.3 mg/kg bw/d x 5% / 100 = 0.15 · Long-term AEL = 0.09 mg/kg bw/d x 5% / 100 = 0.045 µg/kg I In a 2015 opinion on the classification of silver-zinc zeolite, the potential embryotoxic effect in rats at doses where the dams w decrease in the viability of all offspring, increased inciden percentage of litters with late foetal death) and in a two-genera rate, lower live birth rate, reduced pu weight, lower thymus we A two-generation study of rats conducted with a different active with a smaller live litter size on day 1 (F210), and a lower thym	ive of the ond internal og chronic og chronic n elevated ver. erty of silve jogical referative isorption of sosible to do to use the sole of the subsorption of sosible to do to use the sole of og upg/kg bw/cg sole of a pug/kg bw/cg sole of a pug/kg bw/cg sole of a pug/kg bw/cg sole of a sole of a pug/kg bw/cg sole of a sole of	elements. Chronic exposure to silver salts may cause argyria, a lorgans (due to the deposit of an insoluble albuminate of silver). inhalation exposures) with a mild chronic bronchitis being the only alkaline phosphatase levels along with pigmentation of the tissues and er ions, constituting an early marker of silver toxicity. This effect is rence values. were based respectively on the 90-day study of rats conducted with ombined chronic study on rats conducted with silver-zinc zeolite. These bastance tested and the rate of release of the silver ions. 5% and a safety factor of 100 (10 for intra-species variability and 10 for lefine a toxicity reference value for short-term exposure. The medium-term acceptable exposure limit (AEL) as the short-term AEL. days. d (silver ion equivalent) r ion equivalent) mmittee for Risk Assessment (RAC) concluded that there was a verely affected by the treatment. This was manifested primarily by a is in developmental toxicity studies conducted with silver chloride (post- onephrosis and cryptorchidism) and silver acetate (slight increase in the with silver-zinc zeolite (lower number of births (F19), higher stillbirth ased incidence of hydronephrosis. e containing silver also observed a lower number of births (F1), along	
84634 Silver Grease	TOXICITY		IRRITATION	
	Not Available		Not Available	
	TOXICITY	IRRITATI	ON	
aluminium powder coated	der coated Inhalation(Rat) LC50; >2.3 mg/l4h <sup>[1]</sup> Eye: no adverse effect observe		dverse effect observed (not irritating) <sup>[1]</sup>	
	Oral (Rat) LD50; >2000 mg/kg <sup>[1]</sup>	Skin: no a	adverse effect observed (not irritating) <sup>[1]</sup>	
	TOXICITY		ION	
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>		
silver	silver Inhalation(Rat) LC50; >5.16 mg/l4h <sup>[1]</sup> Skin: no adverse effect observed (not irritation) <sup>[1]</sup>		adverse effect observed (not irritating) <sup>[1]</sup>	
	Oral (Rat) LD50; >2000 mg/kg <sup>[2]</sup>			
Legend:	1. Value obtained from Europe ECHA Registered Substances specified data extracted from RTECS - Register of Toxic Effect	Acute tox of chemic	icity 2.* Value obtained from manufacturer's SDS. Unless otherwise al Substances	
	The following information refers to contact allergens as a group Contact allergies quickly manifest themselves as contact eczer eczema involves a cell-mediated (T lymphocytes) immune read involve antibody-mediated immune reactions. The significance distribution of the substance and the opportunities for contact w distributed can be a more important allergen than one with stro clinical point of view, substances are noteworthy if they produc For aluminium compounds:	and may na, more r stion of the of the con vith it are e nger sensi e an allerg	not be specific to this product. arely as urticaria or Quincke's oedema. The pathogenesis of contact delayed type. Other allergic skin reactions, e.g. contact urticaria, tact allergen is not simply determined by its sensitisation potential: the equally important. A weakly sensitising substance which is widely tising potential with which few individuals come into contact. From a ic test reaction in more than 1% of the persons tested.	
	For aluminium compounds: Aluminium present in food and drinking water is poorly absorbed through the gastrointestinal tract. The bioavailability of aluminium is dependent on the form in which it is ingested and the presence of dietary constituents with which the metal cation can complex Ligands in food can have a marked effect on absorption of aluminium, as they can either enhance uptake by forming absorbable (usually water soluble) complexes (e.g., wit carboxylic acids such as citric and lactic), or reduce it by forming insoluble compounds (e.g., with phosphate or dissolved silicate). Considering the available human and animal data it is likely that the oral absorption of aluminium can vary 10-fold based on chemical form alone Although bioavailability appears to generally parallel water solubility, insufficient data are available to directly extrapolate from solubility in water to bioavailability. For oral intake from food, the European Food Safety Authority (EFSA) has derived a tolerable weekly intake (TWI) of 1 millioram (mo) of			
8463A Silver Grease	which are ingested with food. This corresponds to a systemical of body weight. This means that for an adult weighing 60 kg, a Based on a neuro-developmental toxicity study of aluminium compounds in food, including food additives. The Co (COT) considers that the derivation of this PTWI was sound an aluminium	ly available systemica trate admin al Tolerabl ommittee o d that it sh	Is stated a metuation block and a microgrammes ( $\mu$ g) per kilogramme (kg) ly available dose of 8.6 $\mu$ g per day is considered safe. nistered via drinking water to rats, the Joint FAO/WHO Expert e Weekly Intake (PTWI) of 2 mg/kg bw (expressed as aluminium) for all on Toxicity of chemicals in food, consumer products and the environment ould be used in assessing potential risks from dietary exposure to	

