Safety Data Sheet (SDS)

OSHA Hazard Communication Standard (HCS) 2012

Version: 1
Revision date: May, 15, 2015 Printing Date: May 15, 2015

SECTION1: IDENTIFICATION

a) Product identifier

Substance name: Antimony trioxide
Trade name: Twinkling Star
CAS number: 1309-64-4

b) Other means of identification

Synonym: (Di)antimony trioxide (*ATO*); Antimony oxide (Sb_2O_3)

c) Recommended use of the chemical and restrictions on use

Recommended use

The major use of (di)antimony trioxide (ATO) is as a flame retardant. However, it does not have flame retarding properties itself; instead, it is a synergist for halogenated flame retardants in plastics, paints, adhesives, sealants, rubber, and textile back-coatings. Other uses of ATO include: polymerization catalyst in PET resin manufacture, clarifying aid in certain glasses, and in pigments (see Annex I for more details).

Restrictions on use

There are no restrictions on use.

d) Details of the supplier of the safety data sheet

Hsikwangshan Twinkling Star Co., Ltd.
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Importer:

e) Emergency telephone number

+46 8 6699001(Sweden)
+1 714 5827563-7019(USA)

SECTION2: HAZARD IDENTIFICATION

a) Classification of the substance or mixture

Carcinogenicity Category 2

b) Label elements

Signal word: Warning

Hazard pictogram:
GHS08: health hazard

Hazard statement:
Suspected of causing cancer by inhalation

Precautionary statements:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Wear protective gloves/protective clothing/eye protection /face protection.
IF exposed or concerned: Get medical advice/attention.
Store locked up
Dispose of contents/container in accordance with local/regional/national/international regulations.

For more information on human health and environmental effects see sections 9 to 12 of this SDS.

c) Other hazards
The substance does not meet the criteria for a PBT or vPvB substance.
No environmental or physico-chemical hazards identified according to HPR.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

a) Substance

Chemical name	Common name and synonyms	CAS No.	% (w/w)
Main constituent			
(di)antimony trioxide	Antimony oxide (Sb_2O_3)	1309-64-4	>98 - <100
Impurity			
lead monoxide	Lead oxide (PbO)	1317-36-8	<0.1
(di)arsenic trioxide	Arsenic oxide (As_2O_3)	1327-53-3	<0.1
Stabilizing additive			
-			

The supplier has currently no knowledge on additional ingredients that are classified and that contribute to the classification of the substance.
See certificate of analysis for more information on impurity levels.

SECTION 4: FIRST AID MEASURES

a) Description of first aid measures

General advice
IF exposed or concerned: Get medical advice/attention.
Take off all contaminated clothing.
First-aiders should wear suitable personal protective equipment (see section 8) in case of insufficient ventilation or possible skin or eye contact.

Following inhalation

Move affected person to fresh air.
Seek medical attention.

Following skin contact
If normal occupational hygiene measures are maintained, there is no such foreseeable health hazard from ATO. Wash with water and remove clothes if necessary.

Following eye contact
If normal occupational hygiene measures are maintained, there is no such foreseeable health hazard from ATO. Flush eyes thoroughly with water, also under eyelids.

After ingestion
If normal occupational hygiene measures are maintained, there is no such foreseeable health hazard from ATO. Rinse mouth with water.

b) Most important symptoms and effects, both acute and delayed
Acute or delayed effects are not anticipated for ATO.

c) Indication of any immediate medical attention and special treatment needed
Not appropriate (see 4.2).

SECTION 5: FIREFIGHTING MEASURES

a) Extinguishing media
Suitable extinguishing media
Use firefighting measures that suit the environment.
The product is not combustible and does not support the combustion.

Unsuitable extinguishing media
None.

b) Special hazards arising from the substance or mixture
(Di)antimony trioxide dust.

c) Special protective equipment and precautions for fire-fighters
Wear a self-contained breathing apparatus and a fully protective suit and gloves. Dispose of fire debris and contaminated firefighting media in accordance with official regulations.

