ANTIMONY STANDARD SOLUTION 1000MG/L

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
ANTIMONY STANDARD SOLUTION 1000 MG/L

OTHER NAMES
"laboratory reagent", "AAS standard for antimony", "spectroscopy standard", "calibration standard for Sb"

PRODUCT USE
Laboratory analytical standard solution for spectroscopy.
Used for etching and cleaning metals.
■ Operators should be trained in procedures for safe use of this material.

SUPPLIER
Company: S D FINE - CHEM LIMITED
Address:
315- 317, T.V.IND.ESTATE,
248 WORLI ROAD,
MUMBAI- 400 030, INDIA
technical@sdfine.com
Telephone: 91- 22 24959898
Telephone: 91- 22 24959899
Fax: 91- 22 24937232

Section 2 - HAZARDS IDENTIFICATION

HAZARD RATINGS

GHS Classification
Acute Toxicity (Dermal) Category 4
Acute Toxicity (Inhalation) Category 3
Acute Toxicity (Oral) Category 4
Eye Irritation Category 2A
Skin Corrosion/Irritation Category 2

continued...

EMERGENCY OVERVIEW

HAZARD
DANGER
Determined by using GHS criteria:
H331 H302 H312 H315 H319
Toxic if inhaled
Harmful if swallowed
Harmful in contact with skin
Causes skin irritation
Causes serious eye irritation

PRECAUTIONARY STATEMENTS

Prevention
Avoid breathing dust/fume/gas/mist/vapours/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

Response
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
IF ON SKIN: Wash with plenty of soap and water.
IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Call a POISON CENTER or doctor/physician.
Call a POISON CENTER or doctor/physician if you feel unwell.
Rinse mouth.
If eye irritation persists: Get medical advice/attention.
Wash contaminated clothing before reuse.

Storage
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
antimony trifluoride	7783-56-4	<2
nitric acid	7697-37-2	NOT SPEC
water	7732-18-5	NOT SPEC

continued...

Section 4 - FIRST AID MEASURES

SWALLOWED
■ If poisoning occurs, contact a doctor or Poisons Information Centre.
• If swallowed do NOT induce vomiting.
• If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
• Observe the patient carefully.
• Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious
• Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
• Seek medical advice.
Immediately transport to hospital or doctor DO NOT delay.

EYE
■ If this product comes in contact with the eyes:
• Immediately hold eyelids apart and flush the eye continuously with running water.
• 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.
• Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
• Transport to hospital or doctor without delay.
• Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Immediately transport to hospital or doctor DO NOT delay.

SKIN
■ If skin contact occurs:
• Immediately remove all contaminated clothing, including footwear.
• Flush skin and hair with running water (and soap if available).
• Seek medical attention in event of irritation DO NOT delay.

INHALED
• If fumes or combustion products are inhaled remove from contaminated area.
• Other measures are usually unnecessary.

NOTES TO PHYSICIAN
■ The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.
• Most produce a peak effect within 30 minutes.
• Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
• Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
• Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
• Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
• Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
• Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
• Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue.(Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

continued...

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B, NS, SQ

B: Background levels occur in specimens collected from subjects NOT exposed

NS: Non-specific determinant;also observed after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

■ For acute or short term repeated exposures to fluorides:

- Fluoride absorption from gastro-intestinal tract may be retarded by calcium salts, milk or antacids.
- Fluoride particulates or fume may be absorbed through the respiratory tract with 20-30% deposited at alveolar level.
- Peak serum levels are reached 30 mins. post-exposure; 50% appears in the urine within 24 hours.
- For acute poisoning (endotracheal intubation if inadequate tidal volume), monitor breathing and evaluate/monitor blood pressure and pulse frequently since shock may supervene with little warning. Monitor ECG immediately; watch for arrhythmias and evidence of Q-T prolongation or T-wave changes. Maintain monitor. Treat shock vigorously with isotonic saline (in 5% glucose) to restore blood volume and enhance renal excretion.
- Where evidence of hypocalcaemic or normocalcaemic tetany exists, calcium gluconate (10 ml of a 10% solution) is injected to avoid tachycardia.