The Federal Institute for Risk Assessment (BfR) of Germany has assessed the estimated aluminium absorption from antiperspirants. For this purpose, the data, derived from experimental studies, on dermal absorption of aluminium from antiperspirants for healthy and damaged skin was used as a basis. At about 10.5 µg, the calculated systemic intake values for healthy skin are above the 8.6 µg per day that are considered safe for an adult weighing 60 kg. If aluminium -containing antiperspirants are used on a daily basis, the tolerable weekly intake determined by the EFSA is therefore exceeded. The values for damaged skin, for example injuries from shaving, are many times higher. This means that in case of daily use of an aluminium-containing antiperspirant alone, the TWI may be completely exhausted. In addition, further aluminium absorption sources such as food, cooking utensils and other cosmetic products must be taken into account

Systemic toxicity after repeated exposure

No studies were located regarding dermal effects in animals following intermediate or chronic-duration dermal exposure to various forms of aluminium.

When orally administered to rats, aluminium compounds (including aluminium nitrate, aluminium sulfate and potassium aluminium sulfate) have produced various effects, including decreased gain in body weight and mild histopathological changes in the spleen, kidney and liver of rats (104

	mg Al/kg bw/day) and dogs (88-93 mg Al/kg bw/day) o been reported at higher doses. Severity of effects incr The main toxic effects of aluminium that have been ob	during subchronic oral exposure. Effect eased with dose. pserved in experimental animals are n	ts on nerve cells, testes, bone and stomach have eurotoxicity and nephrotoxicity. Neurotoxicity has also	
	been described in patients dialysed with water contain in humans at lower exposures are inconsistent Reproductive and developmental toxicity:	ing high concentrations of aluminium,	but epidemiological data on possible adverse effects	
	Studies of reproductive toxicity in male mice (intraperi (administration of aluminium chloride by gavage) have in mice and rabbits and reduced fertility in mice. No re drinking water. Multi-generation reproductive studies i drinking water.	toneal or subcutaneous administration e demonstrated the ability of aluminiur eproductive toxicity was seen in female n which aluminium sulfate and alumin vicity.	a of aluminium nitrate or chloride) and rabbits n to cause testicular toxicity, decreased sperm quality as given aluminium nitrate by gavage or dissolved in ium ammonium sulfate were administered to rats in	
	High doses of aluminium compounds given by gavage weight or pup weight at birth and delayed ossification. pregnant rats showed evidence of foetotoxicity, but it neuro-development with aluminium citrate administere Laboratory Practice (GLP). Aluminium citrate was sele	A have induced signs of embryotoxicity be have induced signs of embryotoxicity Developmental toxicity studies in whi was unclear whether the findings were ed via the drinking water to Sprague-D ected for the study since it is the most	v in mice and rats in particular, reduced fetal body ch aluminium chloride was administered by gavage to e secondary to maternal toxicity. A twelve-month lawley rats, was conducted according to Good soluble and bioavailable aluminium salt. Pregnant	
	high-dose group, the main effect was renal damage, r neurobehavioural effects were observed of the interview induction of the neurobehavioural effects were observed, other than in lowest observed adverse effect level (LOAEL) was 10 Bioavailability of aluminium chloride, sulfate and nitrat used by JECFA as key study to derive the PTWI.	an day 6 through lactation, and then it nal battery of tests was performed at v nium) and to a lesser extent, the mid- esulting in high mortality in the male of the neuromuscular subdomain (redu 0 mg/kg bw/day and the no observed e and aluminium hydroxide was much	the orispring were exposed post-weahing until various times. Evidence of aluminium toxicity was lose groups (100 mg/kg bw/day of aluminium). In the ffspring. No major neurological pathology or ced grip strength and increased foot splay). Thus, the adverse effect level (NOAEL) was 30 mg/kg bw/day. I lower than that of aluminium citrate This study was	
	Aluminium compounds were non-mutagenic in bacteri chromosome integrity and segregation in vitro. Clasto doses by gavage or by the intraperitoneal route. Seve elicited by aluminium salts in experimental systems. C mitotic spindle functioning, induction of oxidative dami explain the induction of structural chromosomal aberra	al and mammalian cell systems, but s genic effects were also observed in vi ral indirect mechanisms have been pr cross-linking of DNA with chromosoma age, damage of lysosomal membrane ations, sister chromatid exchanges, ch	ome produced DNA damage and effects on vo when aluminium sulfate was administered at high oposed to explain the variety of genotoxic effects al proteins, interaction with microtubule assembly and s with liberation of DNAase, have been suggested to rromosome loss and formation of oxidized bases in	
