

**SPIRAX SARCO SPIRACLEAN 822**Hazard Alert Code:  
**MODERATE**

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 4930-41

Issue Date: 29-Jan-2010

CD 2010/1

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

Spirax Sarco Spiraclean 822

**SYNONYMS**

"cooling tower disinfectant"

**PRODUCT USE**

Detergent/disinfectant for cooling towers.

**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

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

	Min	Max
Flammability:	0	
Toxicity:	2	
Body Contact:	1	
Reactivity:	2	
Chronic:	0	

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

**POISONS SCHEDULE**

S5

**RISK**

- Contact with combustible material may cause fire.
- Contact with acids liberates toxic gas.
- Ingestion may produce health damage\*.
- Cumulative effects may result following exposure\*.
- Limited evidence of a carcinogenic effect\*.
- Possible skin sensitiser\*.

\* (limited evidence).

**SAFETY**

- Keep away from combustible material.
- Do not breathe gas/ fumes/ vapour/ spray.
- Avoid contact with skin.
- To clean the floor and all objects contaminated by this material use water.
- If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

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

NAME	CAS RN	%
sodium hypochlorite	7681-52-9	1-4.9
scale inhibitor		<1
surfactant		<1
water	7732-18-5	>60^

NOTE: Manufacturer has supplied full ingredient information to allow CHEMWATCH assessment.

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

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- 
- For advice, contact a Poisons Information Centre or a doctor.
- 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.

## 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 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.

## 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.

## NOTES TO PHYSICIAN

- For acute or repeated exposures to hypochlorite solutions:
  - Release of small amounts of hypochlorous acid and acid gases from the stomach following ingestion, is usually too low to cause damage but may be irritating to mucous membranes. Buffering with antacid may be helpful if discomfort is evident.
  - Evaluate as potential caustic exposure.
  - Decontaminate skin and eyes with copious saline irrigation. Check exposed eyes for corneal abrasions with fluorescein staining.
  - Emesis or lavage and catharsis may be indicated for mild caustic exposure.
  - Chlorine exposures require evaluation of acid/base and respiratory status.
  - Inhalation of vapours or mists may result in pulmonary oedema.

ELLENHORN and BARCELOUX: Medical Toxicology.

## Section 5 - FIRE FIGHTING MEASURES

### 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 liquid.  
Heating may cause expansion or decomposition leading to violent rupture of containers.  
Decomposes on heating and produces toxic fumes of:  
chlorine.  
Reacts with aluminium / zinc producing flammable, explosive hydrogen gas.

### HAZCHEM

None

### PERSONAL PROTECTION

Glasses:	Gloves:	Respirator:
Safety Glasses.	PVC chemical resistant type.	Type B-P Filter of sufficient capacity

## Section 6 - ACCIDENTAL RELEASE MEASURES

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**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 courses.

Increase ventilation.

Stop leak if safe to do so.

Contain spill with sand, earth or vermiculite.

Collect recoverable product into labelled containers for recycling.

Neutralise with sodium metabisulfite or sodium thiosulfate.

■ Absorb remaining product with sand, earth or vermiculite.

Collect residues and seal in labelled drums for disposal.

Wash spill area with large quantities of water.

If contamination of drains or waterways occurs, advise emergency services.

- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.

**EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)**

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

sodium hypochlorite                      20ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

sodium hypochlorite                      3ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:

sodium hypochlorite                      1ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according exceed the following cutoffs

Very Toxic (T+)    &gt;= 0.1%    Toxic (T)            &gt;= 3.0%

R50                    &gt;= 0.25%    Corrosive (C)      &gt;= 5.0%

R51                    &gt;= 2.5%

else                    &gt;= 10%

where percentage is percentage of ingredient found in the mixture

**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.
- 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**

- Plastic container.
- Check that containers are clearly labelled
- Packaging as recommended by manufacturer.

**STORAGE INCOMPATIBILITY**

Avoid storage with acids and combustible materials.

**STORAGE REQUIREMENTS**

- Store in original containers.
- Store in a well-ventilated area.
- Store away from incompatible materials.

