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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME

**FULL PUBLIC REPORT**

**ALCOSIST NRL**

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Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT****Alcosist NRL****1. importer**

Allied Colloids (Australia), Donaldson Street, Wyong, NSW, 2259

**2. identity of the chemical**

**Other Names:** Alkyl aryl polyoxyethylene ammonium chloride.

**Trade Name:** Alcosist NRL

**Molecular Weight:** > 1000 NAMW.

**3. PHYSICAL AND CHEMICAL PROPERTIES**

Alcosist NRL is presented as an aqueous product. It is an amber liquid at ambient conditions. Physical and chemical properties include:

**Boiling Point:** water boils off above 102° (product), the polymer decomposes >200°.

**Density:** 1.08 g/cm<sup>3</sup> - polymer.  
1.03 g/cm<sup>3</sup> - product.

**Vapour pressure:** 0.6 kPa.

**Water solubility:** miscible with water. Water solubility > 1000 g/l.

**Hydrolysis:** Data was not provided on the grounds that the substance does not contain any groups which will hydrolyse. This is acceptable given that the substance is used in conjunction with acids, alkalis and electrolytes without loss of function.

**Partition coefficient:** No data were provided for partition coefficient on the grounds that the product is surface active. This is acceptable given that the substance is highly water soluble, indicative of low partitioning into octanol.

**Dissociation constant:** pKa = 9.751, 7.434 and 4.499. The company has provided explanations for the dissociation constant data. The pKa values 9.751 and 4.499 should be ignored as they are a function of acid and alkali added during the titration. The pKa value 7.434 is derived from unquaternised amine and triethanolamine and is from the joint titration of the two bases.

#### 4. PURITY OF THE CHEMICAL

**Degree of Purity of product:** approx 88%. the as supplied product contains approx 25% polymer.

**Toxic or hazardous impurities:** residual impurities total less than 2%.

**Non-hazardous impurities** none. The remaining component is water.

**Adjuvant:** 2.6%

#### 5. INDUSTRIAL USE

The notified chemical is used in the form of a solution in the dyeing of nylon at a low concentration (0.5 - 2%) in dye baths. It will be imported in amounts of 24 - 40 tonnes/year for the first five years.

## **6. OCCUPATIONAL EXPOSURE**

It is estimated that up to 50 workers ranging from dye storemen, dyers and dye house managers may be exposed to the chemical.

The most likely route of exposure is dermal. Volatility is expected to be low and therefore there would not be significant inhalational exposure. Splashing or spills may result in skin or eye contact.

General training and provision of safety information is proposed. No specific training is recommended for those working with this substance.

## **7. PUBLIC EXPOSURE**

Public exposure to Alcosist NRL is possible via three sources

- . through release into the environment in industrial effluent,
- . through exposure to textile fabrics treated with the product and
- . through release due to an industrial/transportation accident.

However, the product is used at low concentrations (0.5-2%) in the dyeing process, levels in industrial effluent are reported to be very low and the product is non volatile. Further, only minimal retention of the product by textile fibres is reported and no adverse effects have been reported in the U.K., where the product has been in use for 10 years.

## **8. ENVIRONMENTAL EXPOSURE**

### **Environmental Fate**

#### **Release**

The substance is imported, transported and stored in 200 kg plastic closed top drums.

Alcosist NRL is an aqueous 25% active solution. Therefore, as the product is used at a maximum concentration of 2% in the dyebath,

the active constituent would be present at a maximum concentration of 0.5%. It is expected that 60-80% of the substance will be retained on the fibres being dyed, giving a maximum level of 0.2% in the dyebath which will be discharged to sewer.

The notifier has indicated that two plants will be potential users of the product.

One plant, with a coastal location, has a daily effluent discharge to sewer of 100 kL.day<sup>-1</sup>, with 15 kL containing a maximum concentration of 0.2% active constituent. As the local sewage treatment plant has an average daily flow of 600 ML.day<sup>-1</sup>, the maximum concentration of active constituent entering receiving waters will be 0.05 ppb.

The other plant, with an inland location, has a daily discharge to sewer of 20 kL.day<sup>-1</sup> with 3 kL containing the product. As the local sewage treatment plant has an average daily flow of 20 ML.day<sup>-1</sup>, the maximum concentration of active constituent entering receiving waters will be 0.3 ppb.

In the unlikely event of a spillage or product contamination, disposal would be carried out by an authorised contractor under conditions controlled by the State Pollution Control Commission.

### **Fate**

The notifier has provided data for biodegradability of the substance. As the ratio of Biochemical Oxygen Demand to Chemical Oxygen Demand is 0.05, moderate biodegradability may be assumed (3).

The notifier states that the product is hydrolytically stable, as it does not contain any groups which will hydrolyse. Given that Alcosist NRL is used in dyebaths with a wide range of pH values and is stated to be stable to acids, alkalis and electrolytes, it is unlikely to undergo abiotic degradation before or after sewage treatment.