	unlikely to be of relevance for humans exposed to aluminium via the diet. Aluminium compounds do not cause gene mutations in either bacteria or mammalian cells. Exposure to aluminium compounds does result in both structural and numerical chromosome aberrations both in in-vitro and in-vivo mutagenicity tests. DNA damage is probably the result of indirect mechanisms. The DNA damage was observed only at high exposure levels.			
	The available epidemiological studies provide limited evidence that certain exposures in the aluminium production industry are carcinogenic to humans, giving rise to cancer of the lung and bladder. However, the aluminium exposure was confounded by exposure to other agents including polycyclic aromatic hydrocarbons, aromatic amines, nitro compounds and asbestos. There is no evidence of increased cancer risk in non-occupationally exposed persons.			
	Following the observation that high levels of aluminium in dialysis fluid could cause a form of dementia in dialysis patients, a number of studies were carried out to determine if aluminium could cause dementia or cognitive impairment as a consequence of environmental exposure over long periods. Aluminium was identified, along with other elements, in the amyloid plaques that are one of the diagnostic lesions in the brain for Alzheimer disease, a common form of senile and pre-senile dementia. some of the epidemiology studies suggest the possibility of an association of Alzheimer disease with aluminium in water, but other studies do not confirm this association. All studies lack information on ingestion of aluminium from food and how concentrations of aluminium in food affect the association between aluminium in water and Alzheimer disease." There are suggestions that persons with some genetic variants may absorb more aluminium than others, but there is a need for more analytical research to determine whether aluminium from various sources has a significant causal association with Alzheimer disease and other neurodegenerative diseases. Aluminium is a neurotoxicant in experimental animals. However, most of the animal studies performed have several limitations and therefore cannot be used for quantitative risk assessment. Contact sensitivity:			
	Contact sensitivity: It has been suggested that the body burden of aluminium may be linked to different iseases. Macrophagic myofasciitis and chronic fatigue syndrome can be caused by aluminium-containing adjuvants in vaccines. Macrophagic myofasciitis (MMF) has been described as a disease in adults presenting with ascending myalgia and severe fatigue following exposure to aluminium hydroxide-containing vaccines. The corresponding histological findings include aluminium-containing macrophages infiltrating muscle tissue at the injection site. The hypothesis is that the			
	long-lasting granuloma triggers the development of the systemic syndrome. Aluminium acts not only as an adjuvant,stimulating the immune system either to fend off infections or to tolerate antigens, it also acts as a sensitisers causing contact allergy and allergic contact dermatitis. In general, metal allergies are very common and aluminium is considered to be a weak allergen. A metal must be ionised to be able to act as a contact allergen, then it has to undergo haptenisation to be immunogenic and to initiate an immune response. Once inside the skin, the metal ions must bind to proteins to become immunologically reactive. The most important routes of exposure and sensitisation to aluminium are through aluminium-containing vaccines. One Swedish study showed a statistically significant association between contact allergy to aluminium and persistent itching nodules in children treated with allergen-specific immunotherapy (ASIT) Nodules were overrepresented in patients with contact allergy to aluminium			
	Other routes of sensitisation reported in the literature tattooing of the skin with aluminium-containing pigmer granulomas. Even though aluminium is used extensiv have been reported Systemic allergic contact dermatil pruritic nodules at present and previous injection sites vaccination with aluminium-containing vaccines and/o	are the prolonged use of aluminium-co- nts. Most of the patients experienced e ely in industry, only a low number of c tis in the form of flare-up reactions after a cezema at the site of vaccination as r patch testing with aluminium, and aluminium.	ontaining antiperspirants, topical medication, and eczematous reactions whereas tattooing caused ases of occupational skin sensitisation to aluminium er re-exposure to aluminium has been documented: well as at typically atopic localisations after so after use of aluminium-containing toothpaste	
ALUMINIUM POWDER COATED	No significant acute toxicological data identified in liter	rature search.		
Acute Toxicity	×	Carcinogenicity	×	
Skin Irritation/Corrosion	×	Reproductivity	×	
Serious Eye Damage/Irritation	×	STOT - Single Exposure	×	
Respiratory or Skin sensitisation	×	STOT - Repeated Exposure	×	
Mutagenicity	×	Aspiration Hazard	×	

Legend:

Data either not available or does not fill the criteria for classification
 Data available to make classification