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
Fluorides in urine	3 mg/gm creatinine	Prior to shift	B, NS
	10mg/gm creatinine	End of shift	B, NS

B: Background levels occur in specimens collected from subjects NOT exposed

NS: Non-specific determinant; also observed after exposure to other exposures.

- Chelation with British Anti-Lewisite (BAL) for serious antimony exposures should be employed.
- Dialyse as needed. The role of exchange diffusion is not clear.
- Be sure to monitor for dysrhythmias.

[Ellenhorn and Barceloux: Medical Toxicology].

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Jets of water.
- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

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FIRE FIGHTING
• Alert Fire Brigade and tell them location and nature of hazard.
• Wear breathing apparatus plus protective gloves for fire only.
• Prevent, by any means available, spillage from entering drains or water courses.
• Use fire fighting procedures suitable for surrounding area.
• DO NOT approach containers suspected to be hot.
• Cool fire exposed containers with water spray from a protected location.
• If safe to do so, remove containers from path of fire.
• Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD
• Non combustible.
• Not considered a significant fire risk, however containers may burn.
Decomposes on heating and produces toxic fumes of: nitrogen oxides (NOx) and hydrogen fluoride.

PERSONAL PROTECTION

Glasses:	Gloves:	Respirator:
Chemical goggles.	PVC chemical resistant type.	Type AE- P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
• Clean up all spills immediately.
• Avoid breathing vapours and contact with skin and eyes.
• Control personal contact by using protective equipment.
• Contain and absorb spill with sand, earth, inert material or vermiculite.
• Wipe up.
• Place in a suitable, labelled container for waste disposal.
Use soda ash or slaked lime to neutralise.

MAJOR SPILLS
• Clear area of personnel and move upwind.
• Alert Fire Brigade and tell them location and nature of hazard.
• Wear breathing apparatus plus protective gloves.
• Prevent, by any means available, spillage from entering drains or water course.
• Stop leak if safe to do so.
• Contain spill with sand, earth or vermiculite.
• Collect recoverable product into labelled containers for recycling.
• Neutralise/decontaminate residue.
• Collect solid residue and seal in labelled drums for disposal.
• Wash area and prevent runoff into drains.
• After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
• If contamination of drains or waterways occurs, advise emergency services.

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

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
• Limit all unnecessary personal contact.
• Wear protective clothing when risk of exposure occurs.
• Use in a well-ventilated area.
• Avoid contact with incompatible materials.
• When handling, DO NOT eat, drink or smoke.

continued...

- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER
- Glass container is suitable for laboratory quantities.
- Check that containers are clearly labelled.
- Packaging as recommended by manufacturer.

STORAGE INCOMPATIBILITY
- Avoid storage with reducing agents and strong alkalis.

STORAGE REQUIREMENTS
- Keep dry.
- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials.
- Protect containers against physical damage.
- Check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Shelf life limited - check expiry dates before use

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

+	X	+	X	X	+

+: May be stored together
O: May be stored together with specific preventions
X: Must not be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³
Australia Exposure Standards	antimony trifluoride (Antimony & compounds (as Sb))		0.5		
Australia Exposure Standards	antimony trifluoride (Fluorides (as F))		2.5		
Australia Exposure Standards	nitric acid (Nitric acid)	2	5.2	4	10

The following materials had no OELs on our records
- water: CAS:7732- 18- 5

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EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
antimony trifluoride	50	
nitric acid		25

MATERIAL DATA

ANTIMONY STANDARD SOLUTION 10 MG/ML:

■ None assigned. Refer to individual constituents.

ANTIMONY TRIFLUORIDE:

■ The wide-ranging effects of antimony compounds have made it difficult to recommend an exposure standard which characterises the toxicology of these substances. One criteria, reflecting the irritant properties of antimony pentachloride, produced a calculated value of 5.0 mg/m3 (as antimony), which on the basis of experience was felt to be too high but did act as an "out-rider". The present value reflects this thinking.

