

**SPIRAX SARCO OMEGA 4**Hazard Alert Code:  
HIGH

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 4925-40

Issue Date: 29-Jan-2010

CD 2010/1

**Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION****PRODUCT NAME**

Spirax Sarco Omega 4

**SYNONYMS**

"liquid catalyzed bisulphite oxygen scavenger", "sodium disulfite solution sodium hydrogen sulfite solution", "sodium bisulfite solution"

**PROPER SHIPPING NAME**

BISULPHITES, AQUEOUS SOLUTION, N.O.S.(contains sodium bisulfite)

**PRODUCT USE**

Oxygen scavenger.

**SUPPLIER**

Company: Spirax Sarco Pty Ltd

Address:

72 Mica Street

Carole Park

QLD, 4300

AUS

Telephone: +61 7 3879 4944

Telephone: +61 414 355 619 A/H

Fax: +61 7 3271 4589

**Section 2 - HAZARDS IDENTIFICATION****STATEMENT OF HAZARDOUS NATURE****HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.****HAZARD RATINGS**

	Min	Max
Flammability:	0	
Toxicity:	2	
Body Contact:	3	
Reactivity:	0	
Chronic:	3	

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4

**POISONS SCHEDULE**

None

**RISK**

- Harmful if swallowed.
- Contact with acids liberates toxic gas.
- Irritating to eyes respiratory system and skin.
- May cause CANCER by inhalation.
- Harmful to aquatic organisms may cause long-term adverse effects in the aquatic environment.
- Inhalation may produce health damage\*.
- Cumulative effects may result following exposure\*.
- Possible respiratory and skin sensitiser\*.

\* (limited evidence).

**SAFETY**

- Keep locked up.
- Do not breathe gas/ fumes/ vapour/ spray.
- In case of insufficient ventilation wear suitable respiratory equipment.
- Use only in well ventilated areas.
- Keep container in a well ventilated place.
- Avoid exposure - obtain special instructions before use.
- To clean the floor and all objects contaminated by this material use water.
- Keep container tightly closed.
- This material and its container must be disposed of in a safe way.
- Keep away from food drink and animal feeding stuffs.
- In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
- This material and its container must be disposed of as hazardous waste.

**Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS**

NAME	CAS RN	%
sodium bisulfite	7631-90-5	30-60
cobalt(II) sulfate	10124-43-3	<1^
water	7732-18-5	30-60

NOTE: Manufacturer has supplied full ingredient

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information to allow CHEMWATCH assessment.

**Section 4 - FIRST AID MEASURES****SWALLOWED**

- 
- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- 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.
- Transport to hospital or doctor without 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.

**SKIN**

- If skin or hair contact occurs:
  - Immediately flush body and clothes with large amounts of water, using safety shower if available.
  - Quickly remove all contaminated clothing, including footwear.
  - Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
  - Transport to hospital, or doctor.

**INHALED**

- 
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

**NOTES TO PHYSICIAN**

- Treat symptomatically.
- for corrosives:

**BASIC TREATMENT**

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary oedema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures.
- Where eyes have been exposed, flush immediately with water and continue to irrigate with normal saline during transport to hospital.
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.
- Skin burns should be covered with dry, sterile bandages, following decontamination.
- DO NOT attempt neutralisation as exothermic reaction may occur.

**ADVANCED TREATMENT**

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

**EMERGENCY DEPARTMENT**

- Laboratory analysis of complete blood count, serum electrolytes, BUN, creatinine, glucose, urinalysis, baseline for serum aminotransferases (ALT and AST), calcium, phosphorus and magnesium, may assist in establishing a treatment regime.
- Positive end-expiratory pressure (PEEP)-assisted ventilation may be required for acute parenchymal injury or adult respiratory distress syndrome.
- Consider endoscopy to evaluate oral injury.
- Consult a toxicologist as necessary.

BRONSTEIN, A.C. and CURRANCE, P.L. EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

**Section 5 - FIRE FIGHTING MEASURES**

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**EXTINGUISHING MEDIA**

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

**FIRE FIGHTING**

- 
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- 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 to be a significant fire risk.
- Expansion or decomposition on heating may lead to violent rupture of containers.
- Decomposes on heating and may produce toxic/ irritating fumes.
- May emit acrid smoke.