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- Keep containers securely sealed
  - Protect from light.
  - DO NOT store near acids
- DO NOT store on wooden floors.  
Protect containers against physical damage.
- Check regularly for spills and leaks
  - Store in original containers.
  - Keep containers securely sealed.
  - Store in a cool, dry area protected from environmental extremes.
  - 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

For major quantities:

- Consider storage in banded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams).
- Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.

**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 hypochlorite (Chlorine)					1	3		

The following materials had no OELs on our records

- water: CAS:7732-18-5

**EMERGENCY EXPOSURE LIMITS**

Material	Revised IDLH Value (mg/m <sup>3</sup> )	Revised IDLH Value (ppm)
sodium hypochlorite		10

**MATERIAL DATA**

SPIRAX SARCO SPIRACLEAN 822:

Not available

**SODIUM HYPOCHLORITE:**

■ Odour Threshold Value: 0.08 ppm (detection) - olfactory fatigue may develop

NOTE: Detector tubes for chlorine, measuring in excess of 0.2 ppm, are commercially available. Long-term measurements (8 hrs) may be conducted to detect concentrations exceeding 0.13 ppm.

Smell is not a good indicator of severity of exposure in the range 0.5 to 2 ppm. In this range subjects found exposure unpleasant with itching and burning of the throat reported and occasionally an urge to cough. Significant differences in the responses of males and females were also recorded with females often reporting headache and drowsiness.

Exposure at 1 ppm chlorine for 8 hours produced significant changes in pulmonary function and increased subjective irritation. Similar 8 hour exposures at 0.5 ppm produced no significant pulmonary function changes and less severe subjective irritation. Exposures for 2 hours at 2 ppm chlorine produced no significant changes in pulmonary irritation.

An 8 hour exposure at 1.5 ppm produced increased mucous secretion from the nose and increased mucous in the hypopharynx. Exposure at or below the TLV-TWA and STEL is thought to protect the worker against annoying symptoms in nose, throat and conjunctiva and declines in pulmonary function.

Odour Safety Factor(OSF)

OSF=1.6 (CHLORINE).

available chlorine, as chlorine

TLV TWA: 0.5 ppm, 1.5 mg/m<sup>3</sup>: STEL: 1 ppm, 2.9 mg/m<sup>3</sup>ES Peak: 1 ppm, 3 mg/m<sup>3</sup>CEL TWA: 2 mg/m<sup>3</sup> (compare WEEL TWA)

The odour threshold is likely to be similar to that of chlorine, 0.3 ppm.

Acute, subchronic, and chronic toxicity studies have shown no significant treatment related effects. High concentrations may produce moderate to severe eye irritation, but not permanent injury. High doses also appear to be embryotoxic. Since nearly all sodium hypochlorite is handled as aqueous solution, airborne exposure is likely to be as an aerosol, or mist. Sodium hypochlorite dissociates in water to form free hypochlorous acid in equilibrium. The toxic effects are likely to be similar to those of chlorine or sodium hydroxide.

**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**

- Wear protective gloves, eg. PVC.

**OTHER**

- 
- Overalls.
- Eyewash unit.

Avoid contact with personal clothing as the bleach may affect coloured fabric.

**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	B-P--AUS	-
1000	50	-	B-P--AUS
5000	50	Airline *	-
5000	100	-	B-P--2
10000	100	-	B-P--3
	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**

- 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)
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 alkaline liquid with slight chlorine odour; mixes with water.

**PHYSICAL PROPERTIES**

Liquid.  
Mixes with water.

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Contact with acids liberates toxic gas.

State	Liquid	Molecular Weight	Not applicable
Melting Range (°C)	Not available	Viscosity	Not available
Boiling Range (°C)	Not available	Solubility in water (g/L)	Miscible
Flash Point (°C)	Not applicable	pH (1% solution)	Not available
Decomposition Temp (°C)	Not available	pH (as supplied)	10.5 - 11.5
Autoignition Temp (°C)	Not applicable	Vapour Pressure (kPa)	Not available
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	1.06
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**

- Contact with acids produces toxic fumes of chlorine.

For incompatible materials - refer to Section 7 - Handling and Storage.