SECTION 6: ACCIDENTAL RELEASE MEASURES

a) Personal precautions, protective equipment and emergency procedures
For non-emergency personnel:
Avoid formation of dust.
Ensure adequate ventilation.
Keep unprotected persons away.
Although the substance has no acute toxicity, it is advised to avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8).
Avoid inhalation of dust – wear suitable protective equipment (see section 8).

For emergency responders:
Avoid formation of dust.
Ensure adequate ventilation.
Keep unprotected persons away.
Although the substance has no acute toxicity, it is advised to avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8).
Avoid inhalation of dust – wear suitable protective equipment (see section 8).

b) Methods and material for containment and cleaning up
In any case avoid dust formation.
Sweep all spilled material or use an appropriate industrial vacuum cleaner.
Collect spilled material in suitable containers or closed plastic bags for recovery or disposal.
In case of disposal dispose spilled material or contaminated material as waste as described in section 13.

c) Reference to other sections
For more information on exposure controls/personal protection or disposal considerations, check section 8 and 13 of this safety data sheet.

SECTION 7: HANDLING AND STORAGE

a) Precautions for safe handling
Protective measures
Do not handle until all safety precautions have been read and understood.
As a precautionary measure, the wearing of chemical resistant gloves, long sleeved overalls and closed footwear, designed to minimize skin contact is suggested for all (di)antimony trioxide powder handling workplaces. Use personal protective equipment as required.
Provide showers, eye-baths and self-contained breathing apparatus nearby.
For more information, see the relevant Exposure Scenario, Annex I and check section 2.1: Control of workers' exposure.

Advice on general occupational hygiene
Avoid inhalation or ingestion.
General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating, drinking and smoking at the workplace and wearing standard working clothes and shoes unless otherwise stated.
Wash hands after use.
Remove contaminated clothing and protective equipment before entering eating areas.
Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

b) Conditions for safe storage, including any incompatibilities
Store in well ventilated dry area.
Do not store in open inadequate mislabeled packaging.
For more information, see the relevant Exposure Scenario, Annex I and check section 2.1: Control of workers' exposure.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

An overview of the assigned protection factors (APFs) of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE (www.ebrc.de/mease.html).

Any dust-tight material (e.g. rubber-dipped cotton/rubber/nitrile/leather) suitable for the type of work (e.g. considering mechanical stress) could be used as material for gloves protecting against ATO exposure (non-corrosive inorganic substance). Breakthrough times are not relevant because corrosion and diffusion are excluded by the nature of the substance. Change gloves when damaged or according to manufacturer's instructions.

a) Control parameters

Occupational exposure limit values

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Lead monoxide (CAS #: 1317-36-8)	TWA: 0.05 mg/m^3 Pb	-	IDLH: 100 mg/m^3 Pb TWA: 0.050 mg/m^3 Pb
Arsenic trioxide (CAS #: 1327-53-3)	TWA: 0.01 mg/m^3 As	TWA: 10 µg/m^3 As	IDLH: 5 mg/m^3 As Ceiling: 0.002 mg/m^3 As 15 min
Antimony trioxide (CAS #: 1309-64-4)	TWA: 0.5 mg/m^3 Sb	TWA: 0.5 mg/m^3 Sb	IDLH: 50 mg/m^3 Sb TWA: 0.5 mg/m^3 Sb

b) Appropriate engineering controls

Prevent formation of dust where possible. Ensure appropriate ventilation/exhaustion at machinery and places where dust can be generated. Any deposit of dust which cannot be avoided must be regularly removed using preferably appropriate industrial vacuum cleaners or central vacuum systems.
Waste air is to be released into the atmosphere only when it has passed through suitable dust separators.
Waste water generated during the production process or cleaning operations should be collected and should preferably be treated in an on-site waste water treatment plant which ensures efficient removal of antimony.

c) Individual protection measures, such as personal protective equipment

Eye/face protection

Although the substance has no acute toxicity, it is advised to wear suitable safety glasses. NBN EN 166:2002 is recommended.