Decomposition may produce toxic fumes of:  
sulfur oxides (SOx), metal oxides.

**FIRE INCOMPATIBILITY**

- None known.

**HAZCHEM**

2X

**Personal Protective Equipment**

Gas tight chemical resistant suit.

**Section 6 - ACCIDENTAL RELEASE MEASURES****EMERGENCY PROCEDURES****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.

**MAJOR SPILLS**

- 
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- 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 residues 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.

**PROTECTIVE ACTIONS FOR SPILL**

From IERG (Canada/Australia)  
Isolation Distance 25 metres  
Downwind Protection Distance 250 metres  
IERG Number 37

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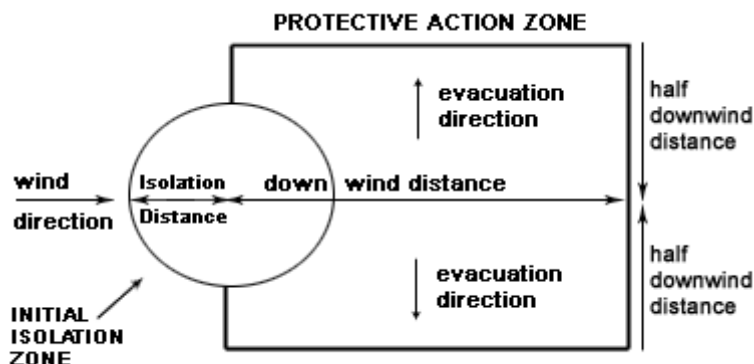
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**FOOTNOTES**

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 154 is taken from the US DOT emergency response guide book.

6 IERG information is derived from CANUTEC - Transport Canada.

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

**Section 7 - HANDLING AND STORAGE****PROCEDURE FOR HANDLING**

- 
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with moisture.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- 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. Launder contaminated clothing before re-use.
- 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.
- DO NOT allow clothing wet with material to stay in contact with skin

**SUITABLE CONTAINER**

- - DO NOT use aluminium or galvanised containers
  - Lined metal can, lined metal pail/ can.
  - Plastic pail.
  - Polyliner drum.
  - Packing as recommended by manufacturer.
  - Check all containers are clearly labelled and free from leaks.
- For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
  - Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):
- Removable head packaging;
  - Cans with friction closures and
  - low pressure tubes and cartridges
- may be used.

Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

**STORAGE INCOMPATIBILITY**

- 
- Contact with acids produces toxic fumes

**STORAGE REQUIREMENTS**

- 
- Store in original containers.

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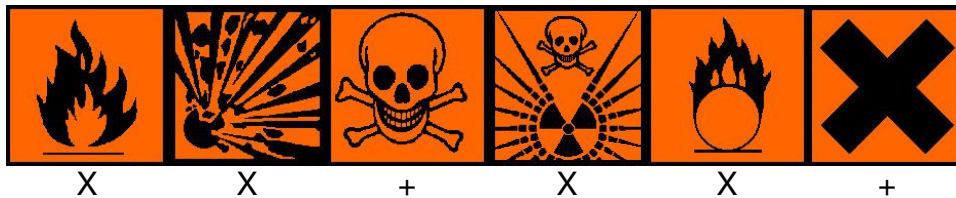
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- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

**SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS**

X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION****EXPOSURE CONTROLS**

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
Australia Exposure Standards	sodium bisulfite (Sodium bisulphite)		5						

The following materials had no OELs on our records

- cobalt(II) sulfate: CAS:10124-43-3 CAS:60459-08-7 CAS:10026-24-1
- water: CAS:7732-18-5

**MATERIAL DATA**

SPIRAX SARCO OMEGA 4:

Not available

SODIUM BISULFITE:

- NOTE: Detector tubes for sulfur dioxide, measuring in excess of 0.1 ppm, are commercially available.

Sulfur dioxide is termed a "mild" respiratory irritant.

Odour threshold (detection) is 0.5 ppm with irritation reported above 2 ppm; at 8-12 ppm eyes and nose are strongly irritated. 150 ppm is only tolerable for about a minute because of extreme irritation. At 500 ppm

there is a sense of suffocation. Human bronchoconstriction occurs with inhalation at 5 ppm or more and the recommended TLV-TWA, for sulfur dioxide, is thought to provide a reduction of significant risk of adverse respiratory effects such as coughing, increase in sputum production and bronchoconstriction.

