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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

REZIMAC 2710

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

REZIMAC 2710

1. IMPORTER

Dulux Australia, McNaughton Road, Clayton, Victoria 3168.

2. IDENTITY OF THE CHEMICAL

Trade name: Rezimac 2710

[Rezimac 2710 is a reaction product which contains a new chemical entity an alkyd polymer (30-60% w/w) in a solvent mixture of xylene (30-60% w/w) and ethyl benzene (10-30% w/w)]

The new polymer is unlikely to be hazardous to health as its high molecular weight (> 1000) prevents significant absorption through biological membranes such as the skin or gastrointestinal tract.

No testing has been carried out to determine the degradation products of the polymer or whether the polymer undergoes a loss of monomers.

3. PHYSICAL AND CHEMICAL PROPERTIES

At room temperature and atmospheric pressure, Rezimac 2710 is a viscous amber liquid with an aromatic odour.

As the polymer is manufactured as a solution in xylene and is never isolated for testing, many of the physical and chemical properties mentioned below are based on those of xylene or are derived by analogy with similar existing polymers.

Boiling point/ range: 136-139°C (xylene)

Specific gravity:	1000 kg/m ³ (20°C) (measured value of Rezimac 2710)
Vapour pressure:	1.3 kPa (33°C) (xylene)
Flash point:	27°C (xylene)
Auto-ignition temperature:	399°C (xylene)
Flammability limits:	1-7% (xylene)
Explosion potential:	explosive in air (xylene)
Thermal decomposition products:	carbon monoxide; carbon dioxide
Reactivity:	Rezimac 2710 is stable in air but will react with oxidising agents
Water solubility:	insoluble (similar existing polymer)
Hydrolysis potential:	not hydrolysable (similar existing polymer)

Comments on Physico-Chemical Properties

No data were provided for vapour pressure on the grounds that by analogy with similar existing polymers, this polymer is not volatile. While the lower molecular weight species may have some volatility, it is accepted that interpretation of the test results would be difficult due to the complex nature of the substance.

No data were provided for water solubility of the polymer and the polymer is stated as insoluble in water by analogy with similar existing polymers. Although qualitative descriptors such as "insoluble" are inadequate for water solubility, the notifier has indicated, and it is accepted, that there are considerable analytical difficulties in providing solubility data for a polymer of this type.

No data were provided for partition coefficient on the grounds that the polymer does not cross biological membranes. The high molecular weight of the polymer is likely to prevent it from crossing biological membranes, though some low molecular weight

material may do so. Again this test would be difficult to perform and interpret.

No data were provided for hydrolysis on the grounds that the polymer is not subject to hydrolysis and similar existing polymers are also not subject to hydrolysis. While the literature suggests alkyd resins may hydrolyse (1), the notifier has indicated that in their experience alkyds only hydrolyse in the presence of alkali and water.

No data were provided for adsorption/desorption on the grounds that no specific information is available. However it should be noted that the polymer after the evaporation of solvent is sticky and will readily adhere to soil. The molecular weight of the polymer and its expected water insolubility suggests the polymer is likely to be immobile in soil.

No data were provided for dissociation constant on the grounds that it is considered inapplicable due to the nature of the polymer and its water insolubility. Again measurement and interpretation of a result for this property would be difficult due to the complexity of the substance.

4. METHOD OF DETECTION AND DETERMINATION

Infrared spectroscopy is used to detect the reaction product, Rezimac 2710.

5. PURITY OF THE CHEMICAL

Degree of purity of polymer: 100% w/w

Amount of polymer in Rezimac 2710: 50% w/w

6. INDUSTRIAL USE

Rezimac 2710 is intended to be used exclusively as a film-forming resin in an industrial paint, Envirokote Red Primer, which will be applied to steel tubes in a controlled factory environment for local use and for export to the USA. Locally, the steel tubes will be used for interior and exterior structural purposes.

The estimated quantity to be imported is 10-100 tonnes per year for the next 5 years.

7. OCCUPATIONAL EXPOSURE

Rezamac 2710, a viscous amber liquid, will be imported in sealed drums, therefore, exposure from spillage during transportation is unlikely.

In the factory environment, workers who may be exposed to Rezamac 2710 are, the paint production workers who mix the paint, those workers who apply the paint (including the quality control testers) and those responsible for transferring the paint into drums. Occasionally, the raw material storemen may be exposed to Rezamac 2710 when they open the drums for sampling. During paint production, the notifier states that Rezamac 2710 will be incorporated into the paint using mixers which have been fitted with extraction ventilation to capture vapours at source. Paint application during quality control testing will be carried out by spray painting in ventilated booths. Paint application onto the steel tubes will be by spray painting which will involve the use of automated spray equipment in ventilated booths fitted with effective filtered exhaust systems. No detailed information was provided for the drum filling operation except that it would be carried out by gravitation. If control and personal protection procedures are not in place, the exposure of these workers to Rezamac 2710 may be high.