**Section 11 - TOXICOLOGICAL INFORMATION****POTENTIAL HEALTH EFFECTS****ACUTE HEALTH EFFECTS****SWALLOWED**

- The concentrate is corrosive to the gastro-intestinal tract and harmful if swallowed.

**EYE**

- The concentrate is highly discomforting to the eyes.
- The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

**SKIN**

- The concentrate is discomforting to the skin and is capable of causing skin reactions which may lead to dermatitis from repeated exposures over long periods.
- A few individuals may show allergic/sensitisation responses which may be minor to severe. Exposure will aggravate this pre-existing condition and those with sensitisation reactions should not be required to work where exposure may occur.

**INHALED**

- The vapour is discomforting to the upper respiratory tract and lungs.
- Not considered an irritant through normal use.  
Inhalation of vapour is more likely at higher than normal temperatures.

**CHRONIC HEALTH EFFECTS**

- Principal routes of exposure are by accidental skin and eye contact and by inhalation of vapours especially at higher temperatures.
- As with any chemical product, contact with unprotected bare skin; inhalation of vapour, mist or dust in work place atmosphere; or ingestion in any form, should be avoided by observing good occupational work practice.

**TOXICITY AND IRRITATION**

- Not available. Refer to individual constituents.

**SODIUM HYPOCHLORITE:**

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

**TOXICITY**

Oral (mouse) LD50: 5800 mg/kg

Oral (woman) TDLo: 1000 mg/kg

Oral (rat) LD50: 8910 mg/kg

**IRRITATION**

Eye (rabbit): 10 mg - Moderate

Skin (rabbit): 500 mg/24h-Moderate

Eye (rabbit): 100 mg - Moderate

- 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

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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.

Hypochlorite salts are classified by IARC as Group 3: NOT classifiable as to its carcinogenicity to humans.

Evidence of carcinogenicity may be inadequate or limited in animal testing.

The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Hypochlorite salts are extremely corrosive and can cause severe damage to the eyes and skin.

A number of fibrosarcomas and squamous cell carcinomas were observed in mice treated dermally with repeated subcarcinogenic doses of 4-nitroquinoline-1-oxide, followed by dermal treatment with sodium hypochlorite.

as sodium hypochlorite pentahydrate

**CARCINOGEN**

Hypochlorite salts 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:

SPIRAX SARCO SPIRACLEAN 822:

SODIUM HYPOCHLORITE:

■ Very toxic to aquatic organisms.

■ 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.

■ For chlorine:

Environmental fate:

Atmospheric chlorine produced as a result of such process as disinfection forms hydrochloric (HCl) or hypochlorous (HOCl) acid in the atmosphere, either through reactions with hydroxy radicals or other trace species such as hydrocarbons. These acids are believed to be removed from the atmosphere primarily through precipitation washout (i.e. wet deposition as chlorine is scrubbed out by rain in the subcloud layer) or dry deposition as gaseous chlorine contacts and reacts with the earth's surface.

Water chlorination, resulting from municipal and industrial wastewater treatment and cooling water disinfection, initially introduces chlorine into the water as chlorine gas, hypochlorite ion (OCl<sup>-</sup>), or its salt. These forms of chlorine are termed free residual chlorines (FRC). Chlorine in aqueous systems volatilises or quickly decays to residual forms such as hypochlorous acid, chloramine and chlorinated organics. Aquatic chemistry is determined by aquatic factors including pH, ammonium ion (which combines with chlorine to produce chloramine) and certain other reducing agents. Inorganic reducing agents in estuarine waters include sulfur, iron and manganese. Other organic compounds in water also contribute to chlorine decay rate. The reactions of chlorine or hypochlorites in water produce a number of by-products many of which have been implicated as genotoxic or tumourigenic.

Chlorine, added to drinking water as chlorine gas (Cl<sub>2</sub>) or hypochlorite salts (e.g., NaOCl), effectively inactivates bacteria in 20 minutes at concentrations of 0.03 to 0.06 mg/l at pH range of 7.0 to 8.5 and temperature range of 4 deg.C to 22 deg.C.

Chlorine disinfectants in wastewater react with organic matters, giving rise to organic chlorine compounds such as AOX (halogenated organic compounds absorbable on activated carbon), which are toxic to aquatic organisms and are persistent environmental contaminants.