Skin protection

Hand and body protection:
ATO is not classified as hazardous to skin (see section 11 for more details). However, industry is committed to adequately control the risks of any adverse effects to workers who are exposed in hot, sweaty conditions to fumes or dust containing ATO by following the occupational hygiene practices as described in the relevant exposure scenarios. As a precautionary measure, the wearing of chemical resistant gloves, long sleeved overalls and closed footwear, designed to minimize skin contact is suggested for all (di)antimony trioxide powder handling workplaces because of possible skin rashes when sweat ducts are blocked – see RAC discussion (ECHA/PR/09/09, 2009).

Respiratory protection

Use local ventilation to keep levels below established threshold values. A suitable particle filter mask is recommended.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

(a) Appearance	Crystalline white powder with particle size of 0.2 µm to 44 µm depending on the type of ATO
(b) Odour	Odourless.
(c) Odour threshold	Not applicable as odourless.

(d) pH	Not applicable to powders.
(e) Melting point/ freezing point	656 °C at 1013 hPa
(f) Initial boiling point and boiling range	1425 °C at 1013 hPa
(g) Flash point	Not applicable as only relevant for liquids or low melting point solids.
(h) Evaporation rate	Not applicable to powders.
(i) Flammability (solid, gas)	Non-flammable. This substance does not contain any chemical groups that might lead to spontaneous ignition a short time after coming in contact with air at room temperature (circa 20 °C). Furthermore, long-term industrial experience in handling shows that the substance does not ignite in contact with air (in accordance with section 1 of REACH Annex XI).
(j) Upper/lower flammability or explosive limits	Non-explosive. (Di)antimony trioxide exhibits no chemical groups indicating explosive properties (e.g. peroxide).
(k) Vapour pressure	~133 Pa at 574 °C
(l) Vapour density	Not applicable to powders.
(m) Relative density	5.897 at 20 °C
(n) Solubility(ies)	2.76 mg/l (T° 22.2°C - ISO 6341 medium - loading 100 mg Sb_2O_3/l - pH 8)
(o) Partition coefficient n-octanol/water	Not applicable to inorganic substances.
(p) Auto-ignition temperature	Not relevant since this would require heat to be developed either by reaction of this substance with oxygen or by exothermic decomposition and which is not lost rapidly enough to the surroundings.
(q) Decomposition temperature	Does not decompose if used as intended.
(r) Viscosity	Not applicable to powders.
(s) Explosive properties	Non-explosive.
(t) Oxidising properties	Non-oxidising substance.

SECTION 10: STABILITY AND REACTIVITY

a) Reactivity

Not applicable. See section 9.

b) Chemical stability

Under normal conditions of use and storage, the product is stable.

c) Possibility of hazardous reactions

Reaction with H--equivalents releases antimony hydride (stibine, SbH3).
Hazardous polymerization will not occur.

d) Conditions to avoid

Avoid dust formation. See section 7.2 Conditions for safe storage, including any incompatibilities.

e) Incompatible materials

Reaction with H--equivalents releases antimony hydride (stibine, SbH3). Strong acids/bases. Reducing agents. See section 7.1 Precautions for safe handling.

f) Hazardous decomposition products

Does not decompose if used as intended.

SECTION 11: TOXICOLOGICAL INFORMATION

a) Information on the likely routes of exposure

Inhalation: Inhalation of vapors in high concentration may cause irritation.
Ingestion: Ingestion may cause irritation to mucous membranes.
Skin contact: Prolonged or repeated contact with skin may cause irritation.
Eye contact: Contact with eyes may cause mechanical irritation.

