2	CAS No.: 7440-36-0 (Antimony)	Substance: Antimony and its compounds

Chemical Substances Control Law Reference No.:
PRTR Law Cabinet Order No.: 1-25 (Antimony and its compounds)

Atomic Symbol: Sb
Atomic Weight: 121.76

1. General information

Antimony is insoluble in water and the water solubility of diantimony trioxide is under 28.7 mg/L at 20°C.

Antimony have a target value for water quality management in tap water. Antimony and its compounds is a Class 1 Designated Chemical Substance under the Law concerning Reporting, etc. of Release to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Law).

Antimony is used for electrodes for batteries for lead alloy and semiconductors for iridium and gallium alloy. It is used as a raw material for the manufacturing of lubricants, cable coating materials, ceramics, and glasses. Diantimony trioxide is used for flame-retardant auxiliaries for plastics, vinyl electric wire, curtains, canvases, paper, and paints, and it is also used for fining agents for glass (to remove bubbles from melted glass), paints, and yellow pigments.

The anthropogenic sources of antimony and its compounds are coal combustion, incineration of waste and sludge, and landfill leachate.

These substances are naturally released to the air from soil raised by the wind, volcanoes, ocean spray, and forest fires. They are also generated biologically and released to the water from the inflow of disturbed or weathered soil.

The totals of production (shipment) and imports in FY2001 were 1,000 to less than 10,000 tons/yr for both antimony and diantimony trioxide, and in FY2004, 1 to less than 10 tons/yr for antinomy and 10,000 to less than 100,000 tons/yr for antimony oxide. The production of diantimony trioxide in FY2005 was 7,792 tons/yr. Antimony and its compounds are categorized within the 10,000-ton class of production and imports under the Law concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Law).

The behavior of this substance in water has not been elucidated, but most dissolved forms are considered to be present in the pentavalent state in freshwater and seawater bodies.

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2. Exposure assessment

Total release to the environment in FY2005 under the PRTR Law came to 1,200 tons, of which 1,100 tons (97% of the total) was reported. Release to public water bodies accounted for a large part of the reported release. In addition, the landfill disposal was approximately 1,100 tons and the transfers to sewage and waste were 1.4 and approximately 860 tons, respectively. Large releases to air were reported by industries involved in nonferrous metal manufacturing, transport equipment manufacturing, ceramics, and soil and stone products. Large releases to public water bodies were reported by the iron, steel, fiber, and chemical industries.

When estimated releases are included, release to water bodies accounted for the greatest quantity of releases to the environment.

The ratio of distribution to each media of antimony and its compounds should not be predicted because their chemical forms are changed in the environment. Therefore, the ratio of distribution to each media of antimony and its compounds was estimated.

Based on the data on possibly artificial releases the predicted environment concentration (PEC), which indicates exposure to aquatic organisms, was determined to be approximately 140 and 15 μg/L for freshwater and seawater bodies, respectively.

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3. Initial assessment of ecological risk

The initial assessment of ecological risk for aquatic organisms was conducted independently for trivalent antimony and pentavalent antimony.

With regard to acute toxicity of trivalent antimony, reliable information of a 48-hour median lethal concentration (LC_{50}) value of 35,500 μg Sb/L was found for the fish *Oreochromis mossambicus* (tilapia), and a 36-hour median inhibition concentration (IC_{50}) population change value of 6,000 μg Sb/L was found for another organism, the tetrahymena *Tetrahymena pyriformis*. Accordingly, an assessment factor of 1,000 was used, and a predicted no effect concentration (PNEC) of 36 μg Sb/L was obtained based on the acute toxicity values. No reliable chronic toxicity values were obtained and the acute toxicity value for fish, 36 μg Sb/L, was adopted as the PNEC of trivalent antimony.

With regard to acute toxicity of pentavalent antimony, reliable information of a 24-hour LC_{50} value exceeding 231,000 μg Sb/L was found for the crustacea *Daphnia magna* (water flea). Accordingly, an assessment factor of 1,000 was used, and a predicted no effect concentration (PNEC) exceeding 230 μg/L was obtained based on the acute toxicity values. No reliable chronic toxicity data were obtained, and the acute toxicity value for crustacean exceeding 230 μg Sb/L was adopted as the PNEC of pentavalent antimony.

The PEC/PNEC ratio of pentavalent antimony in water is less than 0.6 and less than 0.07 for freshwater and seawater bodies, respectively, and therefore ecological risk characterization is impossible at present. It would be advisable to review this substance and collect further risk information on pentavalent antimony. As trivalent antimony exhibits higher toxicity than pentavalent antimony, it should be required to collect data on behavior of trivalent antimony in the environment and organisms living in environments in which trivalent antimony is present.

Hazard assessment (basis for PNEC)			Assessment factor	Predicted no effect concentration PNEC (μg/L)	Exposure assessment		PEC/ PNEC ratio	Result of assessment
Species	Acute / chronic	Endpoint			Water body	Predicted environmental concentration PEC (μg/L)		
Crustacea (water flea)	Acute	LC_{50} mortality	1,000	>230 (Sb(V))	Freshwater	140	<0.6	×
					Seawater	15	<0.07	

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4. Conclusions

	Conclusions	Judgment
Ecological risk	Risk characterization is impossible at present. It would be advisable to review this substance and collect further risk information on pentavalent antimony. As trivalent antimony exhibits higher toxicity than pentavalent antimony, it should be required to collect data on behavior of trivalent antimony in the environment and organisms living in environments in which trivalent antimony is present.	(▲)

[Risk judgments] ○: No need for further work ▲: Requiring information collection

■: Candidates for further work ×: Impossibility of risk characterization

(○) : Though a risk characterization cannot be determined, there would be little necessity of collecting information.

(▲) : Further information collection would be required for risk characterization.