SHOWA DENKO K.K.

GPS/JIPS Safety Summary

1. SUBSTANCE NAME

Aluminum (CAS No.: 7429-90-5)

2. GENERAL STATEMENT

Aluminum is one of the metals found most abundantly in the geosphere, and is widely distributed.
Aluminum is highly reactive, and does not exist naturally as an isolated metal. Normally, the substance is bonded with oxygen, silicone or fluorine. These compounds are usually found in the soil, minerals, rocks and clay. Aluminum is an odorless, light-weight metal obtained from bauxite, and is silvery white in color.
Generally, the substance is used for producing beverage cans, cooking utensils, aircrafts, external wall panels, roofing materials for buildings, and aluminum foil, and is also found in consumer products (such as acid-reducing agents, astringent agents, analgesic, antipyretic, food additives, antiperspirants and cosmetics). Additionally, in powdered form, aluminum has been used in explosives and fireworks.
Our company has used aluminum primarily in thermal exchangers, beverage cans, containers, packaging materials, electrolytic capacitor foils, extruded aluminum alloy materials, forged aluminum alloy products, etc.
Dangers associated with aluminum include the possibility of lung damage for those repeatedly exposed to powders and fumes over extended periods of time. The substance also has the potential to affect the nervous system of persons with renal dysfunction, and can induce functional disorders. It could also have deleterious influences on aquatic organisms.

3. CHEMICAL IDENTITY

Item	Description
Chemical or generic name	Aluminum
Product name	Aluminum
CAS No.	7429-90-5
Other Nos.	Japan: Chemical Substances Control Law ; Not applicable EC No./EINECS No.: 231-072-3
Chemical formula	Al
Structural formula	Al
Sources/references	Sections 3 of the SDS issued by SHOWA DENKO K.K.

4. USES AND APPLICATIONS

Main uses	Our aluminum has been used mainly with heat exchangers, such as chillers for industrial machines, evaporators for refrigerators, as well as aluminum beverage cans, containers, packaging materials, high-purity aluminum products such as foil for aluminum electrolytic capacitors, and aluminum plates, springs, disc products,

	extruded aluminum alloy materials, forged aluminum alloy products, etc.

5. PHYSICAL/CHEMICAL PROPERTIES

Appearance	Solid
Color	White～Grey, Silver (metallic color)
Odor	Odorless
Density	2.702 g/cm^3
Melting point/boiling point	660 ºC /2467 ºC (101.325hPa)
Combustibility	No reliable data available.
Lower and upper Flammability limits	No reliable data available.
Auto-ignition temperature	590 ºC
Molecular weight	27
Vapor pressure	0.00013hPa (974 ºC)
Solubility in water	Non-soluble and reactive
Partition coefficient (n-octanol/water)	Not applicable
Sources/references	Section 9 of the SDS issued by SHOWA DENKO K.K.

6. HEALTH EFFECTS

Effect assessment	Results (GHS(Note 1) hazard classification)
Acute toxicity (oral)	Classification not possible (Note 3)
Acute toxicity (dermal)	Classification not possible
Acute toxicity (Inharation : gases)	Not applicable (Note 2)
Acute toxicity (Inharation : vapors)	Classification not possible
Acute toxicity (Inharation : dusts and mists)	Classification not possible
Skin corrosion/irritation	Classification not possible
Serious eye damage/eye irritation	Classification not possible
Respiratory sensitization	Classification not possible
Skin sensitization	Classification not possible
Germ cell mutagenicity	Classification not possible
Carcinogenicity	Classification not possible
Reproductive toxicity	Classification not possible
Specific target organ toxicity (single exposure)	Classification not possible
Specific target organ toxicity (repeated exposure)	・Causes damage to lung through prolonged or repeated exposure (Category 1 (lung)). ・May cause damage to nervous system through prolonged or repeated exposure (Category 2 (nervous system)).
Aspiration hazard	Classification not possible
Sources/references	Sections 11 of the SDS issued by SHOWA DENKO K. K.
(Note 1) GHS (Globally Harmonized System of Classification and Labeling of Chemicals): It is a system for classifying chemicals according to type and hazard level, and for indicating	

label information pursuant to the globally unified rules for offering Safety Data Sheets.
(Note 2) Not applicable: when chemicals do not fall within the scope of classification because the physical properties defined in the GHS do not apply.
(Note 3) Classification not possible: when unable to classify due to a lack of sufficiently reliable data for defining the classification.

7. ENVIRONMENTAL EFFECTS

Effect assessment	Results (GHS hazard classification)
Hazardous to the aquatic environment	
Acute hazard	Classification not possible
Long-term hazard	May cause long lasting harmful effects to aquatic life (Category 4)
Hazardous to the ozone layer	Montreal Protocol on Substances that Deplete the Ozone Layer (revised version): not included in the list
Sources/references	Sections 12 of the SDS issued by SHOWA DENKO K.K.