After application of the paint to steel tubes, the notifier states that the polymer will become an integral part of the surface onto which it was painted. Potential exposure will then be to the solvents, xylene and ethylbenzene, which will evaporate from the painted surfaces. If the workplace is not well ventilated the concentrations of xylene and ethylbenzene may exceed the recommended exposure standards (xylene: TWA 80 ppm, STEL 150 ppm; ethylbenzene: TWA 100 ppm, STEL: 125 ppm) (2), and may therefore present an occupational hazard.

8. PUBLIC EXPOSURE

The public will only come into contact with the polymer when it is an integral part of a hard durable painted surface that covers steel tubes. Under normal conditions, public exposure to Rezamac 2710 is expected to be extremely low providing the stated use pattern is adhered to and empty drums and filters containing waste

resin and paint are disposed of in the approved manner. The notifier states that waste resin and paint will be disposed in accordance with local environmental statutory requirements.

9. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The polymer in Rezimac 2710 has a high molecular weight (> 1000) and is therefore unlikely to be absorbed across biological membranes such as the skin, gastrointestinal tract or through inhalation. As the polymer including the low molecular weight polymer/s have never been isolated for toxicological testing, no data are available. It is stated in the notification that there are no known health effects associated with the polymer. It is likely that the health effects of Rezimac 2710 will be analogous with that of the aromatic hydrocarbon solvents, xylene and ethylbenzene.

The major occupational health and safety hazards during the handling and use of Rezimac 2710 will be associated with exposure to the organic solvents, xylene and ethylbenzene.

The main route of exposure to xylene and ethylbenzene is through inhalation but skin absorption may also occur (3). They are known to irritate the eyes, nose, throat the respiratory tract and the skin (3). It has been reported that xylene inhaled at high concentrations has narcotic effects associated with central nervous system depression (4). Neurobehavioural effects have been reported for xylene (5, 6). Effects on the liver and kidneys have also been reported (7).

Xylene and ethylbenzene are highly volatile and flammable thus creating potential fire and explosion hazards.

Due to extremely low public exposure under normal use conditions, it is unlikely that Rezimac 2710 will pose any serious health or safety hazard to the public. In order to minimise exposure and health and safety hazards in the workplace, the recommendations under Section 13 should be observed.

10. ENVIRONMENTAL EXPOSURE

Release

The notifier states that polymer released into the factory environment during paint manufacture or paint application (eg overspray) will be trapped by the standard engineering controls in place.

The release of polymer in the factory comes from two sources:

- (a) accidental spillage;
- (b) cleaning of mixers and mills.

Mixers and mills are cleaned using solvent, and the waste solvent collected for sale to a solvent reclaimer (Solvent Services, Brisbane). Spills in the factory are also cleaned up with solvent and are added to the waste cleaning solvent to be reclaimed. The notifier estimates that ~60 kg per annum of polymer would be sent to the solvent reclaimer. The notifier believes that the still bottoms containing the polymer is landfilled at the Brisbane City Council tip at Willawong. The notifier states that bunding arrangements in production and storage areas should result in no release of polymer to sewers and drains.

The major release of polymer in the customer's factory occurs in the spray booth where paint overspray is trapped in the booth filtration system. The notifier estimates ~2500 kg per annum of polymer is collected as overspray. The waste is mixed with kiln dust and allowed to solidify to a non-leaching solid material in a large pit. After solidification the pit is excavated and the solid stacked for final disposal by landfill at the Brisbane City Council tip at Willawong. The notifier states that there is negligible release to sewers and drains. Accidental spillage of paint may occur and this would be cleaned up with solvent and sent to the reclaimer.

The notifier states that drums containing paint are normally recycled between Dulux and the customer. When these are finished with, together with those that held the polymer, they are sold to a drum reconditioner. The drum reconditioner steam cleans the drums and disposes of the sludge by landfill. Approximately 90 kg per annum of polymer would be disposed of in this manner.

The notifier states that they have developed a process whereby waste resin and paint may be processed to reclaim the solvents in which they are dissolved, and the residue converted to an inert solid which can be landfilled. However, it is unlikely that polymer waste will be processed in this manner as it is uneconomical to transfer waste from the paint production plant in Brisbane to the Dulux waste paint plant in Clayton, Victoria.

For disposal directions, the notifier refers users to their respective State Land Management Authority.

Fate

Approximately 2500 kg per annum of polymer would be disposed of, after immobilisation to the one landfill. Small quantities which are landfilled without prior treatment are likely to be immobile and unreactive. While the literature suggests alkyd resins may hydrolyse (1), the notifier has indicated that in their experience alkyds only hydrolyse in the presence of alkali and water. In the field this set of circumstances only occurs when alkyds are applied to freshly prepared concrete or to cured concrete in the presence of continual high humidity. In both cases the pH of the concrete would be of the order of 10 to 11 or higher.