#### Not Available

## **SECTION 12 Ecological information**

12.1. IOXICITY
----------------

Available dpoint EC(ECx) 50 50 50 50	Not Available  Test Duration (hr)  48h  96h  72h  48h  96h	Species Crustac Fish Algae o Crustac	Not Available s s r other aquatic plants	Not Availa	ble Value >100mg/l 0.078-0.108mg 0.2mg/l	Not Availat	ble Source 1 2
Ipoint           50           50           50           50           50           50           50	Test Duration (hr)           48h           96h           72h           48h           96h	Species Crustac Fish Algae o Crustac	s cea or other aquatic plants cea		Value >100mg/l 0.078-0.108mg 0.2mg/l	y/I	Source
Ippoint           EC(ECx)           50           50           50           50           50           50	Test Duration (hr)           48h           96h           72h           48h           96h	Species       Crustac       Fish       Algae or       Crustac	s ea or other aquatic plants eea		Value >100mg/l 0.078-0.108mg 0.2mg/l	ı/I	Source
EC(ECx) 50 50 50 50	48h 96h 72h 48h 96h	Crustac Fish Algae of Crustac	ea r other aquatic plants		>100mg/l 0.078-0.108mg 0.2mg/l	ı/I	1 2
50 50 50 50	96h 72h 48h 96h	Fish Algae of Crustac	r other aquatic plants		0.078-0.108mg 0.2mg/l	ı/I	2
50 50 50	72h 48h 96h	Algae of Crustac	or other aquatic plants		0.2mg/l		
50 50	48h 96h	Crustac	cea			0.2mg/l	
50	96h		Crustacea		1.5mg/l		2
		Algae or other aquatic plants			0.024mg/l		2
lpoint	Test Duration (hr)	Spec	cies		Value		Source
EC(ECx)	120h	Fish			<0.001mg	/L	4
50	96h	Fish	Fish 0.006mg/l				2
50	72h	Algae	Algae or other aquatic plants 11.89mg/l				2
50	48h	Crust	Crustacea 0.001mg/l				2
50	96h	Algae	Algae or other aquatic plants 0.002mg/L			-	4
5 5 5	point C(ECx) 0 0 0 0 0 cted from 1. IUC	Point         Test Duration (hr)           EC(ECx)         120h           0         96h           0         72h           0         48h           0         96h           cted from 1. IUCLID Toxicity Data 2. Europe and the second se	pointTest Duration (hr)SpectC(ECx)120hFish096hFish072hAlgar048hCrus096hAlgarcted from 1. IUCLID Toxicity Data 2. Europe ECHA Regist	Test Duration (hr)         Species           EC(ECx)         120h         Fish           0         96h         Fish           0         72h         Algae or other aquatic plants           0         48h         Crustacea           0         96h         Algae or other aquatic plants	Point         Test Duration (hr)         Species           EC(ECx)         120h         Fish           0         96h         Fish           0         72h         Algae or other aquatic plants           0         48h         Crustacea           0         96h         Algae or other aquatic plants	Test Duration (hr)         Species         Value           C(ECx)         120h         Fish         <0.001mg	Test Duration (hr)         Species         Value           C(ECx)         120h         Fish         <0.001mg/L

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

Metal-containing inorganic substances generally have negligible vapour pressure and are not expected to partition to air. Once released to surface waters and moist soils their fate depends on solubility and dissociation in water. Environmental processes (such as oxidation and the presence of acids or bases) may transform insoluble metals to more soluble ionic forms. Microbiological processes may also transform insoluble metals to more soluble forms. Such ionic species may bind to dissolved ligands or sorb to solid particles in aquatic or aqueous media. A significant proportion of dissolved / sorbed metals will end up in sediments through the settling of suspended particles. The remaining metal ions can then be taken up by aquatic organisms.

When released to dry soil most metals will exhibit limited mobility and remain in the upper layer; some will leach locally into ground water and/ or surface water ecosystems when soaked by rain or melt ice. Environmental processes may also be important in changing solubilities.

Even though many metals show few toxic effects at physiological pHs, transformation may introduce new or magnified effects.

A metal ion is considered infinitely persistent because it cannot degrade further.

The current state of science does not allow for an unambiguous interpretation of various measures of bioaccumulation.

The counter-ion may also create health and environmental concerns once isolated from the metal. Under normal physiological conditions the counter-ion may be essentially insoluble and may not be bioavailable.

Environmental processes may enhance bioavailability.

For silver and its compounds:

#### Environmental fate:

Silver is a rare but naturally occurring metal, often found deposited as a mineral ore in association with other elements. Emissions from smelling operations, manufacture and disposal of certain photographic and electrical supplies, coal combustion, and cloud seeding are some of the anthropogenic sources of silver in the biosphere. The global biogeochemical movements of silver are characterized by releases to the atmosphere, water, and land by natural and anthropogenic sources, long-range transport of fine particles in the atmosphere, wet and dry deposition, and sorption to soils and sediments.

In general, accumulation of silver by terrestrial plants from soils is low, even if the soil is amended with silver-containing sewage sludge or the plants are grown on tailings from silver mines, where silver accumulates mainly in the root systems.

