



Antimony

Physico-chemical properties

DACTARI



Element	Antimony
Symbol	Sb
Atomic number	51
Atomic weight	121.76
Chemical series	metalloids
Discovered	Used from antiquity as a component of bronze (3500 BC)
Origin of the name	From greek "antimonos" meaning "not alone" and from latin "stibium" meaning "mark".
Electron configuration	[Kr] 4d ¹⁰ 5s ² 5p ³
Density	6.70 g/cm ³
Melting point	630.6°C
Boiling point	1587°C
Pearson classification (acid and base)	Border
Electronegativity (Pauling scale)	2.05
Ionic Radius (Marcus)	0.76 Å
Coordination number	6
Oxidation states (main in bold)	-III, III (Sb³⁺) , V (Sb⁵⁺)
Redox potential	0.15 V (Sb ³⁺ /Sb), 0.69 V (Sb ⁵⁺ /Sb ³⁺)
Main mineral compounds (solids)	Stibnite (Sb ₂ S ₃), valentinite (Sb ₂ O ₃), kermesite, stibiconite...
Main Industrial compounds (solids)	SbF ₃ SbF ₅ , SbCl ₃ , SbCl ₅ , Sb ₂ O ₃ , Sb ₂ O ₅ , SbH ₃ ...
Main industrial compounds (solution)	Species in solution : SbO ₃ ⁻ , SbO ₂ ⁻ ...
Biological role	Not present. Similar to arsenic as a poison
Main isotopes	¹²² Sb (T _{1/2} = 2.70 d, β, γ) (1g = 1.47 10 ¹⁶ Bq) ¹²⁵ Sb (T _{1/2} = 2.76 y, EC, β, γ) (1g = 3.82 10 ¹³ Bq)

**Antimony
Acute toxicity
DACTARI**

Element	Antimony	
Symbol	Sb	
	LD 50 (mg/kg) (rat/oral)	Classification LD50*
Antimony (inorganic compounds)	100 - 35000	3 - NC
Antimony metal	100 (rat, <i>ip</i>)	3
Antimony oxide Sb ₂ O ₃	34.6 g/kg	NC
Antimony sulfide Sb ₂ S ₃	1000 (Rat, <i>ip</i>)	4
Antimony (organic compounds)	115	3
Antimony potassium tartrate	115	3
References	INRS (FT 198), HSDB, WHO (2003)	
Fractional absorption : f _A (ICRP 100)	0.05	
Materno-foetal transfer (ICRP 88)	1	

ip : intra peritoneal

***Classification of Acute Toxicity on the Basis of the LD 50.**

Exposure Route	Category 1	Category 2	Category 3	Category 4
Oral (mg/kg bodyweight)	ATE ≤ 5	5 < ATE ≤ 50	50 < ATE ≤ 300	300 < ATE ≤ 2000
Dermal (mg/kg bodyweight)	ATE ≤ 50	50 < ATE ≤ 200	200 < ATE ≤ 1000	1000 < ATE ≤ 2000
Gases (ppmV)	ATE ≤ 100	100 < ATE ≤ 500	500 < ATE ≤ 2500	2500 < ATE ≤ 20000
Vapours (mg/l)	ATE ≤ 0.5	0.5 < ATE ≤ 2.0	2.0 < ATE ≤ 10.0	10.0 < ATE ≤ 20.0

***Acute toxicity hazard categories and acute toxicity estimates (ATE)**

* Classification du GHS (United Nations Globally Harmonised System of Classification and Labelling of Chemicals) des DL₅₀ devant rentrer en vigueur en Europe en 2008. Proposal for a regulation of the European parliament and of the council on classification, labelling and packaging of substances and mixtures, and amending Directive 67/548/EEC and Regulation (EC) No 1907/2006.

Commission of the European Communities, Brussels, 27.6.2007 - COM(2007) 355 final , 2007/0121 (COD).Volume II (Annex I),

http://ec.europa.eu/enterprise/reach/ghs_legislation_en.htm (volume 2, annexe 1)

Antimony
Chronic toxicity
DACTARI

Element	Antimony		
Symbol	Sb		
	Isotopes		Chemical compound
	¹²² Sb	¹²⁵ Sb	
WHO			
RN water guide value (Bq/L)	100	100	
chemical water guide value (mg/L)			20 µg/L
CMR classification			
IARC (1 to 4)			Sb ₂ O ₃ : 2B Sb ₂ S ₃ : 3
CEE	-		Sb ₂ O ₃ : 3
EPA	-		/
Non carcinogen			
Critical effect			Target organs :liver, bone, kidneys
RfD (reference dose) mg/kg/d			4 10 ⁻⁴
NOAEL mg/kg/d			/
Risk phrases			R40
Risk group (Delacroix)	1	3	

Specific activities : ¹²²Sb (1g = 1.47 10¹⁶ Bq) ; ¹²⁵Sb (1g = 3.82 10¹³ Bq)

IARC carcinogenicity to humans:

- C : 1** Carcinogenic to humans
- C : 2A** Probably carcinogenic to humans
- C : 2B** Possibly carcinogenic to humans
- C : 3** Unclassifiable as to carcinogenicity for humans
- C : 4** Probably not carcinogenic for humans

Radiotoxic groups (Delacroix et al., 2002) :

- G 1** : Exemption < 10⁴ Bq
- G 2** : Exemption < 10⁵ Bq
- G 3** : Exemption = 10⁶ Bq
- G 4** : Exemption = 10⁷ Bq
- G 5** : Exemption > 10⁸ Bq