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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Reactive Scarlet 3949 FAT 45170/a

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Reactive Scarlet 3949 FAT 45170/A

1. APPLICANT

Ciba-Geigy Australia Pty Ltd of 235 Settlement Road, Thomastown, Victoria, 3074 has submitted a standard notification statement with their application for an assessment certificate for Reactive Scarlet 3949 FAT 45170/A. The notified chemical will be used as a reactive dye for colouring cellulosic textiles.

2. IDENTITY OF THE CHEMICAL

Reactive Scarlet 3949 FAT 45170/A is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, spectral data, purity, import volume and sites of usage have been exempted from publication in the Full Public Report and the Summary Report

Other name: Reactive Scarlet 3949, FAT 45170/A

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C, 101.3 kPa:	Red powder
Odour:	None
pH:	7.5 (aqueous solution)
Melting Point:	None (decomposes >290°C)
Density:	1770 kg/m^3 at 22°C
Vapour Pressure:	<1x10^{-08} Pa at 25°C
Water Solubility:	>870 g/L at 20°C
Fat Solubility:	<0.012 mg/100 g at 37°C
Partition Co-efficient (n-octanol/water):	Log P_{OW} < -10.0 (calculated as test substance insoluble in octanol)

Hydrolysis as a function of pH:	-pH 7: stable at 50°C -pH 4: not stable at 50°C, half-life~149 hours at 25°C -pH 9: not stable at 50°C, half-life~180 days at 25°C
Adsorption / Desorption:	Not determined
Dissociation Constant pKa:	$-SO_3-$ -2.5>pKa>-3.0 (acidic) Naphthol-NH-triazine pKa ~0.8 (basic) Triazine-NH-CH_2- pKa<2 (basic) OH in alpha-Naphthol pKa>11 (basic)
Flash Point:	Not relevant
Flammability Limits:	Not highly flammable (flame would not spread)
Autoignition Temperature:	No ignition below 400°C
Explosive Properties:	Not explosive
Reactivity / Stability:	No thermal effect below 150°C Not an oxidiser
Surface Tension:	60.5 mN/m at 1 g/L 67.9 mN/m at 10 g/L Not a surfactant
Particle size distribution:	<40 µm 1% >63 µm 96% >100 µm 83% >200 µm 31% >315 µm 14% >400 µm 8% >800 µm <1%

Comments on physico-chemical properties:

The study (OECD TG 112) of the assessment of the pKa's of the functional groups of the notified chemical indicated that the important pKa's are the strongly acidic $-SO_3^-$ groups which will render the molecule sixfold negatively charged over the whole environmentally relevant pH region. The possible protonation of the weakly basic amino groups and ionisation of the weakly acidic -OH group will only have a very small effect in the unimportant pH regions below 3 and above 11.

The high water solubility, low log Pow and lack of surface activity of the notified chemical indicates it is expected to have low affinity to soil/sediment and organic matter.

4. PURITY OF THE CHEMICAL

Toxic or hazardous impurities: None known

Additives/Adjuvants: None

5. INDUSTRIAL USE

The notified chemical will be imported into Australia as a red powder in a ready-to-use form. Some repacking for the purpose of supplying samples of materials for mill trials may be required. If required this repacking will occur at the Ciba warehouse where facilities for the safe handling of hazardous substances are used. The notified chemical will be used as a reactive dyestuff for the colouring of cellulosic textiles. The dyestuff will be used in dyehouses only.

6. OCCUPATIONAL EXPOSURE

The notified chemical will be imported in a ready to use form in sealed cardboard cartons (30 kg nett) with antistatic polyethylene lining. Some repackaging for the purpose of supplying samples or materials for mill trials may be required. The notified chemical will be distributed to dyehouses in city and country areas in New South Wales and Victoria.

It is expected that up to 56-62 employees may be potentially exposed to the substance. This would include 24 weigher operators, 24 dyeing machine operators (plus six more in one dyehouse using pad-thermofix application) and eight laboratory technicians. The workers other than weighers will generally handle the dyestuff in solution, and in most cases, in closed machine systems.