b) Information on toxicological effects

Toxicity endpoints	Description of effects
Absorption	Oral = 0.05-0.3% Dermal = 0.01-0.1% (negligible) Inhalation = <<1 % Bioaccumulation potential: no bioaccumulation potential
Acute toxicity	Based on available data, the classification criteria for acute toxicity are not met. Oral: LD_{50} rat > 20,000 mg/kg bw (Fleming, 1938; Gross et al, 1955; Weil et al, 1978) Dermal: LD_{50} rabbit > 8,300 mg/kg bw (Gross et al, 1955) Inhalation: LC_{50} rat> 5,200 mg/m³ (Leuschner, 2006)
Skin corrosion/irritation	Based on available data, the classification criteria as skin irritant are not met. However, under conditions of substantial heat and sweating, high levels of dermal dust exposure may cause mechanical/physical blocking of sweat glands in the absence of any intrinsic substantial primary skin irritating potential of the substance and also in consideration of the poor solubility of ATO. The Committee for Risk Assessment (RAC) decided in July 2009 that a harmonised skin irritation classification was not supported (ECHA/PR/09/09, 2009). ATO is not a corrosive agent.
Serious eye damage/irritation	Based on available data, the classification criteria for eye irritation are not met (Leuschner, 2005).
Respiratory or skin sensitisation	Based on available data, the classification criteria for skin sensitisation (Chevalier, 2005; Moore, G.E, 1994) and for irritation to the respiratory system (Leuschner, 2006) are not met.
Germ cell mutagenicity	ATO does not cause systemic mutagenicity *in vivo* after oral administration. Negative *in vivo* results on chromosome aberrations and micronuclei were obtained in two different species via oral application – mouse (Elliot et al., 1998) and rat (Whitwell, 2006), (Kirkland et al., 2007). An *in vivo* UDS assay in rats was also negative (Elliot et al., 1998). Based on available data, the classification criteria according to regulation (EC) 1272/2008 as germ cell mutagen are not met.
Carcinogenicity	CAS# 1309-64-4: IARC 2B; ACGIH A2 (Di)antimony trioxide is classified as inhalation carcinogen category 2 (according to HPR). Three chronic inhalation studies in rats are available for the carcinogenicity assessment of (di)antimony trioxide (Watt, 1983; Groth et al., 1986a, Newton et al., 1994). The exposure

	duration in all three animal studies is 12 months and thus all studies deviates from the OECD guideline on chronic toxicity/carcinogenicity, which prescribes an exposure period of 24 months for rats. The study by Newton et al., (1994) showed no (di)antimony trioxide-related lung tumours, neither in males nor females, at any dose level up to 4.5 mg/m^3. The study shows that (di)antimony trioxide reduced the pulmonary clearance rate in a dose dependent manner. However, it is well known that reduced lung clearance rate at chronic exposure of rats to poorly soluble particles (PSPs) can result in pulmonary overload, subsequently followed by an inflammatory response, epithelial cell hypertrophy and/or hyperplasia and squamous metaplasia. The persistence of these tissue responses over chronic time periods can lead to secondary development of lung tumours (Hext, 1994). Due to the deviations from the OECD guidelines and the critical shortcoming in all three studies, US NTP (National Toxicology Program) has embarked on a testing programme leading to a new, full 2-year bioassay; finalised end 2010 and reporting expected in 2014-2015. The overall expert judgement by TC NES was that the most likely mechanism for carcinogenicity appears to be impaired lung clearance and particle overload followed by an inflammatory response, fibrosis and tumours. Consequently, (di)antimony trioxide can be regarded as a threshold carcinogen and as a starting point for a quantitative risk characterisation the NOAEC of 0.51 mg/m^3 derived for local repeated dose toxicity is also used for carcinogenicity. However, in this context, it is questionable whether effects caused by pulmonary overload in the rat are also relevant for humans. NOAEC: 0.51 mg/m³ / Target organ: respiratory: lung
Reproductive toxicity	Based on the available long-term toxicity studies in rodents (Omura et al, 2002) and the relevant information on the toxicokinetic behaviour in rats, it is concluded that the classification criteria for reproductive toxicity are not met because of the lack of absorption and systemic distribution, and a correspondingly negligible exposure of reproductive organs in male and female mammalian species to ATO. The reference Schroeder R.E. (2003) was identified as key study for developmental toxicity and will be used for classification and labelling. This study suggests that the NOAEC for developmental toxicity is >6.3 mg ATO/m³. Thus, based on available data, the classification criteria as developmental toxicant according to regulation (EC) 1272/2008 are not met.
STOT-single exposure	Based on available data, the classification criteria as STOT-single exposure, oral and inhalation are not met since no reversible or irreversible adverse health effects were observed immediately or delayed after exposure.
STOT-repeated exposure	$NOAEC_{inhalation}$ = 0.51 mg/m³ (Newton et al, 1994) $NOAEL_{oral}$ = 1686 mg/kg/d (Hext et al, 1999) The NOAEC was determined in a study with a high background incidence of lung inflammation in controls, therefore there is considerable uncertainty regarding the reliability of this numerical value. The NOAEC is based on impaired lung clearance that was observed at 4.50 mg/m³. Based on available data, the classification criteria as STOT-repeated exposure, oral are not met since no reversible or irreversible adverse health effects were observed immediately or delayed after exposure (NOAEL is above the guidance value). Based on available data, the classification criteria as STOT-repeated exposure, inhalation are not met since there is an absence of consistent identifiable toxic effects other than the non-