The reported effects of SO<sub>2</sub> in humans exposed to levels below 2 ppm, together with the potentiation of SO<sub>2</sub> toxicity by soot and other particulates, may require a review of exposure standards.A worker inhaling 4 ppm for 8 hours and doing light-work would absorb about 150 mg of SO<sub>2</sub>. By comparison, average dietary intake for a 70 kg man has been established at only 50 mg.

Odour Safety Factor(OSF)

OSF=1.8 (sulfur dioxide).

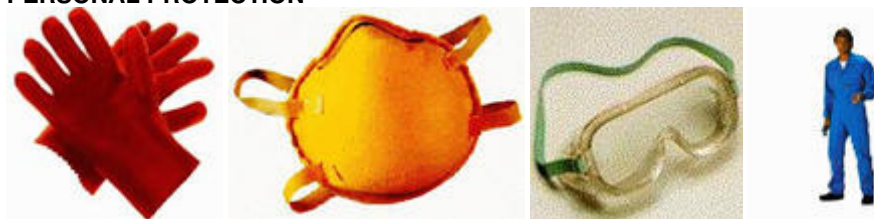
Inorganic sulfites, bisulfites and metabisulfites (sodium, potassium and ammonium salts) liberate sulfur dioxide under certain conditions. Therefore the officially tabled exposure limits for these chemicals normally correspond to the yield of liberated sulfur dioxide. Dithionites may also produce sulfur dioxide

Sulfites have been placed on the U.S. Food and Drug Administration generally recognised as safe (GRAS) list. Sulfur dioxide is an irritant gas and occupational exposure may produce irritation under certain circumstances. Airborne sodium bisulfite, for example, is described by the ACGIH as an irritant to the eyes, skin and mucous membranes of animals; acute exposures by workers produce mild eye and respiratory effects. Inhalation of the dust produces high local concentrations in contact with small areas of sensitive tissue.

The mean daily ingestion of dietary sulfite ranges from 0.0011 to 0.14 mmol/kg (to 14 mg/day) and the accepted maximum daily intake (ADI) by the World Health Organisation is 0.7 mg sulfite (as sulfur dioxide)/ kg body weight. The recommended TLV-TWA for sodium bisulfite is thought to be protective against the significant risk of irritant effects associated with higher levels.

WATER:

- No exposure limits set by NOHSC or ACGIH.

**PERSONAL PROTECTION****EYE**

- 
- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- 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

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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**

- 
- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber
- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

**NOTE:**

- The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

**OTHER**

- 
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.

**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	-AUS P	-
1000	50	-	-AUS P
5000	50	Airline *	-
5000	100	-	-2 P
10000	100	-	-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 site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

**ENGINEERING CONTROLS**

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations.

Provide adequate ventilation in warehouse or closed storage area. 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.)
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

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 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 pink liquid with a pungent sulfur dioxide odour; mixes with water. Absorbs oxygen from the atmosphere.

**PHYSICAL PROPERTIES**

Liquid.  
Mixes with water.  
Corrosive.  
Contact with acids liberates toxic gas.

State	Liquid	Molecular Weight	Not applicable
Melting Range (°C)	-7	Viscosity	Not available

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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)	3
Autoignition Temp (°C)	Not applicable	Vapour Pressure (kPa)	Not available
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	1.30 -
Lower Explosive Limit (%)	Not applicable	Relative Vapour Density (air=1)	Not available
Volatile Component (%vol)	Not available	Evaporation Rate	Not available

**Section 10 - CHEMICAL STABILITY****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 damaging to the health of the individual.

The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

Ingestion of sulfite salts may cause gastric irritation. Large doses may produce violent colic, diarrhoea, circulatory disturbance, depression of vital functions and, sometimes, death.

**EYE**

- The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.

The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

**SKIN**

- The material can produce chemical burns following direct contact with the skin.

Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

The material may cause 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.

**INHALED**

- The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

The material is not thought to produce adverse health effects following inhalation (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.

**CHRONIC HEALTH EFFECTS**

- Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Inhaling this product is more likely to cause a sensitisation reaction in some persons compared to the general population.

Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.

On the basis of epidemiological data, it has been concluded that prolonged inhalation of the material, in an occupational setting, may produce cancer in humans.

