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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**LUPRINTOL TX 4558**

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Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT**

**LUPRINTOL TX 4558**

**1. APPLICANT**

BASF Australia Ltd., 500 Princes Highway, Noble Park, Victoria 3174.

**2. IDENTITY OF THE CHEMICAL**

**Trade names:** Luprintol TX 4558; Luprintol PE New; Luprintol PEF  
(these trade names refer to the commercial product which consists of an aqueous solution of the notified polymer.)

Based on the nature of the chemical and the data provided, Luprintol TX 4558 is considered to be non-hazardous. Therefore the chemical name, synonym, Chemical Abstract Service (CAS) Registry Number:, empirical and structural formula, number-average and weight-average molecular weight, maximum percentage of low molecular weight species; and monomer details, have been exempted from publication in the Full Public Report and Summary Report.

**3. METHODS OF DETECTION AND DETERMINATION**

Infra-red Spectroscopy; Nuclear Magnetic Resonance Spectroscopy

**Spectral data:**

sample: in potassium bromide (KBr)

major absorption wavenumbers for identification: 3424.1 cm<sup>-1</sup>; 2879.1 cm<sup>-1</sup>; 1642.6 cm<sup>-1</sup>; 1479.4 cm<sup>-1</sup>; 1351.2 cm<sup>-1</sup>; 1259.1 cm<sup>-1</sup>; 1106.2 cm<sup>-1</sup>; 1032.2 cm<sup>-1</sup>; 852.9 cm<sup>-1</sup>

Nuclear Magnetic Resonance (NMR) spectral data were also provided.

#### **4. PHYSICAL AND CHEMICAL PROPERTIES**

The following data were determined from tests with Luprintol TX 4558 which is an aqueous solution of the notified polymer. Therefore, certain values given below are due to the presence of water, as indicated in brackets.

<b>Appearance:</b>	light brown liquid
<b>Melting point:</b>	approximately -3°C (water)
<b>Boiling point:</b>	approximately 100°C (water)
<b>Specific gravity:</b>	approximately 1.1 @ 20°C
<b>Vapour pressure:</b>	approximately 2.3 kPa @ 20°C (water)
<b>Water solubility:</b>	completely miscible in water at any ratio @ 20°C
<b>Partition coefficient log P<sub>o/w</sub>:</b>	<0
<b>Hydrolysis:</b>	not hydrolysable
<b>Adsorption/Desorption:</b>	poor soil adsorption
<b>Dissociation constant:</b>	does not dissociate in water
<b>Flash point:</b>	>100°C (DIN 51 758)
<b>Flammability:</b>	not flammable
<b>Autoignition temperature:</b>	>200°C (DIN 51 794)
<b>Explosive potential:</b>	not explosive

**Reactivity:** no incompatible substances,  
hazardous decomposition products or  
hazardous reactions have been  
observed with this chemical.

## 5. PURITY OF THE CHEMICAL

**Degree of purity of the notified polymer:** approx. 66.1%  
w/w

### **Toxic or hazardous impurities:**

- a) **Chemical name:** oxirane  
**Synonyms:** anprolene; epoxyethane; ethylene oxide  
**CAS No:** 75-21-8  
**Maximum residual:** <0.0001% w/w  
**Toxic properties:** tumorigen; mutagen; reproductive-  
effector; skin and eye irritant (1)
- b) **Chemical name:** epichlorohydrin  
**Synonyms:** 1-chloro-2,3-epoxypropane; 3-chloro-1,2-  
epoxypropane; (chloromethyl)ethylene  
oxide; chloromethyloxirane; 2-  
(chloromethyl)oxirane; 3-chloro-1,2-  
propane oxide; chloropropylene oxide;  
gamma-chloropropylene oxide; 3-chloro-  
1,2-propylene oxide; 1,2-epoxy-3-  
chloropropane; 2,3-epoxypropyl chloride;  
glycerol epichlorohydrin; oxirane, 2-  
(chloromethyl))-  
**CAS No:** 106-89-8  
**Maximum residual:** <0.0001% w/w  
**Toxic properties:** tumorigen; mutagen; reproductive-  
effector; skin and eye irritant (1)

**Non-hazardous impurities: (>1% w/w):** not known

## **Additives/ Adjuvants:**

- a)    **Chemical name:**            water  
      **Synonym:**                    hydrogen oxide  
      **CAS No:**                     7732-18-5  
      **Weight percentage:**   approx. 10.2% w/w

**Maximum content of residual monomer:**      <0.0001% w/w

## **6.    INDUSTRIAL USE**

The notified polymer will be imported as an 89.8% aqueous solution, Luprintol TX 4558, which will be used exclusively as a non-ionic dispersing agent and/or emulsifier for textile auxiliaries. It is estimated that greater than one tonne per year of Luprintol TX 4558 will be imported in the first five years.