The four batch operators will weigh out the powder product, and add it to the blending vessel, usually under the control of local exhaust ventilation. Each batch operator weighs out approximately 10 kg three times per day, sixty days per year. It is estimated that a ‘worst case’ exposure to these workers is 0.0004 mg/kg/day.

The steps involved in the textile dye process are weighing, addition of the dye to the blending vessels and transferring of the dye mixture to the dyeing equipment. The dye is dissolved in a vat before it is pumped to a tank from which it is dispensed to the dye machine. These processes all occur in closed systems. The fabric is fed into the dye machine and following dyeing at a rate of 0.5% on the weight of the cellulose the fabric is washed free of unfixed dye and dried. Exposure of workers during the dyeing process is not expected.

Repacking may also be performed at the notifiers warehouse prior to distribution as samples of trial packs. This is performed in a booth where flow air is drawn away from the operators. It is estimated that less than 100 kg will need to be repacked each year and that handling will not be more than 10 days per year for 15-20 minutes on each day.

7. PUBLIC EXPOSURE

The notified chemical will be weighed in a dispensary and incorporated in a dye-bath at a small number of dyehouses in Australia. Considering the high fixation rate of the dye to cellulosic material and assuming retention of 50% of the dye in sediment in the dyehouse effluent system, approximately 2.5% of the notified substance is expected to be released into the sewage as unfixed dye. Public exposure from dye dispersed in this manner is expected to be negligible.

Receptacles, containing residues of dyestuff, need to be properly emptied before disposal to land-fill due to the water solubility of the dye. Incineration is the choice method of disposal. There is expected to be negligible public exposure from the disposal of the notified substance.

The public may come in contact with fabrics dyed with the notified chemical. Considering that the dye stuff is chemically fixed to the fibre, and that it has a high molecular weight and low fat solubility, dermal absorption is expected to be low.

In the case of accidental spillage during transport, the public may be exposed to the notified chemical. However, the exposure will be minimal if the spills are contained and cleaned up by the recommended practices as outlined in the Material Safety Data Sheet (MSDS).

8. ENVIRONMENTAL EXPOSURE

Release

The bulk (95% fixation) of the dye will become chemically bound to the fibre and in this state is not expected to impact on the environment. Some minor losses to the environment might occur from ventilation of dusts to air or through spills at the warehouse, during transit, or at the dyehouse. The major route for environmental release has been identified as unfixed dye which has been washed from the treated fabric.

The notifier states that the portion of the dye (5%) washed off the fabric, will pass through the dyehouse effluent system, where some may be retained in the sludge. It is expected that 50% of the dyestuff is retained in sludge during passage through either the dyehouse biological effluent treatment works or the community sewage treatment plant. The 50% retained in sludge (claimed by the notifier to be an internationally accepted assumption although no reference is given), is used to estimate the quantity of dyestuff not retained.

Fate

The exact fate of the dye residues is unclear, due to uncertainties relating to the degree of sorption onto sediments. The two options are considered below.

Option 1: Dye remains in solution

The dye's very low P_{ow} (calculated), high water solubility, relatively low hydrolytic stability under acidic conditions and lack of surface activity, indicate that it is likely to remain in solution and not be absorbed to the sludge in significant quantities. Furthermore, reactive dyes in general have been found not to adsorb to sludge in model systems (1).

Option 2: Dye is partitioned to sediment

Preliminary studies (2) have shown that dyes with similar molecular structures to the notified chemical can be sorbed to sludge. The mechanism by which this occurs is still uncertain but it has been demonstrated that as the pH of the solution decreases from alkaline levels the degree of sorption to sediments is increased.

After entering the sewage works, unfixed residues may be removed through degradation (chemical or biological) or sorption to sludge. In view of the high water solubility, it is likely that significant quantities of the dye will remain in the aquatic compartment. Any dye partitioned to the sediment will be removed with the sludge during treatment at the dyehouse and sewage works. While azo dyes are generally stable under aerobic conditions, they are susceptible to reductive degradation under the anaerobic conditions characteristic of sediment (3).

The dye was tested for its biodegradability in accordance with OECD Guideline 301A (DOC DIE-AWAY Test). The result, 0% degradation in 28 days, shows that the dye is not ready biodegradable.