The notifier states that after the polymer is incorporated into the paint and subsequent application as a paint film that it undergoes slow deterioration. The paint film will eventually break down, due to embrittlement (air oxidation) and polymer chain scission (UV absorption from sunlight). As most of the tubular steel is used either in internal applications or is topcoated with other coatings, deterioration of the paint film is unlikely to occur over or in the aquatic environment.

11. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers of molecular weight > 1000 according to the Act.

12. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is incorporated into the paint and applied to the steel tubes in the factory.

The polymer is also unlikely to present a hazard to aquatic organisms due to the end-use applications of the steel tubes and the polymer's high molecular weight.

The main environmental exposure arises from landfill disposal of approximately 2500 kg per annum of paint overspray. However, since it is immobilised prior to disposal, environmental hazard would be low.

13. RECOMMENDATIONS FOR SAFETY PROCEDURES TO CONTROL OCCUPATIONAL EXPOSURE AND OCCUPATIONAL HAZARDS

To minimise occupational exposure and health and safety hazards, the following guidelines should be observed:

- . the workplace should be well ventilated and booths or enclosed systems fitted with local exhaust ventilation should be used

in paint mixing and paint handling operations. All spray painting should take place in spray booths which are fitted with local exhaust ventilation;

- . suitable personal protection equipment which comply with Australian Standards (AS) should be used such as:
 - . appropriate splash-proof safety goggles (AS 1337) - *Eye Protectors for Industrial Applications* (8), in situations when liquid xylene may contact the eyes,
 - . elbow length impervious nitrile gloves (AS 2161) - *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)* (9),
 - . appropriate impervious protective clothing (AS 3765) - *Clothing for Protection against Hazardous Chemicals* (10),
 - . appropriate footwear (AS 2210) - *Safety Footwear* (11) and
 - . air purifying respirators suitable for gases and particulates (AS 1716) - *Respiratory Protective Devices* (12), for spray painting and also in situations when ventilation is insufficient. Training on the proper use of respirators and fit-testing of respirators should be implemented;
- . storage of the polymer and paint should be in accordance with relevant State or Territory Dangerous Goods legislation. They should be stored in clearly labelled robust sealable containers which should remain bunded when not in use. Labelling should be in accordance with AS 1216 - *Classification, Hazard Identification and Information systems for Dangerous Goods* (13). The containers should be stored in adequately ventilated rooms suitable for organic solvent containing chemicals;
- . warning signs in large letters conforming to AS 1319 - *Signs for the Occupational Environment* (14), should be posted at all spray painting and storage areas. Further information can be obtained from Worksafe Australia's *Storage of Chemicals - Guidance Note for Placarding Stores for Dangerous Goods and Specified Hazardous Substances* (15);
- . good work practices should be followed to avoid spillages or splashings;

- . regular atmospheric monitoring should be conducted to maintain air concentrations of the aromatic hydrocarbon solvents below the recommended exposure standards (2). Sampling and analysis should be in accordance with AS 2986 - *Workplace Atmospheres - Organic Vapours - Sampling by Solid Adsorption Techniques* (16);
- . good housekeeping and maintenance are essential. Empty drums or cans should be removed to a safe place whilst awaiting disposal. Disposal should be in accordance with local regulations. Should there be an accidental spillage or leakage, make sure sources of ignition are absent and ventilate the area affected; for small quantities, absorb onto paper towels and evaporate the solvents in a fume hood, larger quantities should be collected and atomised in a suitable combustion chamber. Full personal protection should be worn in the event of a spillage or leakage.
- . sources of ignition should be eliminated from work areas. Devices should be constructed of non-sparking material. All electrical equipment should meet the requirements of AS 3000 - *Electrical Installations - Buildings, Structures and Premises* (17), and conductive articles should be electrically grounded;
- . xylene should not be allowed to enter confined spaces such as a sewer because of the possibility of an explosion;
- . a copy of the MSDSs for the polymer and paint should be easily accessible to employees.

14. RECOMMENDATIONS FOR MATERIAL SAFETY DATA SHEET (MSDS)

The MSDS for Rezimac 2710 and for the paint, Envirokote Red Primer, (Attachment 1 and 2), have been compiled according to Worksafe Australia format (18).

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Industrial Chemicals (Notification and Assessment) Act 1989 (the Act), secondary notification of Rezimac 2710 shall be required by Dulux Australia if any of the circumstances stipulated

under subsection 64(2) of the Act arise. Should this chemical be formulated into a product for public use, an appropriate submission should also be made to the Drugs and Poisons Schedule Committee of the National Health and Medical Research Council (NHMRC).

16. REFERENCES

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15. National Occupational Health and Safety Commission *Guidance Note for Placarding Stores for Dangerous Goods and Specified Hazardous Chemicals*, Australian Government Publishing Service Publ., Canberra, 1990.
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