## **7.    PUBLIC EXPOSURE**

The potential for public exposure to the notified polymer is expected to be very low under normal use conditions. No significant risk of public exposure is anticipated during transport as it will be contained in secure containers. Moreover, it will only be available for industrial use and Luprintol TX 4558 will be used at very low concentrations (0.5 - 1%) in print pastes. It will be disposed by incineration at an approved industrial facility with small quantities disposed together with other industrial wastes to a regulated landfill.

## **8.    OCCUPATIONAL EXPOSURE**

### **Process description**

#### **.    Reformulation**

Luprintol TX 4558 will be added to print paste at a level of 0.5 - 1%. It will be pumped into an open mixing vessel in which it

will be mixed with other raw ingredients to make up a one tonne batch of print paste. In a small factory environment, mixing will be done manually but in a large factory, automatic mixers will be used. The final print paste will be a white, very viscous paste with a faint ammonia odour.

## . **Printing**

The paste will be used in textile printing using the print-dry-cure process. Depending on the size of the operation, the print paste together with textile dyes will be either pumped or manually placed onto a silk screen. A blade pushes the paste and dye across the screen which then imparts a print onto the fabric underneath. The fabric is then left to dry in ovens at temperatures up to 120°C or by simple air drying. Curing is then carried out at temperatures ranging from 150°C to 170°C for 3 to 5 minutes.

## **Worker exposure**

Luprintol TX 4558 will be transported and stored in robust sealable containers. It is therefore anticipated that significant risk of exposure from accidental spillage during transport or storage is unlikely.

The notifier states that workers involved with the printing process are usually the same persons who mix the print paste. These workers may come into direct contact with the notified polymer if engineering controls, personal protection measures and good work practices to avoid spillages or splashings are not implemented. Before reformulation, if precautions to minimise contact are not taken, the exposure of workers to the notified polymer may be high. Exposure will be very low after reformulation due to the small amount of polymer used in the print paste.

The major route of direct contact will be dermal. As the notified polymer is of high molecular weight, it is unlikely to cross biological membranes.

## **9. ENVIRONMENTAL EXPOSURE**

### **9.1 Release**

The notified polymer will be used at varying levels in textile mills in metropolitan New South Wales, Victoria and Tasmania, as well as in country Victoria.

Most of the notified polymer will be attached to textiles, but some of the water based print paste containing 0.5 to 1.0 % Luprintol TX 4558 will enter the sewer with the washings from print screens and mixing vessels. Some material will also be released from the washing of the empty 120 kg drums and 1000 kg bulk containers. Up to 3% of the annual use of Luprintol TX 4558, amounting to around 600 kg of the notified polymer, is estimated to enter effluent treatment plants.

Effluent from users will undergo various treatments:

- . primary treatment with discharge into the ocean;
- . secondary treatment with discharge into enclosed waters or oceans; and
- . chemical treatment and discharge into streams and rivers in country areas.

### **9.2 Fate**

Due to its high solubility and lack of significant adsorption characteristics, the notified polymer is likely to be freely dispersed in the water compartment.

The notifier has forwarded biodegradation data (2, 3) obtained using the OECD tests 301C (4) and 302B (5) ( modified Zahn-Wellens Test). Results from testing a similar chemical, Luprintol PE, (2) show <20% elimination, presumably over 28 days, suggesting that the notified polymer is not readily biodegradable. However, the details of the test are very brief.

The latter test (3) using Luprintol TX 4558 shows a 40% decrease in chemical oxygen demand after 28 days, indicating "inherent biodegradability" according to the OECD definition (5). However, closer examination of the results shows that a plateau was

reached at 30% decrease after about 10 days, indicating a virtual cessation from this point.

Ready biodegradability tests are performed under very stringent conditions. The Zahn-Wellens Test is one of the tests at the next level, performed under more favourable conditions (high biomass and concentration). The reaching of a plateau is suggestive of some breakdown to a more persistent degradation product, similar to that which occurs with nonyl phenol ethoxylate (6).