The inherent biodegradability of the dye was tested in accordance with OECD TG 302B (Modified Zahn-Wellens Test). The result, 0% degradation in 28 days, shows that the dye is not inherently biodegradable.

The biochemical oxygen demand (BOD) of the dye was tested and the five day study showed that the BOD_5 of the dye is 0 mg O_2/g.

The bioaccumulation potential of the dye was not investigated because of the very low partition coefficient (log P_{ow} = < -10, calculated) and lipid solubility (<1 mg/kg). Hydrophilic dyes with log P_{ow} < 3 have been shown not to bioaccumulate (3). Also, the large molecular size is likely to inhibit membrane permeability and prevent uptake during exposure (4,5).

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Table 1: Summary of the acute toxicity of Reactive Scarlet 3949 FAT 45170/A

Test	Species (Strain)	Outcome
Acute oral toxicity	Rat (Wistar)	LD_{50}>2000 mg/kg
Acute dermal toxicity	Rat (Wistar)	LD_{50}>2000 mg/kg
Skin irritation	Rabbit (New Zealand White)	No irritation
Eye irritation	Rabbit (New Zealand White)	Slight irritation
Skin sensitisation	Guinea pig (Himalayan spotted)	weak sensitiser

9.1.1 Oral Toxicity (6)

Ten young adult SPF-bred Wistar rats (five/sex) were administered a single oral dose of 2000 mg/kg of Reactive Scarlet 3949 FAT 45170/A by gavage and observed for 14 days. No deaths, clinical signs of toxicity, effects on body weight gain or organ abnormalities were noted. The oral LD_{50} in rats was greater than 2000 mg/kg.

9.1.2 Dermal Toxicity (7)

Ten young adult SPF-bred Wistar rats (five/sex) were dermally treated with 2000 mg/kg of Reactive Scarlet 3949 FAT 45170/A under semi-occlusive dressing for 24 hours. The observation period was 14 days. There were no deaths. Red discolouration of the skin at the application site was noted in all animals through the observation period. This colouration may have resulted from the notified substance staining the skin. The rate of body weight gain was reduced in females. No gross pathological findings were noted at necropsy. The dermal LD_{50} in rats was greater than 2000 mg/kg.

9.1.3 Inhalation Toxicity

No inhalation studies were provided.

9.1.4 Skin Irritation (8)

Three young adult New Zealand White rabbits (two females, one male) received 0.5 g of Reactive Scarlet 3949 FAT 45170/A on the intact skin under semi-occlusive dressing for four hours. No mortalities occurred during the study. No signs of irritation were noted. Red staining of the treated skin by the dye occurred in all animals. The primary irritation index was 0.00. Reactive Scarlet 3949 FAT 45170/A was considered a non-skin irritant in rabbits.

9.1.5 Eye Irritation (9)

Three young adult New Zealand White rabbits (two females, one male) received 0.5 g of Reactive Scarlet 3949 FAT 45170/A into the conjunctival sac of one eye. The treated eyes were not rinsed after 24 hours. Eye irritation was scored at 1, 24, 48 and 72 hours.

Reddish staining of the conjunctivae was noted in the area of the application. In one female the dye was observed in the iris. Conjunctival redness and slight oedema were observed at one and 24 hours. The mean cumulative eye irritation scores were 1.00, 0.67 and 0.00 at 1, 24 and 48 hours, respectively. The scores do not meet the criteria for classification as an eye irritant. No effects on the cornea or iris were observed. The primary ocular score was 0.22, when applied to the conjunctival sac of the rabbit eye. Reactive Scarlet 3949 FAT 45170/A was a slight eye irritant in rabbits.

9.1.6 Skin Sensitisation (10)

The skin sensitisation potential of Reactive Scarlet 3949 FAT 45170/A was studied in Himalayan spotted albino guinea pigs using the Guinea-Pig Maximisation Test (GPMT).

After an irritation screening test, 20 female guinea-pigs were intradermally injected with 0.1 mL of 5% Reactive Scarlet 3949 FAT 45170/A in distilled water. Ten female guinea pigs were used as controls. A 25% solution in distilled water was applied epidermally for 48 hours to the test animals. The test and control animals were challenged two weeks after the epidermal induction application. The solution of 25% Reactive Scarlet 3949 FAT 45170/A in distilled water was epidermally applied for 24 hours.