The ability to accumulate dissolved silver varies widely between species. Some reported bioconcentration factors for marine organisms (calculated as milligrams of silver per kilogram fresh weight organism divided by milligrams of silver per litre of medium) are 210 in diatoms, 240 in brown algae, 330 in mussels, 2300 in scallops, and 18 700 in oysters, whereas bioconcentration factors for freshwater organisms have been reported to range from negligible in bluegills (*Lepomis macrochirus*) to 60 in daphnids; these values represent uptake of bioavailable silver in laboratory experiments. Laboratory studies with the less toxic silver compounds, such as silver suffice and silver chloride, reveal that accumulation of silver does not necessarily lead to adverse effects. At concentrations normally encountered in the environment, food-chain biomagnification of silver in aquatic systems is unlikely. Elevated silver concentrations in biota occur in the vicinities of sewage outfalls, electroplating plants, mine waste sites, and silver iodide-seeded areas. Maximum concentrations recorded in field collections, in milligrams total silver per kilogram dry weight (tissue), were 1.5 in marine mammals (liver) (except Alaskan beluga whales *Delphinapterus leucas*, which had concentrations 2 orders of magnitude higher than those of other marine mammals), 6 in fish (bone), 14 in plants (whole), 30 in annelid worms (whole), 44 in birds (liver), 110 in mushrooms (whole), 185 in bivalve molluscs (soft parts), and 320 in gastropods (whole).

#### Ecotoxicity:

In general, silver ion was less toxic to freshwater aquatic organisms under conditions of low dissolved silver ion concentration and increasing water pH, hardness, sulfides, and dissolved and particulate organic loadings; under static test conditions, compared with flow-through regimens; and when animals were adequately nourished instead of being starved. Silver ions are very toxic to microorganisms. However, there is generally no strong inhibitory effect on microbial activity in sewage treatment plants because of reduced bioavailability due to rapid complexation and adsorption. Free silver ion was lethal to representative species of sensitive aquatic plants, invertebrates, and teleosts at nominal water concentrations of 1-5 ug/litre. Adverse effects occur on development of trout at concentrations as low as 0.17 ug/litre and on phytoplankton species composition and succession at 0.3-0.6 ug/litre.

A knowledge of the speciation of silver and its consequent bioavailability is crucial to understanding the potential risk of the metal. Measurement of free ionic silver is the only direct method that can be used to assess the likely effects of the metal on organisms. Speciation models can be used to assess the likely proportion of the total silver measured that is bioavailable to organisms. Unlike some other metals, background freshwater concentrations in pristine and most urban areas are well below concentrations causing toxic effects. Levels in most industrialized areas border on the effect concentration, assuming that conditions favour bioavailability. On the basis of available toxicity test results, it is unlikely that bioavailable free silver ions would ever be at sufficiently high concentrations to cause toxicity in marine environments.

No data were found on effects of silver on wild birds or mammals. Silver was harmful to poultry (tested as silver nitrate) at concentrations as low as 100 mg total silver/litre in drinking-water or 200 mg total silver/kg in diets. Sensitive laboratory mammals were adversely affected at total silver concentrations (added as silver nitrate) as low as 250 ug/litre in drinking-water (brain histopathology), 6 mg/kg in diet (high accumulations in kidneys and liver), or 13.9 mg/kg body weight (lethality).

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#### 8463A Silver Grease

Silver and Silver Compounds; Concise International Chemical Assessment Document (CICAD) 44 IPCS InChem (WHO)

'The transport of silver through estuarine and coastal marine systems is dependent on biological uptake and incorporation. Uptake by phytoplankton is rapid, in proportion to silver concentration and inversely proportional to salinity. In contrast to studies performed with other toxic metals, sliver availability appears to be controlled by both the free silver ion concentration and the concentration of other silver complexes. Silver incorporated by phytoplankton is not lost as salinity increase; as a result silver associated with cellular material is largely retained within the estuary. Phytoplankton exhibit a variable sensitivity to silver. Sensitive species exhibit a marked delay in the onset of growth in response to silver at low concentrations, even though maximum growth rates are similar to controls. A delay in the onset of growth reduces the ability of a population to respond to short-term favourable conditions and to succeed within th community.

James G. Saunders and George R Abbe: Aquatic Toxicology and Environmental Fate; ASTM STP 1007, 1989, pp 5-18

For aluminium and its compounds and salts:

Despite its prevalence in the environment, no known form of life uses aluminium salts metabolically. In keeping with its pervasiveness, aluminium is well tolerated by plants and animals. Owing to their prevalence, potential beneficial (or otherwise) biological roles of aluminium compounds are of continuing interest.

#### Environmental fate:

Aluminium occurs in the environment in the form of silicates, oxides and hydroxides, combined with other elements such as sodium, fluorine and arsenic complexes with organic matter.

Acidification of soils releases aluminium as a transportable solution. Mobilisation of aluminium by acid rain results in aluminium becoming available for plant uptake. As an element, aluminum cannot be degraded in the environment, but may undergo various precipitation or ligand exchange reactions. Aluminum in compounds has only one oxidation state (+3), and would not undergo oxidation-reduction reactions under environmental conditions. Aluminum can be complexed by various ligands present in the environment (e.g., fulvic and humic acids). The solubility of aluminum in the environment will depend on the ligands present and the pH.

