

SPIRAX SARCO TRANSPOL 392Hazard Alert Code:
NIL

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 50680

Issue Date: 29-Jan-2010

CD 2010/1

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

Spirax Sarco Transpol 392

SYNONYMS

"boiler water treatment scale inhibitor", "formerly 3392"

PRODUCT USE

Antiscaling dispersant for boiler and cooling water treatment.

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****NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.****HAZARD RATINGS**

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

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

POISONS SCHEDULE

None

RISK

- Cumulative effects may result following exposure*.
- * (limited evidence).

SAFETY

- Do not breathe gas/ fumes/ vapour/ spray.
- Avoid contact with skin.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
anionic acrylic polymer		10-30
tetrapotassium 1-hydroxyethylidene diphosphonate	14860-53-8	1-10
water	7732-18-5	>60

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

Section 4 - FIRST AID MEASURES**SWALLOWED**

-
- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

EYE

- If this product comes in contact with eyes:
- Wash out immediately with water.
- If irritation continues, seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).

SPIRAX SARCO TRANSPOL 392

Hazard Alert Code:
NIL

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 50680

Issue Date: 29-Jan-2010

CD 2010/1

- Seek medical attention in event of irritation.

INHALED

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

NOTES TO PHYSICIAN

- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

■ The product contains a substantial proportion of water, therefore there are no restrictions on the type of extinguishing media which may be used. Choice of extinguishing media should take into account surrounding areas. Though the material is non-combustible, evaporation of water from the mixture, caused by the heat of nearby fire, may produce floating layers of combustible substances. In such an event consider:

- foam.
- dry chemical powder.
- carbon dioxide.

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 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 fumes of carbon monoxide (CO).
- May emit acrid smoke.

Decomposition may produce toxic fumes of: carbon dioxide (CO₂), phosphorus oxides (PO_x), other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY

- None known.

HAZCHEM

None

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

When handling larger quantities:

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

- Minor hazard.
- Clear area of personnel.
- Alert Fire Brigade and tell them location and nature of hazard.
- Control personal contact by using protective equipment as required.
- Prevent spillage from entering drains or water ways.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite and place in appropriate containers for disposal.
- Wash area and prevent runoff into drains or waterways.
- If contamination of drains or waterways occurs, advise emergency services.

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

SPIRAX SARCO TRANSPOL 392Hazard Alert Code:
NIL

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 50680

Issue Date: 29-Jan-2010

CD 2010/1

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

-
- Polyethylene or polypropylene container.
- Packing as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

STORAGE INCOMPATIBILITY

- Avoid contamination of water, foodstuffs, feed or seed None known.

STORAGE REQUIREMENTS

-
- Store in original containers.
- 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**

The following materials had no OELs on our records

- tetrapotassium 1-hydroxyethylidene diphosphonate: CAS:14860-53-8
- water: CAS:7732-18-5

MATERIAL DATA

SPIRAX SARCO TRANSPOL 392:

Not available

TETRAPOTASSIUM 1-HYDROXYETHYLIDENE DIPHOSPHONATE:

- It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and

SPIRAX SARCO TRANSPOL 392Hazard Alert Code:
NIL

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 50680

Issue Date: 29-Jan-2010

CD 2010/1

- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

WATER:

- No exposure limits set by NOHSC or ACGIH.

PERSONAL PROTECTION**EYE**

-
- Safety glasses with side shields
- 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 general protective gloves, eg. light weight rubber gloves.

OTHER

- No special equipment needed when handling small quantities.

OTHERWISE:

- Overalls.
- Barrier cream.
- Eyewash unit.

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. If risk of overexposure exists, wear SAA 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

Upper 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

- 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, colourless to pale straw coloured liquid with a slight, characteristic odour; mixes with water.

PHYSICAL PROPERTIES

Liquid.

Mixes with water.

State	Liquid	Molecular Weight	Not applicable
Melting Range (°C)	Not available	Viscosity	Not available
Boiling		Solubility	

SPIRAX SARCO TRANSPOL 392Hazard Alert Code:
NIL

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 50680

Issue Date: 29-Jan-2010

CD 2010/1

Range (°C)	Not available	in water (g/L)	Miscible
Flash Point (°C)	Not applicable	pH (1% solution)	Not available
Decomposition Temp (°C)	Not available	pH (as supplied)	7.1-7.8
Autoignition Temp (°C)	Not applicable	Vapour Pressure (kPa)	Not available
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	1.18
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**

■ The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (eg. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

EYE

■ Although the liquid is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).