Odour Threshold for hydrogen fluoride: 0.042 ppm

NOTE: Detector tubes for hydrogen fluoride, measuring in excess of 1.5 ppm, are available commercially. Long-term measurements (8 hrs) may be conducted to detect concentrations exceeding 0.25 ppm.

Hydrogen fluoride is a primary irritant which as a gas causes severe respiratory irritation and as a liquid which causes severe and painful burns to the skin and eyes. The recommendation for TLV-TWA is based on the results of controlled inhalation studies in human volunteers. The limit is thought to minimise the potential for occurrence of dental and/or osteofluorosis (systemic fluorosis) and to prevent the risk of primary irritation to the eyes, nose, throat and lower respiration system.

At concentrations exceeding 3 ppm there have been reports of skin reddening and burning of the nose and eyes.

Odour Safety Factor(OSF)

OSF=71 (HYDROGEN FLUORIDE).

For fluorides:

Based on a study in which the threshold for minimum increase in bone density due to fluoride exposure was 3.38 mg/m3 (as fluoride), the present TLV-TWA has been adopted to prevent irritant effects and disabling bone changes. There is also support for the proposition that occupational exposure below the TLV will have no adverse effect on pregnant women or off-spring. IARC has classified fluorides in drinking water as Group 3 carcinogens; i.e. Not classifiable as to its carcinogenicity to humans. Equivocal evidence of carcinogenic activity (osteosarcoma) has been found in male rats administered sodium fluoride in drinking water. (0-175 ppm) Evidence was not found in female rats or in male or female mice.

NITRIC ACID:

■ For nitric acid:

Odour Threshold Value: 0.27 ppm (detection)

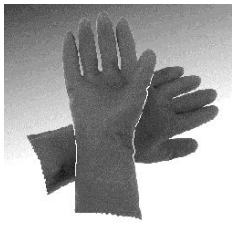
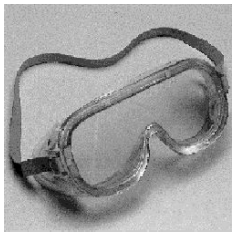
NOTE: Detector tubes for nitric acid, measuring in excess of 5 ppm, are commercially available.

The TLV-TWA is protective against corrosion of the skin, tissue and other membranes, against irritation to the eyes and mucous membranes, and against acute pulmonary oedema or chronic obstructive lung disease. It is not clear whether the TLV-TWA and STEL values will prevent potentiation of the toxicity of inhaled nitrogen dioxide.

WATER:

■ No exposure limits set by NOHSC or ACGIH.

PERSONAL PROTECTION

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EYE
- Safety glasses with side shields; or as required,
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel 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].

HANDS/FEET
- Polyethylene gloves.
- PVC gloves.

OTHER
- Laboratory coat.

RESPIRATOR
■ Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	AE- AUS P	-
1000	50	-	AE- AUS P
5000	50	Airline *	-
5000	100	-	AE- 2 P
10000	100	-	AE- 3 P
	100+		Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult your
Occupational Health and Safety Advisor.

ENGINEERING CONTROLS
■ General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25- 0.5 m/s (50- 100 f/min)

continued...

aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5- 1 m/s (100- 200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood- local control 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 m/s (200-400 f/min) for extraction of solvents generated in a tank 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.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Clear, colourless, odourless, acidic liquid. Mixes with water.
Analytical standard solution for Sb(III) 10,000 micrograms per litre

PHYSICAL PROPERTIES
Liquid.
Mixes with water.

State	Liquid	Molecular Weight	121.75 Sb
Melting Range (°C)	Not available	Boiling Range (°C)	100 approx.
Solubility in water (g/L)	Miscible	Flash Point (°C)	Not applicable
pH (1% solution)	Not available	Decomposition Temp (°C)	Not available
pH (as supplied)	1 approx	Autoignition Temp (°C)	Not applicable
Vapour Pressure (kPa)	As for water.	Upper Explosive Limit (%)	Not applicable
Specific Gravity (water=1)	1.0 approx.	Lower Explosive Limit (%)	Not applicable
Relative Vapour Density (air=1)	Not available	Volatile Component (%vol)	Not available
Evaporation Rate	As for water.		

continued...