The trivalent aluminum ion is surrounded by six water molecules in solution. The hydrated aluminum ion, [Al(H2O)6]3+, undergoes hydrolysis, in which a stepwise deprotonation of the coordinated water ligands forms bound hydroxide ligands (e.g., [Al(H2O)5(OH)]2+, [Al(H2O)4(OH)2]+). The speciation of aluminum in water is pH dependent. The hydrated trivalent aluminum ion is the predominant form at pH levels below 4. Between pH 5 and 6, the predominant hydrolysis products are Al(OH)2+ and Al(OH)2+, while the solid Al(OH)3 is most prevalent between pH 5.2 and 8.8. The soluble species Al(OH)4- is the predominant species above pH 9, and is the only species present above pH 10. Polymeric aluminum

hydroxides appear between pH 4.7 and 10.5, and increase in size until they are transformed into colloidal particles of amorphous AI(OH)3, which crystallise to gibbsite in acid waters. Polymerisation is affected by the presence of dissolved silica; when enough silica is present, aluminum is precipitated as poorly crystallised clay mineral species.

Hydroxyaluminum compounds are considered amphoteric (e.g., they can act as both acids and bases in solution). Because of this property, aluminum hydroxides can act as buffers and resist pH changes within the narrow pH range of 4-5.

Monomeric aluminum compounds, typified by aluminum fluoride, chloride, and sulfate, are considered reactive or labile compounds, whereas polymeric aluminum species react much more slowly in the environment. Aluminum has a stronger attraction for fluoride in an acidic environment compared to other inorganic ligand.

The adsorption of aluminum onto clay surfaces can be a significant factor in controlling aluminum mobility in the environment, and these adsorption reactions, measured in one study at pH 3.0-4.1, have been observed to be very rapid. However, clays may act either as a sink or a source for soluble aluminum depending on the degree of aluminum saturation on the clay surface.

Within the pH range of 5-6, aluminum complexes with phosphate and is removed from solution. Because phosphate is a necessary nutrient in ecological systems, this immobilization of both aluminum and phosphate may result in depleted nutrient states in surface water.

Plant species and cultivars of the same species differ considerably in their ability to take up and translocate aluminum to above-ground parts. Tea leaves may contain very high concentrations of aluminum, >5,000 mg/kg in old leaves. Other plants that may contain high levels of aluminum include Lycopodium (Lycopodiaceae), a few ferns, Symplocos (Symplocaceae), and Orites (Proteaceae). Aluminum is often taken up and concentrated in root tissue. In sub-alpine ecosystems, the large root biomass of the Douglas fir, *Abies amabilis*, takes up aluminum and immobilizes it, preventing large accumulation in above-ground tissue. It is unclear to what extent aluminum is taken up into root food crops and leafy vegetables. An uptake factor (concentration of aluminum in the plant/concentration of aluminum in soil) of 0.004 for leafy vegetables and 0.00065 for fruits and tubers has been reported, but the pH and plant species from which these uptake factors were derived are unclear. Based upon these values, however, it is clear that aluminum is not taken up in plants form soil, but is instead biodiluted.

Aluminum concentrations in rainbow trout from an alum-treated lake, an untreated lake, and a hatchery were highest in gill tissue and lowest in muscle. Aluminum residue analyses in brook trout have shown that whole-body aluminum content decreases as the fish advance from larvae to juveniles. These results imply that the aging larvae begin to decrease their rate of aluminum uptake, to eliminate aluminum at a rate that exceeds uptake, or to maintain approximately the same amount of aluminum while the body mass increases. The decline in whole-body aluminum residues in juvenile brook trout may be related to growth and dilution by edible muscle tissue that accumulated less aluminum than did the other tissues. The greatest fraction of the gill-associated aluminum was not sorbed to the gill tissue, but to the gill mucus. It is thought that mucus appears to retard aluminum transport from solution to the membrane surface, thus delaying the acute biological response of the fish. It has been reported that concentrations of aluminum in whole-body tissue of the Atlantic salmon exposed to 190 and were directly related to the aluminum exposure concentration. In acidic waters (pH 4.6-5.3) with low concentrations of calcium (0.5-1.5 mg Ca/L), labile aluminum between 25 and 75 ug/L is toxic. Because aluminum is toxic to many aquatic species, it is not bioaccumulated to a significant degree (BCF <300) in most fish and shellfish; therefore, consumption of contaminated fish does not appear to be a significant source of aluminum exposure in humans.

Bioconcentration of aluminum has also been reported for several aquatic invertebrate species. BCF values ranging from 0.13 to 0.5 in the whole-body were reported for the snail. Bioconcentration of aluminum has also been reported for aquatic insects.

## Ecotoxicity:

## Freshwater species pH >6.5

Fish: Acute LC50 (48-96 h) 5 spp: 0.6 (Salmo salar) - 106 mg/L; Chronic NOEC (8-28 d): 7 spp,NOEC, 0.034-7.1 mg/L. The lowest measured chronic figure was an 8-d LC50 of 0.17 mg/L for Micropterus sp.