SKIN

■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED

■ Not normally a hazard due to non-volatile nature of product.

The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

CHRONIC HEALTH EFFECTS

■ Long-term exposure to the product is not thought to produce chronic effects adverse to the health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.

TOXICITY AND IRRITATION

■ Not available. Refer to individual constituents.

TETRAPOTASSIUM 1-HYDROXYETHYLIDENE DIPHOSPHONATE:

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

TOXICITY

Oral (rat) LD50: 520 mg/kg

IRRITATION

Nil Reported

■ For phosphonic acid and its salts:

Phosphonic acids and their salts have not been shown to induce skin sensitisation in guinea pigs. None of the studies however follow OECD guidelines or were GLP compliant. However, only the investigation on the disodium salt of HEDP was recorded to a standard sufficient to support the robustness and reliability of the study design and conduct. Most studies were not reported in great detail, but they stated the adherence to well established protocol such as Buehler or Magnusson and Kligman. The information available provided, however, a coherent picture in that these compounds should not be considered skin sensitisers.

The acids or salts of ATMP, HEDP and DTPMP did not show any carcinogenic activity when tested in rodents.

The effects of ATMP acid and its salts on the reproductive system can be evaluated on the basis of a well conducted 3-generation reproductive toxicity study. Although the study predated current guidelines (e.g., no evaluation of the oestrus cycle, sperm parameters and developmental milestones), the

SPIRAX SARCO TRANSPOL 392Hazard Alert Code:
NIL

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 50680

Issue Date: 29-Jan-2010

CD 2010/1

overall evidence suggests that ATMP acid and its salts are not selectively toxic to the male or female reproductive system. The absence of effects on the reproductive organs in well conducted subchronic and chronic toxicity studies with ATMP provides further support to this assessment. On the basis of a 3-generation reproductive toxicity study and also a well conducted FDA segment II study, there is further no evidence for foetotoxic or teratogenic effects of ATMP. In the absence of any guideline compliant reproductive toxicity studies, the reproductive toxicity of HEDP acid can be evaluated on the basis of subchronic oral feeding studies in rats and dogs which did not reveal any effects on the reproductive system at exposures up to 1500-1800 mg/kg bw/d. There were also no effects on fertility (i.e., indicated by the pregnancy rate) of the disodium salt of HEDP when fed at doses up to 447 mg/kg bw/d to rats in a 2-generation study. The reproductive toxicity of DTPMP acid and its salts can be evaluated on the basis of a well conducted 2-generation study in which Long Evan rats fed with DTPMP containing diet at levels up to 312 mg acid/kg bw/d. Although in this study, some alterations were observed with regard to a lower pregnancy rate in F2 (i.e., not statistically significant) and reduced pup body weight in F2a (i.e., statistically significant), these effects were not considered to be of biological significance as they were either not observed in F1 or could not be replicated in F2b. The absence of effects on the reproductive system could further be confirmed in an OECD guideline compliant subchronic toxicity study.

Generally, from a structure activity standpoint, none of the phosphonates possess structural elements that indicate the potential for genotoxicity. Neither ATMP acid nor the salt induced gene mutations in bacterial systems. When testing ATMP acid in the acid form, it induced dose-dependent gene mutations in mouse lymphoma cells. However, this positive result was demonstrated to be an artefact of pH which was not observed when neutralized ATMP acid was tested in the in vitro mouse lymphoma assay up to the solubility limit. The pentasodium salt of ATMP did not induce chromosome damage either in vitro or in vivo.

The available data on in vivo and in vitro genotoxicity of HEDP and its salts indicate no potential of HEDP and its salts to cause mutagenicity in bacterial mutagenicity assays. Conflicting results were obtained in an in vitro mouse lymphoma assay. In this assay, a dose-dependent positive response was seen in the presence of metabolic activation which was, however, discounted because of high control values.

Both, DTPMP acid and the salt were negative in well performed and guideline compliant bacterial mutagenicity assays. DTPMP acid was further negative for gene mutations at the HPRT locus in CHO cells. Similarly to HEDP acid, the evidence for mutagenic potential is conflicting. While the salt of DTPMP was negative for mammalian gene mutations, DTPMP acid, even when neutralised, induced mutations at the thymidine kinase locus in mouse lymphoma L5178Y cells. Since pH effect has been excluded and increased osmolality is an unlikely cause (positive response was only seen in presence of S9 mix), it is possible that chelation of essential ions may have caused the positive response in the presence of S9. Iron chelation appears to play a role in contributing to positive responses in the mouse lymphoma assay.