	specific PSP overload, which is an adaptive response not triggering a STOT classification.
Aspiration hazards	ATO as an inorganic metal oxide is void of a low surface tension effect and as a solid does have a very high viscosity, i.e. an aspiration hazard can safely be excluded. Based on available data, the classification criteria are not met.

SECTION 12: ECOLOGICAL INFORMATION

a) Ecotoxicity

Antimony metal and antimony containing compounds will dissolve and generate antimony ions (Vangheluwe et al., 2001). The environmental section will therefore discuss the fate of antimony in general.

Acute aquatic toxicity test results:		
Marine fish [*Pagrus major*]	96 h LC50	6.9 mg Sb/L (Takayanagi, 2001)
Freshwater fish [*Pimephales promelas*]	96 h LC50	14.4 mg Sb/L (Brooke et al, 1986)
Invertebrates [*Chlorohydra viridissimus*]	96 h LC50	1.77 mg Sb/L (TAI, 1990)
Algae [*Pseudokirchneriella subcapitata*]	72 h ErC50 (growth rate)	> 36.6 mg Sb/L (Heijerick et al, 2004)
Plants [*Lemna minor*]	4 d EC50	> 25.5 mg Sb/L (Brooke et al, 1986)
Chronic aquatic toxicity test results:		
Fish [*Pimephales promelas*]	28 d NOEC/LOEC (growth; length)	1.13/2.31 mg Sb/L (Kimball, 1978)
Invertebrates [*Daphnia magna*]	21 d NOEC/LOEC (reproduction)	1.74/3.13 mg Sb/L (Heijerick et al, 2003)
Algae [*Pseudokirchneriella subcapitata*]	72 h NOEC/LOEC (growth rate)	2.11/4.00 mg Sb/L (Heijerick et al, 2004)
Chronic sediment toxicity test results:		
Midge [*Chironomus riparius]*	14 d NOEC (growth)	78 mg Sb/kg ww (Heijerick et al, 2005)
Chronic terrestrial toxicity test results (values were determined in a soil spiked with Sb_2O_3 and aged for 31 weeks before testing):		
Soil invertebrates	NOEC	999 mg Sb/kg dw (Moser, 2007)
Plants	NOEC	999 mg Sb/kg dw (Smolders et al., 2007)
Soil microorganisms	NOEC	2930 mg Sb/kg dw (Smolders et al., 2007)
Toxicity tests for microorganisms (for STP)		
Aquatic microorganisms	NOEC	2.55 mg Sb/L (EPAS, 2005)
Inhibition of nitrification	EC50	27 mg Sb/L (EPAS, 2005)

For an overview of PNECs, check section 8.1.2 and for more information on how the environmental classification was derived, contact your supplier.

b) Persistence and degradability

Whereas antimony formally meets the criterion for persistence based on the absence of any degradation, this criterion is considered not to be applicable to inorganic elements. In addition, under conditions of a standard EUSES lake and the median partition coefficient for suspended matter, antimony meets the criteria for rapid removal from the water column.

c) Bioaccumulative potential

Antimony does not meet the criteria for bioaccumulation: a BCF for aquatic organisms of 40 and a BSAF of 1 for earthworms are derived, and are all much lower than the threshold of 2,000 l/kg. Also, there is evidence to support that

antimony does not biomagnify in the food chain. Therefore, antimony is not considered bioaccumulative (B) or very bioaccumulative (vB) based on the definitive criteria.

d) Mobility in soil

A log Kp of 2.07 has been determined for soil.

e) Other adverse effects

(Di)antimony trioxide is not expected to contribute to ozone depletion, ozone formation, global warming or acidification.