Amphibian: Acute LC50 (4 d): Bufo americanus, 0.86-1.66 mg/L; Chronic LC50 (8-d) 2.28 mg/L

Crustaceans LC50 (48 h): 1 sp 2.3-36 9 mg/L; Chronic NOEC (7-28 d) 3 spp, 0.136-1.72 mg/L

Algae EC50 (96 h): population growth, 0.46-0.57 mg/L; 2 spp, chronic NOEC, 0.8-2.0 mg/L

### Freshwater species pH <6.5 (all between pH 4.5 and 6.0)

Fish LC50 (24-96 h): 4 spp, 0.015 (S. trutta) - 4.2 mg/L; chronic data on Salmo trutta, LC50 (21-42 d) 0.015- 0.105 mg/L

Amphibians LC50 (4-5 d): 2 spp, 0.540-2.670 m/L (absolute range 0.40-5.2 mg/L)

#### Alga: 1 sp NOEC growth 2.0 mg/L

Among freshwater aquatic plants, single-celled plants are generally the most sensitive to aluminium. Fish are generally more sensitive to aluminium than aquatic invertebrates. Aluminium is a gill toxicant to fish, causing both ionoregulatory and respiratory effects.

The bioavailability and toxicity of aluminium is generally greatest in acid solutions. Aluminium in acid habitats has been observed to be toxic to fish and phytoplankton. Aluminium is generally more toxic over the pH range 4.4.5.4, with a maximum toxicity occurring around pH 5.0.5.2. The inorganic single unit aluminium species (Al(OH)2 +) is thought to be the most toxic. Under very acid conditions, the toxic effects of the high H+ concentration appear to be more important than the effects of low concentrations of aluminium; at approximately neutral pH values, the toxicity of aluminium is greatly reduced. The solubility of aluminium is also enhanced under alkaline conditions, due to its amphoteric character, and some researchers found that the acute toxicity of aluminium increased from pH 7 to pH 9. However, the opposite relationship was found in other studies. The uptake and toxicity of aluminium in freshwater organisms generally decreases with increasing water hardness under acidic, neutral and alkaline conditions. Complexing agents such as fluoride, citrate and humic substances reduce the availability of aluminium to organisms, resulting in lower toxicity. Silicon can also reduce aluminium toxicity to fish.

Drinking Water Standards: aluminium: 200 ug/l (UK max.) 200 ug/l (WHO guideline) chloride: 400 mg/l (UK max.) 250 mg/l (WHO guideline) fluoride: 1.5 mg/l (UK max.) 1.5 mg/l (WHO guideline) nitrate: 50 mg/l (UK max.) 50 mg/l (WHO guideline) sulfate: 250 mg/l (UK max.) Soil Guideline: none available.

Air Quality Standards: none available. 12.2. Persistence and degradability

Ingredient

Persistence: Water/Soil

Persistence: Air

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# 8463A Silver Grease

Ingredient	Persistence: Water/Soil	Persistence: Air	
	No Data available for all ingredients	No Data available for all ingredients	
12.3. Bioaccumulative potential			
Ingredient	Bioaccumulation		
	No Data available for all ingredients		
12.4. Mobility in soil			
Ingredient	Mobility		
	No Data available for all ingredients		

# 12.5. Results of PBT and vPvB assessment

	Ρ	В	т	
Relevant available data	vailable			
PBT	BT X X X			
VPVB X X X				
PBT Criteria fulfilled?				No
vPvB				No

## 12.6. Endocrine Disruption Properties

Not Available

# 12.7. Other adverse effects

Not Available

# **SECTION 13 Disposal considerations**

13.1. Waste treatment methods	S
Product / Packaging disposal	<ul> <li>Containers may still present a chemical hazard/ danger when empty.</li> <li>Return to supplier for reuse/ recycling if possible.</li> <li>Otherwise: <ul> <li>If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li> <li>Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> <li>DO NOT allow wash water from cleaning or process equipment to enter drains.</li> <li>It may be necessary to collect all wash water for treatment before disposal.</li> <li>In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>Where in doubt contact the responsible authority.</li> <li>Recycle wherever possible or consult manufacturer for recycling options.</li> <li>Consult State Land Waste Management Authority for disposal.</li> <li>Bury residue in an authorised landfill.</li> </ul> </li> </ul>
Waste treatment options	Not Available
Sewage disposal options	Not Available

# **SECTION 14 Transport information**

# Labels Required

	NOT REGULATED by Ground ADR Special Provision 375 NOT REGULATED by Air IATA Special Provision A197 NOT REGULATED by Sea IMDG per 2.10.2.7 NOT REGULATED by ADN Special Provision 274 (The provision of 3.1.2.8 apply)
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# Land transport (ADR-RID)

14.1. UN number	3077
14.2. UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver)
14.3. Transport hazard class(es)	Class     9       Subrisk     Not Applicable
14.4. Packing group	III
14.5. Environmental hazard	Environmentally hazardous
14.6. Special precautions for user	Hazard identification (Kemler)90Classification codeM7