Sulfites and bisulfites can cause narrowing of the airways, stomach upset, flushing, low blood pressure, tingling sensation, itchy wheal, swelling and shock, and asthmatics are especially prone. They induce allergic-like reactions which can occur on first contact with the material.

**TOXICITY AND IRRITATION**

- Not available. Refer to individual constituents.

**SODIUM BISULFITE:**

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

TOXICITY

IRRITATION

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Oral (rat) LD50: 2000 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.

Human lymphocyte mutagen

**WATER:**

■ No significant acute toxicological data identified in literature search.

**CARCINOGEN**

Sulfites International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs

Group 3

**Section 12 - ECOLOGICAL INFORMATION**

Refer to data for ingredients, which follows:

**SODIUM BISULFITE:****SPIRAX SARCO OMEGA 4:**

■ DO NOT discharge into sewer or waterways.

**SPIRAX SARCO OMEGA 4:**

Marine Pollutant:

Not Determined

■ Prevent, by any means available, spillage from entering drains or water courses.

■ Harmful 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.

**SODIUM BISULFITE:**

■ Sulfur dioxide is oxidised rapidly by both homogeneous and heterogeneous reactions and is removed from the atmosphere by precipitation and by dry deposition on surfaces, mainly as sulfuric acid. Because of its high vapor pressure (3,000 mm Hg at 20°C), sulfur dioxide is typically present in a gaseous phase. Some of the sulfur dioxide emitted into the air moves unchanged to various surfaces including soil, water, grass, and vegetation in general.

In the atmosphere, sulfur dioxide can be transformed into sulfuric acid or sulfates by a variety of processes. Sulfur dioxide may be oxidised to sulfur trioxide (SO<sub>3</sub>) and sulfate in air photochemically or catalytically. The oxidations generally involve homogeneous-phase reactions (oxidation in the gas phase) and heterogeneous gas-solid reactions (oxidation on the surface of particles). Gas-phase reactions include direct photochemical oxidation of sulfur dioxide and oxidation by reacting with other gases and substances, including O<sub>2</sub>, O<sub>3</sub>, NO, NO<sub>2</sub>, NO<sub>3</sub>, N<sub>2</sub>O<sub>5</sub>, OH, hydrocarbons, or some heavy metal ions. In the direct oxidation pathway, sulfur dioxide gas molecules (at different electronically excited states due to solar irradiation) react with each other, forming SO<sub>3</sub>, which may be further oxidised by other gases or water drops to form sulfate. Reaction pathways with other gases all result in similar end products: SO<sub>3</sub>, or sulfate. Rate constants for sulfur dioxide oxidation by these gases vary from 2x 10<sup>-24</sup> to 4x10<sup>-3</sup> cm<sup>3</sup> per molecule per second, with the reaction with N<sub>2</sub>O<sub>5</sub> being the fastest. Heterogeneous gas-solid reactions include oxidation of sulfur dioxide on the surfaces of activated carbons, metal oxides, and other particles.

Sulfur dioxide may be photochemically or catalytically oxidized to SO<sub>3</sub> and sulfate in air. The oxidations generally involve homogeneous-phase reactions (oxidation in gas or liquid phase) and heterogeneous gas-solid reactions (oxidation on the surface of particles). The atmospheric residence time of sulfur dioxide is about 10 days. Photochemical oxidation involves the reaction of sulfur dioxide with reactive molecules and free radical species, and with products of O<sub>3</sub> and alkene gases. Photochemical oxidation is thought to be initiated by absorption of solar irradiation energy.

Sulfur dioxide can be oxidized by OH radicals in the gas phase relatively quickly, making it a major mechanism for sulfur dioxide conversion. The conversion rates have been characterized to be >1% per hour.

In the atmosphere, aqueous-phase oxidation of sulfur dioxide can occur in cloud, fog, rain, deliquescent aerosol particles, and in surface liquid films on these particles. Once dissolved in these droplets, sulfur dioxide may be oxidised to sulfate via a variety of mechanisms, thus forming "acid rain". Such a removal mechanism is commonly termed "wet deposition".

Sulfur dioxide can also be removed from air by uptake of plant leaves. It is reported that direct surface uptake of sulfur dioxide is the most significant dry removal process for atmospheric sulfur.