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY
• Presence of incompatible materials.
• Product is considered stable.
• Hazardous polymerisation will not occur.
For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.
■ Antimony poisoning causes similar symptoms to arsenic poisoning although vomiting is more prominent. There may be changes in the rhythm of the heart beat. The insoluble salts are less dangerous.

EYE
■ This material can cause eye irritation and damage in some persons.

SKIN
■ Skin contact with the material may be harmful; systemic effects may result following absorption.
■ This material can cause inflammation of the skin oncontact in some persons.
■ Open cuts, abraded or irritated skin should not be exposed to this material.

INHALED
■ The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of the material, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

CHRONIC HEALTH EFFECTS
■ The material is considered to be harmful by all exposure routes.
Bare unprotected skin should not be exposed to this material.
Principal routes of exposure are usually by skin contact, eye contact and inhalation of vapour Repeated or prolonged exposure to antimony and its compounds may produce inflammation of the mouth cavity, dry throat, metallic taste, gum infection, perforation of the nasal septum and throat, laryngitis, headache, difficulty breathing, indigestion, nausea, vomiting, diarrhoea, loss of appetite, anaemia, weight loss, tightness and pain in the chest, sleeplessness, muscular pain and weakness, dizziness, pharyngitis, bronchitis and pneumonia. Degenerative changes of the liver and kidney may occur. Chronic exposure to antimony compounds may result in itchiness, spots and pus blisters around sweat glands. Workers exposed to antimony can develop obstructive lung disease. Antimony crosses the placenta and is excreted in breast milk. There may be an increased incidence of spontaneous late abortions, premature births, and gynaecological problems among female antimony smelter workers. Antimony may be associated with an increased incidence of cancers of the lung and chest.

TOXICITY AND IRRITATION
■ Not available. Refer to individual constituents.

ANTIMONY TRIFLUORIDE:
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION

continued...

Oral (mouse) LD50: 804 mg/kg Nil Reported

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

NITRIC ACID:

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (human) LDLo: 430 mg/kg	Nil Reported
Inhalation (rat) LC50: 2500 ppm/1h * * DuPont	
Unreported (man) LDLo: 110 mg/kg	
Inhalation (Cat) LC: 500 mg/m³/4h	
Inhalation (Rat) LC50: 130 mg/m³/4h	
Oral (Human) LD: 430 mg/kg	
Inhalation (Cat) TCLo: 300 mg/m³/2h	

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.
The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.
The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.
Oral (?) LD50: 50-500 mg/kg *
[Various Manufacturers]

WATER:

■ No significant acute toxicological data identified in literature search.

CARCINOGEN

Fluorides (inorganic, used in drinking-water)	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3

continued...

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

NITRIC ACID:
ANTIMONY TRIFLUORIDE:
■ DO NOT discharge into sewer or waterways.
■ Prevent, by any means available, spillage from entering drains or water courses.

ANTIMONY STANDARD SOLUTION 1000 MG/L:
No data

ANTIMONY TRIFLUORIDE:
■ Hazardous Air Pollutant: Yes

■ 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.
■ Although small amounts of fluorides are conceded to have beneficial effects, two forms of chronic toxic effect, dental fluorosis and skeletal fluorosis may be caused by excessive intake over long periods. Fluorides are absorbed by humans following inhalation of workplace and ambient air that has been contaminated, ingestion of drinking water and foods and dermal contact.

Both hydrogen fluoride and particulate fluorides will be transported in the atmosphere and deposited on land or water by wet and dry deposition. Non-volatile inorganic fluoride particulates are removed from the atmosphere via condensation or nucleation processes. Fluorides adsorbed on particulate matter in the atmosphere are generally stable and are not readily hydrolysed, although they may be degraded by radiation if they persist in the atmosphere. Fluorine and the silicon fluorides (fluosilicates, silicofluorides) are hydrolysed in the atmosphere to form hydrogen fluoride. Hydrogen fluoride may combine with water vapour to produce an aerosol or fog of aqueous hydrofluoric acid. Based upon available data, inorganic fluoride compounds, with the exception of sulfur hexafluoride, are not expected to remain in the troposphere for long periods or to migrate to the stratosphere. Estimates of the residence time of sulfur hexafluoride in the atmosphere range from 500 to several thousand years. Fluoride in aerosols can be transported over large distances by wind or as a result of atmospheric turbulence. The distance travelled is determined by the deposition velocity of both the gaseous hydrogen fluoride and the fluorides in particulate form. Atmospheric fluorides may be transported to soils and surface waters through both wet and dry deposition processes.