One of the control animals died during the study. Necropsy of this animal found a dark red discolouration of the lungs.

After the induction injections all animals (including controls) displayed signs of slight irritation. The injection site of treated animals was found to be discoloured red. This effect was also noted in treated animals after epidermal induction. After the challenge application, red discolouration was noted for 24 hours in all animals. No positive reactions were noted in control animals. Two of the treated animals displayed very slight erythematous reactions at 24 hours. Reactive Scarlet 3949 FAT 45170/A was a weak skin sensitiser (10%- Grade II) in guinea-pigs.

9.2 Repeated Dose Toxicity (11)

SPF-bred Wistar rats (five/sex/group) were given repeated doses by gavage of 0, 50, 200 or 1000 mg/kg/day of Reactive Scarlet 3949 FAT 45170/A in distilled water for 28 days. An additional five rats per sex were treated with the vehicle or 1000 mg/kg/day Reactive Scarlet 3949 FAT 45170/A for 28 days and observed for a further 14 days.

No deaths occurred in the study. No signs of clinical toxicity were observed. Higher food consumption was noted for 1000 mg/kg females compared to control females. This trend was also noted in the prestudy period. A corresponding increase in body weights was noted. No apparent treatment-related ophthalmoscopic alterations were noted. Two animals (mid and high dose) displayed corneal opacity at four weeks.

Slight variations in some haematological parameters between control and high dose groups were noted, however, mean values were within the normal ranges derived from historical data for Wistar rats. These variations differed between the sexes. Slight variations in clinical biochemistry parameters (plasma cholesterol and phospholipid concentrations) were noted for the high dose groups compared to controls. These variations were within the historical reference range. A significant increase in bilirubin concentration in plasma was recorded for high dose animals. The authors claim that the high bilirubin readings were due to the red dye colour in the plasma causing spectral interference. Bilirubin reacts with a 2,5-dichloro-phenyldiazonium salt to form a red azo dye that is measured from 540 to 600 nm. The UV/Vis spectrum for Reactive Scarlet 3949 FAT 45170/A had a peak at 502 nm. Some of the absorbance corresponding to the 502 nm peak is measured between 540 and 590 nm and this may interfere with the red azo dye absorbance. No tests were performed to confirm this theory. After the recovery period (14 days) the levels of bilirubin are comparable for high dose and control animals and the red discolouration of the plasma was not observed.

No significant variations to urine parameters were noted. Orange discolouration of the urine was noted in the mid and high dose groups. After the recovery period this discolouration was not noted in the urine of high dose animals.

High dose males had significantly heavier kidneys than control males. After the recovery period no difference between kidney weights of high dose and control males was noted.

Reddish discolouration of the kidneys was noted in mid dose males and high dose rats of both sexes. This alteration was still apparent after 14 days recovery for high dose rats. These alterations correlated with intratubular lipofuscin-like pigment in high dose females and increased severity of tubular hyaline droplets in mid and high dose males. Slight vacuolation of the squamous epithelium of the stomach was noted in all groups.

9.3 Genotoxicity

Table 2: Summary of genotoxicity studies

Test system	Species and strain	Test conditions	Results
Salmonella typhimurium, Reverse mutation assay	*S. typhimurium* (TA1535, TA1537, TA100, TA98)	33.3-5000 µg/plate ± ma*	Negative
Esherichia coli, Reverse mutation assay	*E. coli* (WP2 *uvrA*, WP2)	33.3-5000 µg/plate ± ma*	Negative
Micronucleus test	NMRI mouse	200-2000 mg/kg	Negative
Chromosome aberration assay	Chinese hamster cell line V79	250-5000 µg/mL ± ma*	Positive + ma*

* ma = metabolic activation

9.3.1 *Salmonella typhimurium* and *Escherichia coli* Reverse Mutation Assays (12)