Hazard Label	9
Special provisions	274 335 375 601
Limited quantity	5 kg
Tunnel Restriction Code	3 (-)

# Air transport (ICAO-IATA / DGR)

14.1. UN number	3077		
14.2. UN proper shipping name	Environmentally hazardo	ous substance, solid, n.o.s. * (contains s	ilver)
14.3. Transport hazard class(es)	ICAO/IATA Class ICAO / IATA Subrisk ERG Code	9 Not Applicable 9L	
14.4. Packing group	111		
14.5. Environmental hazard	Environmentally hazardo	bus	
14.6. Special precautions for user	Special provisions Cargo Only Packing In	Istructions	A97 A158 A179 A197 A215 956
	Cargo Only Maximum Qty / Pack		400 kg
	Passenger and Cargo Packing Instructions		956
	Passenger and Cargo Maximum Qty / Pack		400 kg
	Passenger and Cargo Limited Quantity Packing Instructions		Y956
	Passenger and Cargo	Limited Maximum Qty / Pack	30 kg G

# Sea transport (IMDG-Code / GGVSee)

14.1. UN number	3077	
14.2. UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver)	
14.3. Transport hazard class(es)	IMDG Class     9       IMDG Subrisk     Not Applicable	
14.4. Packing group	Ш	
14.5. Environmental hazard	Marine Pollutant	
14.6. Special precautions for user	EMS NumberF-A , S-FSpecial provisions274 335 966 967 969Limited Quantities5 kg	

# Inland waterways transport (ADN)

14.1. UN number	3077	
14.2. UN proper shipping name	ENVIRONMENTALLY H	IAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver)
14.3. Transport hazard class(es)	9 Not Applicable	
14.4. Packing group	Ш	
14.5. Environmental hazard	Environmentally hazard	IOUS
14.6. Special precautions for user	Classification code Special provisions Limited quantity Equipment required Fire cones number	M7 274; 335; 375; 601 5 kg PP, A*** 0

# 14.7. Transport in bulk according to Annex II of MARPOL and the IBC code

Ship Type

Not Applicable

# 14.8. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
aluminium powder coated	Not Available
silver	Not Available

# 14.9. Transport in bulk in accordance with the ICG Code

Product name

Product name	Ship Type
aluminium powder coated	Not Available
silver	Not Available

## **SECTION 15 Regulatory information**

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

#### aluminium powder coated is found on the following regulatory lists EU REACH Regulation (EC) No 1907/2006 - Annex XVII - Restrictions on the European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labelling and manufacture, placing on the market and use of certain dangerous substances, mixtures Packaging of Substances and Mixtures - Annex VI and articles International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS) Europe EC Inventory European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) silver is found on the following regulatory lists European Union - European Inventory of Existing Commercial Chemical Substances EU European Chemicals Agency (ECHA) Community Rolling Action Plan (CoRAP) List of Substances (EINECS) Europe EC Inventory International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2020/878; Regulation (EC) No 1272/2008 as updated through ATPs.

### 15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

#### National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (aluminium powder coated; silver)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (aluminium powder coated; silver)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - FBEPH	Yes
Legend:	Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.

#### **SECTION 16 Other information**

Revision Date	23/02/2022
Initial Date	23/02/2022

### Full text Risk and Hazard codes

H228	Flammable solid.
H261	In contact with water releases flammable gases.

## Other information

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.

The 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. For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

#### Definitions and abbreviations

PC-TWA: Permissible Concentration-Time Weighted Average

PC-STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer ACGIH: American Conference of Governmental Industrial Hygienists STEL: Short Term Exposure Limit TEEL: Temporary Emergency Exposure  $\mathsf{Limit}_\circ$ IDLH: Immediately Dangerous to Life or Health Concentrations ES: Exposure Standard OSF: Odour Safety Factor NOAEL :No Observed Adverse Effect Level LOAEL: Lowest Observed Adverse Effect Level TLV: Threshold Limit Value LOD: Limit Of Detection OTV: Odour Threshold Value BCF: BioConcentration Factors BEI: Biological Exposure Index AIIC: Australian Inventory of Industrial Chemicals DSL: Domestic Substances List NDSL: Non-Domestic Substances List IECSC: Inventory of Existing Chemical Substance in China EINECS: European INventory of Existing Commercial chemical Substances ELINCS: European List of Notified Chemical Substances NLP: No-Longer Polymers ENCS: Existing and New Chemical Substances Inventory KECI: Korea Existing Chemicals Inventory NZIoC: New Zealand Inventory of Chemicals PICCS: Philippine Inventory of Chemicals and Chemical Substances TSCA: Toxic Substances Control Act TCSI: Taiwan Chemical Substance Inventory INSQ: Inventario Nacional de Sustancias Químicas NCI: National Chemical Inventory FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

### **Reason For Change**

A-1.00 - First release