Environmental fate/dynamics	Results
Mobility in soil	No reliable data available.
Persistence/degradability	The substance is inorganic and non biodegradable.
Bioaccumulation potential	Its accumulation potential has generally been regarded as being low.
Conclusion about PBT/vPvB	The criteria for persistent bioaccumulative and toxic (PBT; remaining persistently in the environment and possessing high bioaccumulation potential and toxicity) and very persistent and very bioaccumulative (vPvB; remaining very persistently in the environment and possessing very high bioaccumulation potential) chemicals are believed to inapplicable.
Sources/references	Section 12 of the SDS issued by SHOWA DENKO K.K. and Section 8 of the Chemical Safety Report of REACH

8. EXPOSURE

	Exposure potentials through main uses
Occupational exposures	Harmful influences have not been reported under general work conditions, but there is the possibility that workers, who are engaged in the tasks below, could be exposed in contact with skin or through inhalation. Additionally, there is the possibility of suffering burns when engaged in tasks at high temperatures. ・Manufacturing of products for preparations, or mold products through tablet formation, compression, extrusion or pelletizing (volatile substances, fumes and dusts may be generated) (PROC14). ・Hand-cutting of materials and mold products, rolling, assembling and dismantling (including metal blocks) at low temperatures (PROC21). ・Process on metals under high temperatures (PROC25). ・Packing, unpacking, mixing/blending, measuring and other tasks of metallic powders and other inorganic materials, on handling solid

	inorganic materials at normal temperatures (PROC26). ・Manufacturing metallic powders (PROC27).
Consumer exposures	There is a slight potential that consumers could be exposed to aluminum contained in the following final products through dermal or inhalation. ・Products such as a metal base and alloy (PC7). ・Explosives and other products (PC11). ・Cosmetic and personal-care products (PC39). ・Metallic products such as Cutleries, cooking utensils, pots, pans, noble metal products, toys, furniture, building materials (AC7).
Environmental exposures	Although environmental exposure is possible in the following cases, no specific effects on the environment have been reported, as mentioned in Section 7 Environmental Effects. ・There is the potential for discharge mainly into the air and aquatic environment, from aluminum manufacturing processes (ERC1). ・The substance has been used in products that may be used outdoors over a long period of time, such as consumer- and industrial-use building materials (gutters, water supply pipes, frames). Therefore there is also the potential for widespread discharge into the aquatic and soil environment (ERC10). ・There is the potential for discharge of the substance into the air, aquatic and soil environment from metal cutting, machining, crushing and other processes for molded products (ERC12).
Precautions	If there is the potential for exposure during use in other applications, please implement appropriate measures by referring to the risk management recommendations.

9. RISK MANAGEMENT RECOMMENDATIONS

	Risk management recommendations
Occupational exposures	Technical measures
	・Install local ventilation at manufacturing places or places using the substance where dusts and fumes may be generated. Install a wash stand, eye washer and safety shower at places that manufacture, store or handle the product. Wear appropriate protective masks, as well as clothes and protective gloves, etc.
	Local exhaust and total ventilation
	・For controlling and restricting environmental concentrations below the following recommended values, install local exhaust or total ventilation systems at places where the product is manufactured, stored or handled.
	Allowable exposure limit
	Recommended values of the Japan Society for Occupational Health (2011): ・0.5 mg/m^3 for respirable dust (class 1 dusts) ・2 mg/m^3 for total dust (class 1 dusts) American Conference of Governmental Industrial Hygienists (ACGIH): ・1 mg/m^3 (TLV-TWA)
	Protective equipment
	While working, wear appropriate protective eyewears, dust-proof masks, air-supplied respirators, clothes and protective gloves made of materials impermeable to powders.
	Precautions
	・Managers are asked to provide workers training concerning the

	selection and use of appropriate protective equipment, worksite management, etc.
Consumer exposures	If handled properly, there is low possibility that consumers inhale aluminum contained in the products or are exposed to it through the skin. Consumers can take aluminum used in cosmetic, medical and pharmaceutical products or food additives, and an intake amount is a safe level.
Environmental exposures	Leakage into the environment is small because the substance is usually in a solid form. However, when dusts and fumes are generated by processing, take implement preventive measures against leakage into rivers, water channels, and sewerage trenches, and pay attention to the daily management and handling of the substance.
Special instructions (emergency measures at times of leakage, etc.)	The substance could seep out of a melting furnace and others if it is heated to high temperatures to turn into a liquid. In such a case, solidify the leaked substance by air-cooling and then collect it.
Sources/references	Sections 4, 5, 6, 7, 8, 13 and 14 of the SDS issued by SHOWA DENKO K.K.

10. STATE AGENCY REVIEW

Hazard assessment	Situations of review
International Chemical Safety Cards	ICSC No. :0988, http://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0988
REACH	http://apps.echa.europa.eu/registered/data/dossiers/DISS-9eb0e19f-e4e7-5137-e044-00144f67d031/DISS-9eb0e19f-e4e7-5137-e044-00144f67d031_DISS-9eb0e19f-e4e7-5137-e044-00144f67d031.html
USA.ATSDR toxic report	http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=191&tid=34

11. REGULATORY INFORMATION/GHS CLASSIFICATION-LABELING INFORMATION

Regulatory information only in Japan
The following information is provided about the aluminum powder.