Sulfur dioxide is very soluble in water, and oceans are generally considered to be a sink for sulfur dioxide. It is also possible that oceans can be a source of sulfur dioxide if the equilibrium pressure of sulfur dioxide in surface water exceeds the partial pressure of sulfur dioxide in the air immediately above it. Any potential releases of sulfur dioxide from water would be expected to partition to the atmosphere.

Dissolved sulfur dioxide in the surface layer of the ocean may be slowly oxidised to the sulfate anion (SO<sub>4</sub><sup>2-</sup>) by the combined presence of dissolved O<sub>2</sub> and trace amounts of transition metal salts as catalysts. At ocean depths, dispersed sulfate may be reduced to sulfur dioxide, sulfur, and hydrogen sulfide by the action of bacteria. Sulfur dioxide absorbed by freshwater lakes is less rapidly oxidized than seawater because of the much lower salt content of freshwater.

Soil can absorb sulfur dioxide, with uptake being dependent on the pH and moisture content of the soil.

Acid rain is the leading cause in an increase in heavy metal mobility in soil. When soil is basic pH, heavy metals will form insoluble oxides or hydroxides of sulfate, and when soil is acidic, soluble sulfates will form.

Sulfur dioxide can be reduced to H<sub>2</sub>S in heat- and alkali-treated sewage sludge by the sulfate-reducing bacteria, *Desulfovibrio desulfuricans* or *Desulfotomaculum orientis*.

**WATER:****Ecotoxicity**

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
sodium bisulfite	HIGH		LOW	HIGH
water	LOW		LOW	HIGH

**Section 13 - DISPOSAL CONSIDERATIONS**

■

**SPIRAX SARCO OMEGA 4**Hazard Alert Code:  
HIGH

Chemwatch Material Safety Data Sheet

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- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Treat and neutralise at an approved treatment plant. Treatment should involve: Neutralisation followed by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

**Section 14 - TRANSPORTATION INFORMATION**

Labels Required: CORROSIVE

**HAZCHEM:**

2X (ADG7)

ADG7:

Class or division:	8	Subsidiary risk:	None
UN No.:	2693	UN packing group:	III
Special provisions:	274	Packing Instructions:	None
Notes:	None	Limited quantities:	5 L
Portable tanks and bulk containers - Instructions:	T7	Portable tanks and bulk containers - Special provisions:	TP1; TP28
Packagings and IBCs - Packing instruction:	P001; IBC03; LP01	Packagings and IBCs - Special packing provisions:	None

Shipping Name: BISULPHITES, AQUEOUS SOLUTION, N.O.S. (contains sodium bisulfite)

Land Transport UNDG:

Class or division:	8	Subsidiary risk:	None
UN No.:	2693	UN packing group:	III

Shipping Name: BISULPHITES, AQUEOUS SOLUTION, N.O.S. (contains sodium bisulfite)

**Air Transport IATA:**

ICAO/IATA Class:	8	ICAO/IATA Subrisk:	None
UN/ID Number:	2693	Packing Group:	III
Special provisions:	None		

Shipping Name: BISULPHITES, AQUEOUS SOLUTION, N.O.S. (CONTAINS SODIUM BISULFITE)

**Maritime Transport IMDG:**

IMDG Class:	8	IMDG Subrisk:	None
UN Number:	2693	Packing Group:	III
EMS Number:	F-A,S-B	Special provisions:	274 944
Limited Quantities:	5 L	Marine Pollutant:	Not Determined

Shipping Name: BISULPHITES, AQUEOUS SOLUTION, N.O.S. (contains sodium bisulfite)

**Section 15 - REGULATORY INFORMATION****POISONS SCHEDULE**

None

**REGULATIONS**

Regulations for ingredients

**sodium bisulfite (CAS: 7631-90-5) is found on the following regulatory lists;**

"Australia Exposure Standards", "Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "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 Spirax Sarco Omega 4 (CW: 4925-40)**

**SPIRAX SARCO OMEGA 4**Hazard Alert Code:  
HIGH

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**Section 16 - OTHER INFORMATION****Ingredients with multiple CAS Nos**

Ingredient Name	CAS
cobalt(II) sulfate	10124-43-3, 60459-08-7, 10026-24-1

**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/m<sup>3</sup>.

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:  
[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ 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.

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