Salmonella typhimurium, strains TA98, TA1537, TA100 and TA1535, and *Escherichia coli*, strains WP2 *uvrA* and WP2, were cultured with 33.3 - 5000 µg/plate of Reactive Scarlet 3949 FAT 45170/A in the absence or presence of metabolic reactivation provided by rat liver S9. Two types of assays were used: the plate incorporation test and the pre-incubation test. The rat liver microsomal fraction (S9) was prepared from male Wistar rats that had been treated with 500 mg/kg of Aroclor 1254 for five days. Reactive Scarlet 3949 FAT 45170/A was dissolved in water. An untreated control and a solvent control were used. Sodium azide, 4-nitro-*o*-phenylene-diamine, methylmethane sulphonate and 2-aminoanthracene were used as the positive controls.

There were no dose-related or significant increases in the number of revertant colonies in any of the six test strains used, either in the presence or absence of metabolic activation. The positive controls behaved as expected. Under the test condition, Reactive Scarlet 3949 FAT 45170/A was not mutagenic in the *S. typhimurium* and *E. coli* reverse mutation assays.

9.3.2 Micronucleus Test (13)

NMRI mice (five/sex/dose) received an oral dose by gavage of 0, 200, 700 or 2000 (two groups) mg/kg in Reactive Scarlet 3949 FAT 45170/A in water. Bone marrow cells were collected 24 hours after administration for all groups, except the repeat high dose group. For the repeat high dose group bone marrow cells were obtained 48 hours after dosing. Cyclophosphamide was used as a positive control.

No signs of toxicity were noted. There was no increase in the proportion of normochromatic erythrocytes, indicating that Reactive Scarlet 3949 FAT 45170/A was not toxic to bone marrow cells. There was no increase in the frequency of

detected micronuclei for any test group compared to the negative control group. The positive control group showed an increased frequency of induced micronuclei. Reactive Scarlet 3949 FAT 45170/A did not induce micronuclei formation in bone marrow cells of mice.

9.3.3 *In vitro* chromosomal aberration assay (14)

V79 Chinese hamster cells were treated with 250 to 5000 µg/mL Reactive Scarlet 3949 FAT 45170/A. A series of three experiments were performed, with chromosomal preparations being made either 18 or 28 hours after treatment. These experiments were performed either in the presence or absence of metabolic activation. For metabolic activation, a microsomal liver fraction (S9) was prepared from male Wistar rats that had been treated with 500 mg/kg of Aroclor 1254 for five days. A culture medium (solvent for dissolving the test substance) was used as a negative control. Ethylmethane sulphonate (EMS) and cyclophosphamide (CPA) were used as positive controls for the experiments without and with metabolic activation, respectively.

Slight toxic effects were noted at doses of 2500 and 5000 mg/mL in the absence of metabolic activation. In the absence of metabolic activation no significant increases in the frequency of chromosomal aberrations were noted for treated groups. In the presence of metabolic activation significant increases in the frequency of chromosomal aberrations (excluding gaps) were noted at doses of 2500, 3000 and 3500 µg/mL at both 18 and 28 hours post-exposure, but not at 4000 or 5000 µg/mL. Chromatid aberrations were the main type of abnormality, however, increased chromosome aberrations were also reported. The effect was most pronounced at 2500 µg/mL. The positive controls behaved as expected. No biologically relevant increases in the occurrence of polyploid metaphases were noted. This study indicated that Reactive Scarlet 3949 FAT 45170/A has some clastogenic activity *in vitro*.

9.4 Overall Assessment of Toxicological Data

The acute toxicity of Reactive Scarlet 3949 FAT 45170/A was low (LD_{50} > 2000 mg/kg) when applied orally and dermally. No data on the hazard of inhaling this dye was presented. As the proportion of the notified substance below 40 micrometers in diameter is less than 1%, only a small fraction will be respirable. Reactive Scarlet 3949 FAT 45170/A caused no dermal irritation, however, slight ocular irritation was noted. Repeat-dose oral toxicity was mainly confined to the kidney. This dye did not induce gene mutation in bacteria or micronuclei in polychromatic erythrocytes in the bone marrow of mice. However, Reactive Scarlet 3949 FAT 45170/A consistently induced chromosomal aberrations *in vitro* at relatively high concentrations but with no dose-relationship. The genotoxic potential is therefore judged to be low.