The notified polymer is therefore not expected to significantly degrade during sewer treatment, particularly in metropolitan Sydney, and will thus enter receiving waters largely unchanged. The fate of any of the persistent metabolites formed is unclear.

As indicated by its high water solubility, the notified polymer is unlikely to exhibit a bioaccumulative tendency in spite of its possible persistence.

## **10. EVALUATION OF TOXICOLOGICAL DATA**

As the notified polymer is a new synthetic polymer with number-average molecular weight greater than 1000, according to the *Industrial Chemicals (Notification and Assessment) Act 1989*, toxicological data specified in Part C of the Schedule are not required to be submitted for assessment.

However, based on a similar polymer found in a previously used product, Luprintol PE, it is likely that Luprintol TX 4558 in its undiluted form, may demonstrate in laboratory animals low acute oral toxicity (7) slight to moderate eye irritant effects (8) and/or slight skin irritant effects (9).

## **11. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

The notifier has included in the notification statement, toxicity data on Luprintol PE\* and Luprintol TX 4558\*\*, as indicated by asterisks (\*) below:



Table 2 Summary of ecotoxicity of Luprintol PE and Luprintol TX  
4558

Test	LC <sub>50</sub> (mg/L)	NOEC (mg/L)	EC <sub>10</sub> (mg/L)	Ref
Golden orfe (96h) * 10	>1000	<2200	1000	-
Rainbow trout (48h) * 11	100-500	100	-	
Rainbow trout (48h) **	100-200	100	-	12
Bacteria ( <i>Pseudomonas putida</i> ) *	-	-	>10000	13

Only the golden orfe test was submitted in full. This test was performed under static conditions and nominal concentrations (note some undissolved material was visible at the bottom of the aquarium). Brief details only are available for the bacteria test while the rainbow trout results are mentioned only in the Material Safety Data Sheet (MSDS). The toxicity data indicate that the notified polymer is practically non-toxic to fish.

The low toxicity to microorganisms indicate that activated sludge activity in biological waste treatment plants is unlikely to be significantly affected. Testing of Luprintol PE is also stated not to inhibit "breathing of the activated sludge up to the test concentration of 1000 mg/L".

## 12. ASSESSMENT OF ENVIRONMENTAL HAZARD

Under normal usage, the notified polymer is likely to remain predominantly in the water compartment. Its molecular weight, high water solubility and low biodegradability, may lead to a higher hazard than a standard high molecular weight polymer.

Its major entry will be to sewage treatment plants as dilute solutions arising from the washings of print screens, mixing

vessels and emptied containers. Depending on the user situation and flow rates of the receiving waters, two receiving water concentrations of the notified polymer, ("best" and "worst" cases), can be derived. These calculations assume continuous rather than batchwise production and no breakdown or removal in the sewer:

*"Best case" - Large scale user, 250 ML per day flow rate*

Max. annual use: 7000 kg/site

Max. annual discharge (3%): 210 kg

Max. daily discharge: 0.7 kg  
(300 days/ year of production)

Max. final concentration =  $\frac{0.7}{250 \times 10^6} = 2.8 \text{ ppb}$

*"Worst case" - Small scale user, 4ML per day flow rate*

Max. annual use: 1000  
kg/site

Max. annual discharge: 30 kg

Max. daily discharge: 0.1 kg  
(300 days/year of production)

Max. final concentration =  $\frac{0.1}{4 \times 10^6} = 25 \text{ ppb}$

The "best case" assumptions approximately describe the outcome from use of the notified polymer by major users in metropolitan areas. The "worst case" scenario applies to country Victoria.

These calculations show that the receiving water concentrations of the notified polymer (under each scenario), are likely to be several orders of magnitude less than the fish toxicity levels.

Batchwise production and 50 days use in a low flow case may result in a concentration of 150 ppb of the notified polymer in

the receiving water which is still several orders of magnitude below fish toxicity levels.

Thus the notified polymer is likely to constitute a minimum environmental hazard.

### **13. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS**

The notified polymer in Luprintol TX 4558 has a molecular weight of >1000 and a partition coefficient in octanol/water of <0. Therefore it is unlikely to cross biological membranes to bring about systemic effects. However, low molecular weight (<1000) species which are present at approximately 33.9% w/w have the potential to cross biological membranes. The level of the impurities, oxirane and epichlorohydrin, (<0.0002% w/w in total) is too low for them to be of any toxicological concern. Based on Luprintol PE and due to its detergent like activity, it is possible for Luprintol TX 4558 to exhibit eye and/or skin irritant effects especially in its undiluted form.