Fluorides undergo transformations in soil and water, forming complexes and binding strongly to soil and sediment.

In water, the transport and transformation of inorganic fluorides are influenced by pH, water hardness and the presence of ion-exchange materials such as clays. In natural water, fluoride forms strong complexes with aluminum in water, and fluorine chemistry in water is largely regulated by aluminum concentration and pH. Below pH 5, fluoride is almost entirely complexed with aluminum and consequently, the concentration of free F- is low. As the pH increases, Al-OH complexes dominate over Al-F complexes and the free F- levels increase. Fluoride forms stable complexes with calcium and magnesium, which are present in sea water. Calcium carbonate precipitation dominates the removal of dissolved fluoride from sea water. The residence time for fluoride in ocean sediment is calculated to be 2?3 million years. Fluorosilicic acid and hydrofluoric acid in high aquatic concentrations such as may be found in industrial waste ponds may volatilise, releasing silicon tetrafluoride and hydrogen fluoride into the atmosphere.

Solubilisation of inorganic fluorides from minerals may also be enhanced by the presence of ion-exchange materials (e.g., bentonite clays and humic acid). Once dissolved, inorganic fluorides remain in solution under conditions of low pH and hardness and in the presence of ion-exchange material. Soluble inorganic fluorides may also form aerosols at the air?water interface or vaporise into the atmosphere whereas undissolved species generally undergo sedimentation.

continued...

Factors that influence the mobility of inorganic fluorides in soil are pH and the formation of aluminium and calcium complexes In more acidic soils, concentrations of inorganic fluoride were considerably higher in the deeper horizons. The low affinity of fluorides for organic material results in leaching from the more acidic surface horizon and increased retention by clay minerals and silts in the more alkaline, deeper horizons. The maximum adsorption of fluoride to soil was reported to occur at pH 5.5. In acidic soils with pH below 6, most of the fluoride is in complexes with either aluminium or iron. Fluoride in alkaline soils at pH 6.5 and above is almost completely fixed in soils as calcium fluoride, if sufficient calcium carbonate is available.
Fluoride is extremely immobile in soil, as determined by lysimeter experiments.
Populations living in areas with high fluoride levels in groundwater may be exposed to higher levels of fluorides in their drinking water or in beverages prepared with the water. Among these populations, outdoor laborers, people living in hot climates, and people with polydipsia will generally have the greatest daily intake of fluorides because they consume greater amounts of water.
Foods characteristically high in fluoride content are certain types of fish and seafood (1.9?28.5 mg/kg), especially those types in which the bones are consumed, bone products such as bone meal and gelatin, and tea, which contains approximately 0.52 mg fluoride/cup

Fluoride is mainly absorbed by the body in the form of hydrogen fluoride, which has a pKa of 3.45. That is, when ionic fluoride enters the acidic environment of the stomach lumen, it is largely converted into hydrogen fluoride. Most of the fluoride that is not absorbed from the stomach will be rapidly absorbed from the small intestine.

Fluorides have been shown to accumulate in animals that consume fluoride-containing foliage accumulation is primarily in skeletal tissue and therefore, it is unlikely that fluoride will biomagnify up the food chain.