The notified substance's high water solubility and stated surface active properties indicate that bioaccumulation is unlikely in the aquatic environment.

## **9. ASSESSMENT OF TOXICOLOGICAL DATA**

Toxicological testing has not been carried out on Alcocist NRL. This is acceptable for polymers with a NAMW >1000. Given that the compound is a polymer with a high molecular weight, absorption is expected to be low. One of the impurities present as a residual impurity at 1.7% is a skin and eye irritant. Otherwise residual impurities are present in sufficiently low quantities to be considered not to present a toxicological hazard.

The adjuvant, present in the product at 2.6%, is a skin and eye irritant and is a skin sensitiser. It has been reported to be tumorigenic in mice and to cause liver and kidney damage in animals on chronic exposure.

## **10. Environmental Effects**

No ecotoxicological data were provided, which is acceptable for polymers of NAMW > 1000.

The notifier has provided the result ( $LC_{50} 96h = 1.3 \text{ mg.L}^{-1}$ ) from a 96 hour acute toxicity test on rainbow trout exposed to ethoxylated amine, a starting material in the manufacture of the notified substance. It expects the notified substance to have similar toxicity in the low ppm range.

There is literature support for the above prediction, most quaternary ammonium compounds are acutely toxic to aquatic organisms at concentrations between 0.5 and 10  $\text{mg.L}^{-1}$  while some may be acutely toxic at concentrations below 0.3  $\text{mg.L}^{-1}$  (4). Toxicity arises because quaternary ammonium compounds, if tested for fish toxicity in deionised water will, through ionic interactions, bind readily to gills. This can give rise to toxic effects due to reduction of oxygen transfer across damaged membranes or through effects on the ionic balance. However, the literature records that toxicity is greatly reduced in the environment because of preferential binding to dissolved organics in surface water (5).

## **11. Assessment of environmental hazards**

The main route of environmental exposure for the notified substance will occur when unfixed dyeing agent in the effluent from sewage plants is released to the aquatic compartment where it may persist given its hydrolytic stability, although not in its free state given its expected propensity to bind to dissolved organics.

The notifier predicts that the maximum environmental concentration of Alcosist NRL in receiving waters will be 0.05 ppb for the coastal plant and 0.3 ppb for the inland plant. If the substance's toxicity to aquatic organisms is less than 0.3 mg.L<sup>-1</sup> (4), the safety factor in inland situations will be less than 1000. As we are considering concentrations of substance entering receiving waters, an additional dilution together with expected binding to dissolved material in water should provide an adequate safety margin.

The potential hazard is greater in inland areas because of the lower volume of discharge from the sewage plant and receiving waters but, at these concentrations, the environmental hazard posed by the notified substance is likely to be insignificant.

## **12. RECOMMENDATIONS for the control of occupational exposure**

To minimise exposure to Alcosist NRL the following precautions and guidelines should be observed.

- . As good work practice, all precautions should be taken to minimise splashing and to minimise skin contact with Alcosist NRL while mixing and applying.
- . Workers using Alcosist NRL or products containing it should receive a material safety data sheet.

Workers engaged in operations where splashing is possible should wear goggles which conform to *Australian Standard number 1337 - 1984* (6) to prevent eye contact.

- . Workers handling the chemical should wear appropriate gloves which conform to *Australian Standard number 2161-1978* (7) and any other protective clothing required to prevent skin contact.

### 13. material safety data sheet

The material safety data sheet for Alcocist NRL is in accordance with the Worksafe Australia format (8).

### 14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals Notification and Assessment Act 1989* (the Act), secondary notification of Alcosist NRL will be required if any of the circumstances stipulated under section 64 (2) of the Act arise.

### REFERENCES

- (1) Sax, Irving and Lewis RJ Sr Dangerous Properties of Industrial Materials. 6th Edition, Van Nostrand Reinhold, New York (1984).
- (2) RTECS (Registry of Toxic Effects of Chemical Substances) US Department of Health and Human Services (NIOSH).
- (3). Lyman W J (et al) (1982), Handbook of Chemical Property Estimation Methods - Environmental Behaviour of Organic Compounds, p9-63.
- (4) USEPA Environmental Effects Branch, Health and Environmental Review Division, (1984), Generic Assessment of Ecological Effects of Quaternary Ammonium Compounds.
- (5). M S Goodrich, L H Dulak, M A Friedman and J J Lech, Environmental Toxicology and Chemistry, 1991, **10**, 509-515.
- (6) Australian Standard 1337-1984 *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ, Sydney 1984.
- (7) Australian Standard 2161-1978 *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ, Sydney 1978.
- (8) Guidance Note for Completion of a Material Safety Data Sheet. [NOHSC : 3001 (1991)], 3rd Edition, October 1991.