HERA (Human and Environmental Risk Assessment on ingredients of European household cleaning products) - Phosphonates
Oral bisphosphonates (given in certain medical treatments) can give stomach upset and inflammation and erosions of the esophagus, which is the main problem of oral N-containing preparations. This can be prevented by remaining seated upright for 30 to 60 minutes after taking the medication. Intravenous bisphosphonates can give fever and flu-like symptoms after the first infusion, which is thought to occur because of their potential to activate human T cells. Notably, these symptoms do not recur with subsequent infusions. There is a slightly increased risk for electrolyte disturbances, but not enough to warrant regular monitoring. In chronic renal failure, the drugs are excreted much slower, and dose adjustment is required. Bisphosphonates have been associated with osteonecrosis of the jaw; with the mandible twice as frequently affected as the maxilla and most cases occurring following high-dose intravenous administration used for some cancer patients. Some 60% of cases are preceded by a dental surgical procedure and it has been suggested that bisphosphonate treatment should be postponed until after any dental work to eliminate potential sites of infection. A number of cases of severe bone, joint, or musculoskeletal pain have been reported, prompting labeling changes.

Bisphosphonates are incorporated into the bone matrix, from where they are gradually released over periods of weeks to years. The extent of bisphosphonate incorporation into adult bone, and hence, the amount available for release back into the systemic circulation, is directly related to the total dose and duration of bisphosphonate use. Although there are no data on foetal risk in humans, bisphosphonates do cause foetal harm in animals, and animal data suggest that uptake of bisphosphonates into foetal bone is greater than into maternal bone. Therefore, there is a theoretical risk of foetal harm (e.g., skeletal and other abnormalities) if a woman becomes pregnant after completing a course of bisphosphonate therapy. The impact of variables such as time between cessation of bisphosphonate therapy to conception, the particular bisphosphonate used, and the route of administration (intravenous versus oral) on this risk has not been established.

The non-nitrogenous bisphosphonates (disphosphonates) are metabolised in the cell to compounds that compete with adenosine triphosphate (ATP) in the cellular energy metabolism. The osteoclast initiates apoptosis and dies, leading to an overall decrease in the breakdown of bone.

Nitrogenous bisphosphonates act on bone metabolism by binding and blocking the enzyme farnesyl diphosphate synthase (FPPS) in the HMG-CoA reductase pathway (also known as the mevalonate pathway). Disruption of the HMG CoA-reductase pathway at the level of FPPS prevents the formation of two metabolites (farnesol and geranylgeraniol) that are essential for connecting some small proteins to the cell membrane. This phenomenon is known as prenylation, and is important for proper sub-cellular protein trafficking.

WATER:

- No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

SPIRAX SARCO TRANSPOL 392:

TETRAPOTASSIUM 1-HYDROXYETHYLIDENE DIPHOSPHONATE:

- 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.

- The principal problems of phosphate contamination of the environment relates to eutrophication processes in lakes and ponds. Phosphorus is an essential plant nutrient and is usually the limiting nutrient for blue-green algae. A lake undergoing eutrophication shows a rapid growth of algae in surface waters. Planktonic algae cause turbidity and flotation films. Shore algae cause ugly muddying, films and damage to reeds. Decay of these algae causes oxygen depletion in the deep water and shallow water near the shore. The process is self-perpetuating because anoxic conditions at the sediment/water interface causes the release of more adsorbed phosphates from the sediment. The growth of algae produces undesirable effects on the treatment of water for drinking purposes, on fisheries, and on the use of lakes for recreational purposes.