The notified chemical is not classified as hazardous according to Worksafe Approved Criteria for Classifying Hazardous Substances (15) in relation to the toxicity data provided.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The following ecotoxicity studies have been provided.

Table 3

Test	Species	Result
Acute toxicity	Zebra fish	96h LC_{50} > 327 mg/L NOEC = 327 mg/L
Acute toxicity	Daphnia magna	48h EC_{50} > 184 mg/L NOEC = 184 mg/L
Growth inhibition	Green algae (*Scendesmus subspicatus*	72h EC_{50} = 18.8 mg/L NOEC = 3.2 mg/L
Growth inhibition	Bacteria from activated sludge	3h IC_{50} · 320 mg/L

The above studies were conducted according to OECD test guidelines. The dye is practically non-toxic to fish, aquatic invertebrates and sewage microorganisms. Slight aligstatic effects (i.e. growth inhibition) were noted. However, data provided by the notifier in a previous submission for a similar chemical, indicate that this effect may not be due to toxicity but rather reductions in the quality or quantity of light transmitted to the algae in the dye solution.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

As indicated above, 95% of the dye is fixed in the dyeing process, thus 5% of the applied dye could be discharged into effluents at the dyehouses where it is used. The notifier has provided predicted environmental concentrations (see table below) based on the worst cases where the receiving waters from sewage treatment paints are expected to provide the lowest dilution.

For city dyehouses the dilution factor of sewage treatment plant discharge to the receiving waters is likely to exceed 100.

For country dyehouses where annual consumption is high, approximately one tonne per year is likely to be consumed (worst-case situation). The wastewater from one dyehouse effluent system passes to the local sewage treatment plant. The volume of effluent handled by these works in dry-weather conditions is 5 ML per day. Therefore, dilution in these works is estimated to be 1:3 based on 2 ML per day as total discharge from the dyehouse. This effluent will be diluted by mixing with at least 5 ML per day in the sewage treatment plant. The sewage treatment plant discharges to receiving waters with a dilution factor of 1:3.

For country dyehouses where the annual consumption of dyestuff is low, a conservative volume of 2 ML of dyehouse effluent per day has been used in PEC calculations. This volume could often be 4 ML per day. A conservative value of 1:3 has been used for the dilution factor into receiving waters. This implies a dry-weather flow of only 18 ML per day in the river at the outlet of the sewage treatment plant.

Table 4 Estimation of Predicted Environmental Concentration

Process or dilution factor	City dyehouse	Country dyehouse - high dye use	Country dyehouse - low dye use
Typical use of dye expected per day	30 kg	30 kg	15.0 kg
Quantity in wash water (at a fixation rate of 95%)	1.5 kg	1.5 kg	0.75 kg
Quantity of water used including wash-off water (at 100 L/kg)	200,000 L	200,000 L	100,000 L
Effluent concentration in dye-specific wash-water	7.5 mg/L	7.5 mg/L	7.5 mg/L
Dilution factor in dyehouse by other wash-waters	1:11.5 (2.5 ML/day effluent)	1:9 (2 ML/day effluent)	1:19 (2 - 4 ML/day effluent)
Influent concentration	600 µg/L	750 µg/L	380 µg/L
Dilution factor in sewage treatment plant	1:100	1:3	1:2
Concentration balance in effluent from sewage treatment plant No removal of dye in sludge: 50% removal of dye in sludge:	 6 µg/L 3 µg/L	 250 µg/L 125 µg/L	190 µg/L 95 µg/L
Dilution factor in receiving waters	1:3 to 1:10	1:3	1:3
Predicted environmental concentration in receiving waters No removal of dye in sludge: 50% removal of dye in sludge:	 2 - 0.6 µg/L 1 - 0.3 µg/L	 84 µg/L 42 µg/L	 64 µg/L 32 µg/L
Safety factor* for exposure of most sensitive aquatic organism (Algae, *Scenedesmus subspicatus*, for growth inhibition: EC_{50} = 18.8 mg/L)	9400 to 31300	223	294

* The safety factor is the highest PEC divided by the lowest EC_{50}.