Chlorine hydrolyses very rapidly in water (rate constants range from 1.5 x 10<sup>-4</sup> at deg. C to 4.0 x 10<sup>-4</sup> at 25 deg.C; half-life in natural waters, 0.005 seconds. In fresh and wastewaters at pH >6, complete hydrolysis occurs with the formation of hypochlorous acid (HOCl) and chloride ion (Cl<sup>-</sup>). The hypochlorous acid ionizes to hydrogen ion (H<sup>+</sup>) and hypochlorite ion (OCl<sup>-</sup>). At pH values >5, OCl<sup>-</sup> predominates; at pH values <5, HOCl predominates. Free chlorine (Cl<sub>2</sub>, HOCl, and OCl<sup>-</sup>) reacts rapidly with inorganics such as bromide and more slowly with organic material present in natural waters. These reactions yield chloride, oxidised organics, chloroorganics (including trihalomethanes), oxygen, nitrogen, chlorate, bromate and bromoorganics. Chlorines ultimate aqueous fate is chloride.

Vapourisation of molecular chlorine (Cl<sub>2</sub>) from water to the atmosphere may be significant at low pH values and high concentrations (e.g., pH 2 and 3500 mg/l chlorine), but is insignificant at neutral pH and low concentrations.

Vegetation acts as an important sink for chlorine air pollution. Plant exposure to elevated levels of chlorine can cause plant injury; however chlorine tends to be rapidly converted to other less toxic forms.

Atmospheric: When chlorine, hypochlorous acid or hydrogen chloride mixes in the atmosphere with water vapour, dilute solutions of strong mineral acids are formed that fall to earth as acid rain, snow, and fog, or acidified dry particles.

Chlorine may react with soil components to form chlorides; depending on their water solubility, these chlorides are easily washed out from the soil.

Bioaccumulation/ bioconcentration: There is no potential for the bioaccumulation or bioconcentration of chlorine.

Ecotoxicity:

Fish LC50 (96 h): 0.015-13.5 mg/l

Chlorine has high acute toxicity to aquatic organisms; many toxicity values are less than or equal to 1 mg/l. Twenty-four-hour LC50 values range from 0.076 to 0.16 mg/l for *Daphnia magna* (water flea) and from 0.005 to 0.1 mg/l for *Daphnia pulex* (cladocern); 48-hour LC50 values range from 5.3 to 12.8 mg/l for *Nitocra spinipes* (snail); and 96-hour LC50 values range from 0.13 to 0.29 mg/l for *Oncorhynchus mykiss* (rainbow trout), from 0.1 to 0.18 mg/l for *Salvelinus fontinalis* (brook trout), and from 0.71-0.82 mg/l for *Lepomis cyanellus* (green sunfish)

Papillomas of the oral cavity in fish have been associated with exposure to chlorinated water supplies.

Chlorine is phytotoxic but is also essential to plant growth; crops need around 2 kg or more of chlorine per acre. Acute toxicity to plants is characterized by defoliation with no leaf symptoms and, in higher plant forms, by spotting of the leaves (at 1.5 mg/m<sup>3</sup>) and marginal and interveinal injury (at 150-300 mg/m<sup>3</sup>)

Data from experimental studies indicate that injury to animals occurs only in the presence of high concentrations of chlorine, either in drinking water or the ambient atmosphere.

[http://www.epa.gov/chemfact/s\\_chlori.txt](http://www.epa.gov/chemfact/s_chlori.txt)

U.S. ENVIRONMENTAL PROTECTION AGENCY August 1994.

■ In fresh water, the hypochlorites break down rapidly into non-toxic compounds when exposed to sunlight. In seawater, chlorine levels decline rapidly; however, hypobromite (which is acutely toxic to aquatic organisms) is formed. Sodium and calcium hypochlorite are low in toxicity to avian wildlife, but they are highly toxic to freshwater fish and invertebrates.

Hypochlorite is a highly reactive chemical which, during and after its use in household scenarios, undergoes a variety of reactions. The major one is the oxidation of inorganic and organic species.

A minor reaction, which consumes about 1.5% of the chlorine atoms from hypochlorite, is chlorination, which leads to formation of organohalogen by-products that are often measured by the group parameter, AOX.