- For phosphonates:

The physico-chemical characteristics determining the health and environmental behaviour of phosphonates are: high water solubility, non-volatility, very low octanol-water partition coefficients, moderate to high sorption coefficients, multi-protic acidity and strong (transition) metal complexation

Environmental fate:

Biodegradation: Orthophosphate has been found to suppress phosphonate utilisation in many microorganisms. Thus organisms preferentially use inorganic phosphate, which may explain the low biodegradability of phosphonates in synthetic test media and natural sewage systems. The classical tests, such as the OECD screening test, BOD20 test or the closed bottle test show only a low degree of ultimate biodegradation of phosphonate derivatives. For ATMP and HEDP a DOC (Dissolved Organic Carbon) removal of 23 - 33 % was observed in an inherent biodegradability test (Zahn-Wellens test), but mineralisation was very low even after long-term incubation. However, several studies have shown that phosphonate degrading bacteria can be found in almost any environment whether soil, activated sludge or river water. At low ortho-phosphate concentration, i.e. if phosphate is the growth-limiting factor, phosphonate degradation occurs with almost complete breakdown of HEDP (94 %). DTPMP showed 60 % degradation under similar conditions. No quantitative study was done for ATMP. These phosphate-limited conditions are not likely to occur in most environments. Inherent biodegradation tests (Zahn-Wellens, SCAS testing) also indicate a low degree of biodegradation under the standard test conditions. For example, biodegradation of radiolabelled ATMP, HEDP and DTPMP resulted in SCAS tests in 0.5 to 10.2 % release of ¹⁴CO₂ over a 210 day period. As a consequence, it is assumed that biodegradation does not occur in sewage treatment plants.

Degradation does occur in the presence of river sediment; however studies indicate that phosphonates become tightly bound onto the sediment, for a significant part irreversibly. This leads to the conclusion that the major part of the (bio)degradation may occur in the sediment but not in the water

SPIRAX SARCO TRANSPOL 392Hazard Alert Code:
NIL

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 50680

Issue Date: 29-Jan-2010

CD 2010/1

phase. Half-lives for this degradation were calculated, assuming an exponential decay, from the average measured values, i.e. for ATMP 8.8% in 50 days, for HEDP 7.1 % in 50 days and for DTPMP 15.9% in 50 days and 29.6 % in 38 days. The corresponding half-lives are 376 days for ATMP, 471 days for HEDP and 200 days and 75 days for DTPMP. For the latter a half-life of 137.5 days was used in the assessment.

Anaerobic degradation has not been studied extensively. It has been reported only minor conversion of ATMP and HEDP occurs in model digestors. No inhibitory effect was observed neither for ATMP up to 100 mg/liter and for HEDP up to 5 mg/g dry sludge.

In soils, biodegradation of DTPMP has been shown. ATMP and HEDP also show degradation, but slower than DTPMP. When sludges or sediments are disposed of at land, this will ensure mineralisation and removal from the environment.

Hydrolysis: Phosphonates are quite stable in water as evidenced by the dark controls in the photolysis studies. However it was found that ATMP would hydrolyse fairly easily at low concentrations (70 ppb) with complete primary degradation in a few days. Another study reported 37 % degradation of HEDP in the presence of copper ions. Yet another study on the hydrolysis of phosphonates came to the conclusion that metal ions, aerobic conditions and light were favourable conditions of the hydrolysis/degradation of these substances. Although hydrolytic degradation mechanisms have been identified, they appear to be strongly dependent on the specific environmental conditions, and in particular on the presences of certain metal ions and light. Hydrolysis half-lives in the range of 50 -200 days at 15 ? 25 °C have been calculated. In colder environments the half-life for hydrolysis might be of the same order as biodegradation.

Photodegradation: Photodegradation is another important route of the environmental removal of phosphonates. It is catalysed by transition metal ions and is pH dependent. It is especially pronounced in the presence of iron ions when 40 to 90 % degradation of the phosphonate-residues to ortho-phosphate occurs in 17 days. Other transition metals also stimulate photodegradation, in particular for HEDP. Further studies on HEDP confirmed these findings. HEDP was found to be degradable in river waters at neutral pH simulating day-light conditions. The rate of degradation was concentration dependent. At 3 mg/l, 70% was degraded in 8 days, at 10 mg/l, only 12.5 % was degraded. The half life was estimated at about. 100 hrs at 3 mg/l.

Bioaccumulation: As expected for highly water-soluble substances, the log Kow values for phosphonates are low (ATMP: -3.53; HEDP: -3.49; EDTMP: -4.10; HDTMP: -4.43; DTMP: -3.40). The potential for bioaccumulation of phosphonates in aquatic organisms is therefore expected to be low as well. Experimental bioconcentration studies with zebra fish have been conducted with radiolabelled ATMP and HEDP. For both substances, the BCF values determined after 4-6 weeks of exposure were less than 24.