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■ Antimony exists in the atmosphere in low concentrations. Urban air contains 0.05 to 0.06 ppm of antimony. There are very low concentrations in water due to minimal solubility. Volatilisation from water is not likely. The soil usually contains 0.1 to 10 mg/kg dry weight. Antimony concentrations in freshwater fish are low, approximately 3 mg/kg wet weight.
Little is known of the adsorptive behavior of antimony, its compounds, and ions in soils and sediments. The binding of antimony to soil is determined by the nature of the soil and the form of antimony deposited on the soil. Some forms of antimony may bind to inorganic and organic ligands. On the other hand, a mineral form would be unavailable for binding. Some studies suggest that antimony is fairly mobile under diverse environmental conditions, while others suggest that it is strongly adsorbed to soil.Since antimony has an anionic character (e.g. Sb(OH)i), it is expected to have little affinity for organic carbon. It is not expected that cation exchange, which generally dominates adsorption to clay, would be important for anionic antimony. Antimony is known to form coprecipitates with hydrous iron, manganese, and aluminum oxides in soil and sediment. Antimony adsorbs strongly to colloidal material in soil. The partition coefficient of antimony to 0.05-0.003 um colloids was 1,300. Antimony adsorbed to such material can be transported with the colloids in groundwater.
Leaching experiments performed with river sediment samples from a mining district in Idaho indicated that Sb(V) was the major species released during leaching. The fraction of antimony leached from sediment with deionized water after 10 days was highly correlated with the free iron and manganese oxide content of the sediment. The release of antimony from the sediment increased at low pH and increased sharply at high pH. The form of released antimony was also sensitive to pH. At pH 2.7, the bulk of antimony released was as Sb(II1); at pH 4.3, the concentrations of tri- and pentavalent antimony were comparable; and at pH 6.3 and above, Sb(V) was the predominant species.
Antimony does not appear to bioconcentrate appreciably in fish and aquatic organisms. No detectable bioconcentration occurred during a 28-day test in bluegills (EPA 1980). Only low levels of antimony have been reported in fish and aquatic organisms collected off the coast of Africa, Australia, and the Danube River in Austria. Bioconcentration factors for antimony ranged from 0.15 to 390. A study of the distribution of antimony around a smelter site indicated that antimony occurring in plants results from surface deposition. Uptake from soil is minor and appears to be correlated with the amount of available antimony (that which is soluble or easily exchangeable).Antimony bioconcentration was measured in voles, shrews, rabbits, and invertebrates around a smelter. Analysis of antimony in organs of the small mammals, compared with estimates of their antimony intake from food, showed that, although the amount of antimony in the organs was elevated, it was low compared to the amount ingested. The results suggest that antimony does not biomagnify from lower to higher trophic levels in the food chain.

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Thermodynamically, most dissolved antimony in natural waters under aerobic conditions should be present in the +5 oxidation state as antimonate species. At 0.001 M total antimony, the dominant species were Sb(OH)6? and Sb(OH)5 0. A small quantity of polymeric hydroxy species were found, but these will be less significant when the total antimony concentration is low, such as in natural water. While industrial inputs will commonly contain antimony in the +3 oxidation state (e.g., antimony trioxide), it is not known how fast antimonite would oxidize to antimonate under natural conditions. Under reducing conditions, trivalent species such as Sb(OH) 3 0, Sb(OH) 4? , and Sb2S4 4- may be significant.
Antimony compounds may undergo photochemical reactions, but these do not appear to be significant in determining their aquatic fate. Antimony trioxide suspensions strongly absorb ultraviolet radiation below 325 nm and darken. The process is reversible, and when the light is removed, the white color slowly returns. The effect is believed to be due to peroxide radical formation on the crystal surface. Both water and oxygen seem to be necessary for the reoxidation of the reduced antimony.
Antimony can be reduced and methylated by microorganisms in the aquatic environment, similar to arsenic, and become mobilized. This reaction is most likely to occur in reducing environments, such as in bed sediment. In the case of arsenic, this reaction may be mediated by fungi and bacteria, but it is not known whether this is the case with antimony. The resulting trimethylstibine is initially oxidized by atmospheric oxygen to a mixture of trimethylstilbine oxide ((CH3)3SbOH) and trimethylstibinic acid ((CH3)2SbO3H), and then to antimony oxides and insoluble polymers. The rate constant is estimated to be of the order of 0.1 to 0.2 L/molsec. Trimethylstibine has a high vapor pressure, 103 mmHg at 25 deg C, and might volatilize before it is completely oxidized. The oxidation product, (CH3)3SbO, is much more soluble than trimethylstibine; therefore, oxidation will reduce volatilization. Oxidation of trimethylstibine in the gas phase is very rapid; the rate is 0.11/mmHg-sec or 2000 L/mol-sec. Trimethylstibine has been shown to react with alkyl iodides and bromides; this results in the formation of quaternary salts. Should antimony occur in a landfill with alkyl halides, the formation of quaternary salts should greatly enhance antimony's mobility.
There is evidence that phytoplankton can reduce Sb(V) to the Sb(III). Sb(III) decreases to very low levels at the base of the seasonal thermocline and remains low down to the sediment where increasing levels are again observed. Sb(III) only accounts for 44% of the inorganic antimony in the anoxic zone, and speciation in this region is unclear. Thermodynamically, the antimony should be in the trivalent state. Thiocomplexes are thought to account for some of the antimony in this zone. Methylated antimony species existed throughout the water column and made up 10% of total antimony. Monomethyl antimony species were more abundant in surface waters and in the anoxic zone. There was no sharp increase in methyl antimony near the sediment, which would be expected if these species were formed biosynthetically. Since the highest antimony concentration is at the surface, it is unlikely that antimony is taken up by phytoplankton, as is the case with arsenic. A decrease in antimony concentration with depth suggests scavenging by particulate matter and, at lower depths, by iron hydroxyoxides.