Hypochlorite itself is rapidly broken down during use, in the sewer, and if any does reach sewage treatment it will further degrade (half-life of around 0.6 minutes). Predictions have indicated that its concentration will fall to below 1.E-32 ug/l by the end of the sewer, partially due to its reaction with ammonia in the sewer which leads to a subsequent increase in chloramine.

The level of chloramine reaching surface water is estimated to be below 5.E-10 ug/l. Both these concentrations are orders of magnitude below the lowest acute EC50s determined for sodium hypochlorite (EC50 to invertebrates = 5 ug/l) and monochloramine (EC50 to invertebrates = 16 ug/l).

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The organohalogen by-products formed from the use of hypochlorite are currently receiving much attention. However, the levels of AOX produced are low (for example, 37 ug/l from bleach use compared to a sewage background level of 106 ug/l), and the organohalogens produced from domestic use of hypochlorite are not believed to have an adverse effect on the environment. Available data indicate that no dioxins are produced, and that the identified AOXs are typically small molecules with a low degree of chlorination and for which ecotoxicological properties are known or can be predicted. Where drinking water is disinfected by chlorination, the levels of organohalogens in sewage effluent arising from bleach use will be comparable with, and sometimes only a fraction of, those arising from the tap-water. After secondary sewage treatment, the levels entering receiving waters will be of the same order of magnitude as background levels typically present in rivers, though the total flux in rivers from natural sources will be much greater.

The majority of the measured AOX is unidentified, but thought to consist of high molecular weight components formed from fats, proteins and humic acids which are too large to bioaccumulate.

In addition, studies on the whole AOX mixture in laundry waste-water indicated that the level of AOX present did not effect growth or reproduction of Ceriodaphnia, and that around 70% is removed in activated sludge.

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

■ DO NOT discharge into sewer or waterways.

■ The material is classified as an ecotoxin\* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

\* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

**Ecotoxicity**

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
sodium hypochlorite			LOW	

**Section 13 - DISPOSAL CONSIDERATIONS**

■ Recycle wherever possible.

Consult manufacturer for recycling options.

Consult State Land Waste Management Authority for disposal.

Treat and neutralise at an effluent treatment plant.

Bury residue in an authorised landfill.

Recycle containers if possible, or dispose of in an authorised landfill.

**Section 14 - TRANSPORTATION INFORMATION****HAZCHEM:**

None (ADG7)

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: ADG7, UN, IATA, IMDG

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

S5

**REGULATIONS**

Regulations for ingredients

**sodium hypochlorite (CAS: 7681-52-9,10022-70-5) is found on the following regulatory lists;**

"Australia Hazardous Substances", "Australia High Volume Industrial Chemical List (HVICL)", "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"

**No data for Spirax Sarco Spiraclean 822 (CW: 4930-41)**

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

Ingredient Name	CAS
sodium hypochlorite	7681-52-9, 10022-70-5

**EXPOSURE STANDARD FOR MIXTURES**

■ "Worst Case" computer-aided prediction of vapour components/concentrations: ■ Composite Exposure Standard for Mixture (TWA) (mg/m<sup>3</sup>): 1.5 mg/m<sup>3</sup> ■ If the breathing zone concentration of ANY of the components listed below is exceeded, "Worst Case" considerations deem the individual to be overexposed. Component Breathing Zone ppm Breathing Zone mg/m<sup>3</sup> Mixture Conc: (%).

Component	Breathing zone (ppm)	Breathing zone (mg/m <sup>3</sup> )	Mixture Conc (%)
sodium hypochlorite	0.50	1.5000	4.9

■ Operations which produce a spray/mist or fume/dust, introduce particulates to the breathing zone. If the breathing zone concentration of ANY of the components listed below is exceeded, "Worst Case" considerations deem the individual to be overexposed. ■ At the "Composite Exposure Standard for Mixture" (TWA) (mg/m<sup>3</sup>): 1.5 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.

**SPIRAX SARCO SPIRACLEAN 822****Hazard Alert Code:  
MODERATE**

Chemwatch Material Safety Data Sheet

Revision No: 3

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