As the shelf-life of Luprintol PE is practically unlimited, according to the notifier, Luprintol TX 4558 is expected to exhibit a similar degree of stability. However, the notifier has also reported on the degradation products of the notified polymer.

Based on Luprintol PE, precautions to minimise contact are recommended when the undiluted form is being handled or used, or during prolonged contact with the notified polymer.

No work-related injuries or diseases have been reported and the notified polymer is not known to have caused or aggravated any health conditions. However, the notifier has warned that prolonged skin contact may cause irritation.

The notified polymer has low vapour pressure, is not highly flammable, nor explosive and is stable at room temperature. Therefore, under normal use, this polymer is not expected to pose any significant safety hazard to workers.

Due to low public exposure during normal use conditions, the notified polymer is not expected to pose any significant health or safety hazard to the public.

#### 14. **RECOMMENDATIONS**

To minimise worker exposure to Luprintol TX 4558, the following guidelines and precautions should be observed:

suitable personal protective equipment which comply with Australian Standards (AS) should be worn such as:

- . splash proof goggles (AS 1337) - *Eye Protectors for Industrial Applications* (14), when handling the undiluted form of the product;
- . impervious gloves (AS 2161) - *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)* (15) when contact with the undiluted form of the product is possible and during prolonged skin contact;
- . should splashing be anticipated, impervious clothing;

good work practices should be implemented to avoid splashings or spillages;

storage should be in robust sealable containers;

good housekeeping and maintenance should be practised. Spillages should be cleaned up promptly with absorbents which should then be disposed in the appropriate manner in accordance with local regulations;

- . the work place should be well ventilated;

good personal hygiene should be observed; and

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

## **15. ASSESSMENT OF MATERIAL SAFETY DATA SHEET (MSDS)**

The Material Safety Data Sheet (MSDS) for Luprintol TX 4558 (Attachment 1) was provided in Worksafe Australia format (16). This MSDS was provided by BASF Australia Ltd. as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of BASF Australia Ltd.

## **16. REQUIREMENTS FOR SECONDARY NOTIFICATION**

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of Luprintol TX 4558 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

## **17. REFERENCES**

1. Registry of Toxic Effects of Chemical Substances (RTECS) database, 1991.
2. BASF Aktiengesellschaft, FRG, data on file, 1989.
3. BASF Aktiengesellschaft, FRG, "Determination of the COD and BOD values; determination of eliminability". Data on file, Test No: 080191/09/J1210, 1991.
4. *OECD Guidelines for Testing Chemicals*, "Ready Biodegradability: Modified MITI Test (I)" No: 301C, 1981.
5. *OECD Guidelines for Testing Chemicals*, "Inherent Biodegradability: Modified Zahn-Wellens Test" No:302B, 1981.
6. Giger, W. and Ahel, M., Proceedings from the Seminar on Nonylphenolethoxylates (NPE) and Nonylphenol (NP), Swedish Environment Protection Agency, 1991.
7. BASF Aktiengesellschaft, FRG, "Acute Oral Toxicity". Data on file, Project No: 10A0259/881088, 1988.

8. BASF Aktiengesellschaft, FRG, "Acute Eye Irritation". Data on file, Project No: 11H0259/882130, 1988.
9. BASF Aktiengesellschaft, FRG, "Acute Skin Irritation/Corrosivity". Data on file, Project No: 18H0259/882129, 1988.
10. BASF Aktiengesellschaft, FRG, "Report on the Test of the Acute Toxicity on Golden Orfe". Data on file, Report No: 10F0259/885199, 1988.
11. BASF Aktiengesellschaft, FRG, Material Safety Data Sheet for Luprintol PE, 1991.
12. BASF Aktiengesellschaft, FRG, Material Safety Data Sheet, for Luprintol TX 4558, 1991.
13. BASF Aktiengesellschaft, FRG, "Determination of bacteria toxicity for the determination water pollution classification". Data on file, Eco-number: 01/89/2014, 1990.
14. Australian Standard 1337 - 1984, *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, 1984.
15. Australian Standard 2161 - 1978, *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, 1978.
16. National Occupational Health and Safety Commission, *Guidance Note for the Completion of a Material Safety Data Sheet*, 3rd Edition, AGPS, Canberra, 1991.