NITRIC ACID:
■ For oxides of nitrogen:
Environmental fate
Oxides of nitrogen are part of the biogeochemical cycling of nitrogen, and are found in air, soil and water. In the atmosphere, oxides of nitrogen are rapidly oxidised to nitrogen dioxide (half-life about 50 days), which dissolves in water to produce dilute nitric acid and precipitates in rain. An increased rate of formation of oxides of nitrogen therefore contributes to 'acid rain'.
In the stratosphere, oxides of nitrogen play a crucial role in maintaining the level of ozone. Ozone is formed through the photochemical reaction of nitrogen dioxide and oxygen. However, too little nitrogen dioxide results in too little ozone being formed, On the other hand, too much nitric oxide reduces the level of ozone because of an increase in the reaction of ozone to convert nitric oxide to nitrogen dioxide.
In the lower atmosphere, oxides of nitrogen play a major role in the formation of photochemical smog in a complex set of reactions that lead to the formation of a variety of nitrated organic compounds (from volatile organic matter) and excessive levels of ozone.
Environmental transport The oxides of nitrogen travel as gases through soil and the atmosphere, and in solution in water in soils, rivers and lakes, and rain and snow.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
antimony trifluoride			LOW	
nitric acid			LOW	

continued...

water	LOW	LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Treat and neutralise at an effluent treatment plant.
- Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM:
☐ None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: UN, IATA, IMDG

Section 15 - REGULATORY INFORMATION

REGULATIONS
Regulations for ingredients

antimony trifluoride (CAS: 7783-56-4) is found on the following regulatory lists;
"Australia Hazardous Substances","Australia Inventory of Chemical Substances (AICS)"

nitric acid (CAS: 7697-37-2) is found on the following regulatory lists;
"Australia Exposure Standards","Australia Hazardous Substances","Australia High Volume Industrial Chemical List (HVICL)","Australia Inventory of Chemical Substances (AICS)","Australia National Pollutant Inventory","Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix E (Part 2)", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix F (Part 3)","Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 5","Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 6","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals"

water (CAS: 7732-18-5) is found on the following regulatory lists;
"Australia Inventory of Chemical Substances (AICS)","IMO IBC Code Chapter 18: List of products to which the Code does not apply","OECD Representative List of High Production Volume (HPV) Chemicals"

No data for Antimony Standard Solution 1000mg/L (: 5504-69)

Section 16 - OTHER INFORMATION

EXPOSURE STANDARD FOR MIXTURES
■ "Worst Case" computer-aided prediction of spray/ mist or fume/ dust components and concentration:

■ Composite Exposure Standard for Mixture (TWA) :100 mg/m³.
■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by using available literature references.

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■ The (M)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.

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

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