Applicable laws	Regulatory situations
Industrial Safety and Health Act	・Hazardous substances, inflammable substances, item 2, Appended Table 1 of the Enforcement Ordinance.
Water Pollution Control Act	・Specified substance, paragraph 4, Article 2 of the Act, Article 3-3 of the Enforcement Ordinance
Fire Service Act	Category II inflammable solids, metal powder, (Appended Table 1 of hazardous materials, Category II, paragraph 7, Article 2 of the Act)
Civil Aeronautics Act	・Flammable substances・Substance that generates inflammable gas through interaction with water, Appended Table 1 , Article 194 of the Enforcement Regulations . ・Flammable substances, Appended Table 1 , Article 194 of the Enforcement Regulations . (Aluminum powder; coated) ・Flammable substances・Substance that generates

	inflammable gas through interaction with water, Appended Table 1 , Article 194 of the Enforcement Regulations . (Aluminum powder; non-coated) ・Substances prohibited from being transported, Article 194 of the Enforcement Regulations .(Self igniting metal or Self igniting alloy)
Ship Safety Act	・Flammable substances , Appended Table 1 , Article 3 of Regulations for the Carriage and Storage of Dangerous Goods in Ship. ・Flammable substances , Appended Table 1 , Article 3 of Regulations for the Carriage and Storage of Dangerous Goods in Ship. (Aluminum powder; coated) ・Flammable substances・Substance that generates inflammable gas through interaction with water, Appended Table 1 , Article 3 of Regulations for the Carriage and Storage of Dangerous Goods in Ship.. (Aluminum powder; non-coated) ・Flammable substances・Self igniting substances, Appended Table 1 , Article 3 of Regulations for the Carriage and Storage of Dangerous Goods in Ship. (Self igniting metal or Self igniting alloy)
Act on Port Regulations	・Other hazardous materials, inflammable liquids(Self igniting substances), Article 21-2 of the Act, Article 12 of Enforcement Regulations, Appended table specifying the types of hazardous materials (Self igniting metal)
Road Act	・Restrictions on vehicle traffic, Article 19-13 of the Enforcement Ordinance, Appended Table 2 of Notification No.12 of Japan Expressway Holding and Debt Repayment Agency, (metal powder)
Foreign Exchange and Foreign Trade Act	・Item 4 of Appended Table 1 of Export Trade Control Order. ・Item 14 of Appended Table 1 of Export Trade Control Order.
Water supply Act	・Specified hazardous substance, paragraph 2, Article 4 of the Act, Water quality standard (Heisei 15 Article 101 of the Ordinance)
Pneumoconiosis Act	・Article 2 of the Act, Appended Table (Dusty work), Article 2 of the Enforcement Ordinance
UN classification	4.3 (Aluminum powder; non-coated) 4.1 (Aluminum powder; coated)
UN No.	UN1396 (Aluminum powder; non-coated) UN1309 (Aluminum powder; coated)

GHS classification, label information

Hazards	Classification results (hazard information)
Physical chemical hazards	
Flammable solids	Not classified
Pyrophoric solids	Not classified
Self-heating substances and mixtures	Category 2 or Category 3 (In case of powder)
Substances and mixtures which, in contact with water, emit flammable gases	Not classified
Oxidizing solids	Not classified
Corrosive to metals	Not classified

Health hazards	
Specific target organ toxicity (repeated exposure)	Category 1 (lung).
Hazardous to the aquatic environment	
Long-term hazard	Category 4
GHS label elements	
Pictogram or symbol	(In case of powder) 
Signal word	Danger
Hazard statement	・In contact with water releases flammable gas. (In case of Powder) ・Causes damage to lung through prolonged or repeated exposure. ・May cause long lasting harmful effects to aquatic life.

12. CONTACT INFORMATION

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13. DATE OF ISSUE AND REVISION, ADDITIONAL INFORMATION

Date of issue: November 21, 2013
Revisions:

Date of revision	Revised section	Revised item	Version

Special instructions: none

14. DISCLAIMER

This Safety Summary which is a translation of original Safety Summary prepared in Japanese, has been prepared as a part of the efforts by GPS/JIPS: Japan Initiative of Product Stewardship by the chemical industry. This Safety Summary is meant to provide an outline of information related to the safe handling of the subject substance rather than provide expert information regarding the risk assessment processes, the effect on human health or the environment, etc. Moreover it is not a replacement for the Safety Data Sheet (SDS), the Chemical Safety Report (CSR), or other risk assessment documents. To the greatest extent possible, the Safety Summary contains accurate statements based on laws, materials, information and other data available at the time of issue. However, it does not cover all such data. Additionally, it does not intend to provide a guarantee in any way.