The above PECs indicate that the dye is unlikely to present a hazard to aquatic organisms. Although the algal species tested is considered by the US EPA to be insensitive (16), the notifier has provided information for similar dyes that the growth inhibition effect of the dye on algae is a function of decreased light intensity or change in light quality reaching the algae in the coloured media. In any event, the dye's high solubility suggests that once released to the waterways, dilution would be expected to swiftly reduce the environmental concentration to undetectable levels. The substance is not expected to reach the terrestrial compartment in any significant amounts, nor have any impact on terrestrial (soil) organisms.

Spills of the dye should not present an environmental hazard when cleaned up according to the MSDS.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Reactive Scarlet 3949 FAT 45170/A was of low acute toxicity, was not a dermal irritant but exhibited slight ocular irritation. Repeat-dose oral toxicity was low and the notified chemical exhibited low levels of sensitisation. The dye was not mutagenic but was weakly genotoxic. Based on the toxicological data given, FAT 45170/A is not classed as hazardous according to Worksafe Australia criteria.

The levels of exposure to Reactive Scarlet 3949 FAT 45170/A during shipping and transport to the warehouse is expected to be negligible as the notified chemical will be in a lined sealed container. Significant exposure to the notified chemical via the dermal or oral route is only likely in the event of a spill.

There is a limited amount of handling of the dye due to the use of closed systems. Local exhaust ventilation is normally used during weighing processes and down draft air systems and a booth is used when repackaging is necessary. It is expected that only four workers at each of the eight dyehouses will be exposed directly to Reactive Scarlet 3949 FAT 45170/A during their work, and that the remaining workers will be using the dye in closed systems. Those exposed to Reactive Scarlet 3949 FAT 45170/A may make contact with the dissolved dye via skin or eye contact at a maximum of 4 mg/kg/day.

When used under the conditions described by the notifier, Reactive Scarlet 3949 FAT 45170/A presents a low risk to those working with the chemical. Public exposure to the onbound dye is expected to be negligible. The proposed use of the notified chemical is not expected to pose a significant hazard to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to Reactive Scarlet 3949 FAT 45170/A the following guidelines and precautions should be observed:

. if engineering controls and work practices are insufficient to reduce exposure to Reactive Scarlet 3949 FAT 45170/A to a safe level, then the following personal protective equipment which conforms to Australian Standard (AS) or Australian/New Zealand Standard (AS/NZS) should be worn:

the appropriate respiratory device should be selected and used in accordance to AS/NZS 1715 (17) and should comply to AS/NZS 1716 (18).

eye protection should be selected and fitted in accordance to AS 1336 (19) to comply with AS/NZS 1337 (20).

industrial clothing must conform to the specifications detailed in AS 2919 (21).

industrial gloves or mittens should conform to AS 2161 (22).

all occupational footwear should conform to AS/NZS 2210 (23).

spillage of the notified chemical should be avoided.

good personal hygiene should be practised to minimise the potential for ingestion.

a copy of the Material Safety Data Sheet should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for Reactive Scarlet 3949 FAT 45170/A was provided in Worksafe Australia format (24).

This MSDS was provided by Ciba-Geigy Australia Pty Ltd as part of their notification statement. The accuracy of this information remains the responsibility of Ciba-Geigy Australia Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Reactive Scarlet 3949 FAT 45170/A shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

1. Reference 25 in Hobbs, S, *Industry Category Document: UK Dye Production and Use in the Textile Industry*, UK Department of the Environment (/38), July 1988.

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3. Yen CP, Perenich TA and Baughman GL, 1991, *Environmental Toxicology and Chemistry*, **10**, 1009-1017.

4. Anliker *et al.* 1988. *Chemosphere*, **17**, 1631-1644.

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6. Crouch, CN, 1994, Acute oral toxicity with FAT 45'170/A in rats. RCC, Research and Consulting Company, Ltd (Füllinsdorf, Switzerland), Study No: 375276.

7. Crouch, CN, 1994, Acute dermal toxicity with FAT 45'170/A in rats. RCC, Research and Consulting Company, Ltd (Füllinsdorf, Switzerland), Study No: 375287.

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