SECTION 13: DISPOSAL CONSIDERATIONS

a) Waste treatment methods

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. If the percentage of ATO in waste is greater than 1 % then the waste must be treated as hazardous under Directive 91/689/EEC. If the concentration is below 1 % ATO-containing waste shall be handled as nonhazardous waste. All waste should be removed by licensed waste removal company, incinerated or recycled. If only the total antimony concentration in waste is known then waste with greater than 1 % antimony should be treated as hazardous under Directive 91/689/EEC. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements. The used packing is only meant for packing this product. After usage, empty the packing completely.

Suitable disposal of hazardous waste for manufacturing and industrial use: Keep separate and dispose of to either

-Hazardous waste incineration operated according to Council Directive 2008/98/EC on waste, Directive 2000/76/EC on the incineration of waste and the Reference Document on the Best Available Techniques for Waste Incineration of August 2006.

-Hazardous landfill operated under Directive 1999/31/EC.

Suitable disposal of non-hazardous waste for manufacturing and industrial use: Disposal of wastes is possible via incineration (operated according to Directive 2000/76/EC on the incineration of waste) or landfilling (operated according to Reference Document on the Best available Techniques for Waste Industries of August 2006 and Council Directive 1999/31/EC and Council Decision 19 December 2002).

Suitable disposal of waste for professional use: Waste from end-of-life articles can be disposed of as municipal waste, except when they are separately regulated, like electronic devices, batteries, vehicles, etc. Disposal of wastes is possible via incineration (operated according to Directive 2000/76/EC on the incineration of waste) or landfilling (operated according to Reference Document on the Best available Techniques for Waste Industries of August 2006 and Council Directive 1999/31/EC and Council Decision 19 December 2002).

SECTION 14: TRANSPORT INFORMATION

(Di)antimony oxide which does not contain more than 0.5% arsenic is considered not-dangerous and does not need to be classified for transportation.

RID/ADR:	not restricted	ADNR/ADN:	not restricted
IATA/ICAO:	not restricted	IMO/IMDG:	not restricted

a) UN Number

Not applicable (see introduction section 14)

b) N proper shipping name
Not applicable (see introduction section 14)

c) Transport hazard class(es)
Not applicable (see introduction section 14)

d) Packaging group
Not applicable (see introduction section 14)

e) Environmental hazards
No environmental hazard

f) Transport in bulk according to Annex II of MARPOL73/78 and the IBC code
Not available

g) Special precautions for user
Not available

SECTION 15: REGULATORY INFORMATION

a) Safety, health and environmental regulations/legislation specific for the substance or mixture
Worldwide Chemical Inventories

EINECS (EU): conform
TSCA (USA): listed
DSL(Canada): listed
AICS (Australia):listed
ENCS (Japan): 1-543
ECL(Korea): KE/09846
PICCS (Philippines): listed
IECSC(China): listed

(Di)antimony trioxide is not a SEVESO substance, not an ozone depleting substance and not a persistent organic pollutant.

Other regulatory information
Water Hazard Class 1 VwVwS (VerwaltungsVorschrift wassergefährdende Stoffe) from 27.07.2005 (German Regulation)

SECTION 16: OTHER INFORMATION

Data are based on our latest knowledge but do not constitute a guarantee for any specific product features and do not establish a legally valid contractual relationship.

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Key or legend to abbreviations and acronyms used in the safety data sheet:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL - Canadian Domestic Substances List
EINECS - European Inventory of Existing Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
ECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

Disclaimer:

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**********THE END OF REPORT**********