Metal remobilisation: Metal remobilisation is the re-dissolution of metals such as zinc, copper, chromium, cadmium, mercury etc., which are precipitated in river and lake sediments. This could lead to several problems: increased exposure of water life to these metals at toxic levels, and passing through of the metal to drinking water abstracted from surface water. It has been suggested that the increased metal concentrations may stimulate algal growth, leading to algae blooms in summer.

Studies have shown that phosphonates only remobilise metals at concentrations of at least 100 to 300 ppb. This is well above the predicted environmental concentration of less than 1 ppb. Even at concentrations estimated for a worst case situation of 10 to 30 ppb, no metal remobilisation is expected.

Ecotoxicity

Chelating agents can inhibit algae growth, due to complexation of essential nutrients. The 96 hours EC50 values for the species *Selenastrum* range from 0.45 mg/L for DTPMP up to 12 mg/L for ATMP. Very large differences have been observed between species. In an 8-day study the effect concentration (EC50) for *Chlorella* was well above 10 mg/l for all phosphonates. With many chelating agents, algal growth inhibition results may be strongly affected by chelation of trace metal nutrients. This is often interpreted incorrectly as a toxic effect on algae, whereas the real cause is nutrient limitation. It may also induce a high degree of variability between test labs and individual tests, due to variations in the organisms tested and small variations in the test medium composition

Tests on invertebrates (*Chironomus*, *Daphnia*, Grass shrimp) show low toxicity. The most sensitive species is *Daphnia magna* with 24 and 48 hours LC50 values of 165 to 242 mg/l.

Phosphonates were tested on a number of fish species and demonstrated a low toxicity to fish; the 96 hours LC50 values range from 125 (48 hours) to > 2400 mg/l for freshwater fish (*Bluegill Sunfish*, *Channel Catfish* and *Rainbow Trout*), and from > 1000 up to 8132 mg/l for marine fish (*Sheepshead minnow*). All phosphonates were tested for 14 days on rainbow trout LC50 values ranged from 150 to >262 mg/l. NOEC's based on mortality and behaviour ranged from 47 mg/l (ATMP) to 139 mg/l (DTPMP).

Because of their chelating properties, a small effect is observed on oysters (*Eastern oyster*) due to interference with the shell building metabolism. The 96 hours EC50 ranges from 67 to 200 mg/L, with NOEC's of 55 to 95 mg/l

The acute toxicity of ATMP and HEDP towards microorganisms relevant for sewage treatment plants was investigated in a bacterial respiration inhibition test with *Pseudomonas putida* showing EC0 values of >500 mg/l studied the toxicity to microorganisms using a photoluminescence test. The EC50 was above 2500 mg/l for ATMP and DTPMP and above 250 mg/l for HEDP.

Test data on earthworm (*Eisenia foetid*) show low toxicity of ATMP and HEDP with 14 day NOEC of 1000 mg/kg soil dw and > 1000 mg/kg soil dw

HERA (Human and Environmental Risk Assessment on ingredients of European household cleaning products) - Phosphonates.

■ DO NOT discharge into sewer or waterways.

WATER:

Ecotoxicity

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

Section 13 - DISPOSAL CONSIDERATIONS

-
- 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.
- Dispose of 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.

Section 14 - TRANSPORTATION INFORMATION**HAZCHEM:**

None (ADG7)

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

Section 15 - REGULATORY INFORMATION**POISONS SCHEDULE**

None

SPIRAX SARCO TRANSPOL 392

Hazard Alert Code:
NIL

Chemwatch Material Safety Data Sheet

Revision No: 3

Chemwatch 50680

Issue Date: 29-Jan-2010

CD 2010/1

REGULATIONS

Regulations for ingredients

tetrapotassium 1-hydroxyethylidene diphosphonate (CAS: 14860-53-8) is found on the following regulatory lists;

"Australia Inventory of Chemical Substances (AICS)", "International Council of Chemical Associations (ICCA) - High Production Volume List"

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 Transpol 392 (CW: 50680)

Section 16 - OTHER INFORMATION

■ 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.

■ 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.

This document is copyright. Apart from any fair dealing for the purposes of private study, research, review or criticism, as permitted under the Copyright Act, no part may be reproduced by any process without written permission from CHEMWATCH. TEL (+61 3) 9572 4700.

Issue Date: 29-Jan-2010

Print Date: 6-May-2010