

File No: NA/532

Date: August 1997

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in EFKA -4550**

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act* 1989 (the Act), and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health and Family Services.

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Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT****Polymer in EFKA -4550****1. APPLICANT**

Multichem Pty Ltd of 400 High St KEW VICTORIA 3101 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in EFKA-4550.

**2. IDENTITY OF THE CHEMICAL**

The notified polymer in EFKA-4550 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, molecular weight, spectral data and details of the polymer composition have been exempted from publication in the Full Public Report and the Summary Report.

**Trade Name:** EFKA-4550 (contains 50% of notified polymer)

**Number-Average  
Molecular Weight (NAMW):** > 1 000 g/mol

**Weight-Average  
Molecular Weight:** > 10 000 g/mol

**Maximum Percentage of Low  
Molecular Weight Species**

**Molecular Weight < 500:** < 10 %

**Molecular Weight < 1 000:** < 10 %

**Method of Detection  
and Determination:** the chemical has been analysed with gel permeation chromatography (GPC), infrared (IR) spectroscopy and gas chromatography (GC)

**3. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance at 20°C  
and 101.3 kPa:** the pure polymer is a yellowish, viscous material;  
imported product is in a 50/50 mix with water

**Boiling Point:** 100°C (in water)

**Specific Density:** 1.09 kg/m<sup>3</sup> (for pure polymer)  
1.06 kg/m<sup>3</sup> (for 50% dispersion in water)

<b>Vapour Pressure:</b>	not applicable
<b>Water Solubility:</b>	very water soluble
<b>Partition Co-efficient (n-octanol/water):</b>	not determined
<b>Hydrolysis as a Function of pH:</b>	not determined
<b>Adsorption/Desorption:</b>	not determined
<b>Dissociation Constant:</b>	not determined
<b>Flash Point:</b>	> 100°C
<b>Flammability Limits:</b>	not determined
<b>Autoignition Temperature:</b>	not determined
<b>Explosive Properties:</b>	not determined
<b>Reactivity/Stability:</b>	under normal conditions the polymer will not degrade or depolymerise.

### **Comments on Physico-Chemical Properties**

The notified polymer is an acrylic copolymer containing a high percentage of a methacrylate. This will confer on the substance a high miscibility with water.

The notified polymer is miscible with water in all proportions and hence the many ester linkages in the pendant chains are potentially susceptible to hydrolysis. However, the notifier claims these linkages are subject to steric hindrance, and so under normal environmental conditions where the pH lies between 4 and 9, this hydrolysis could be expected to be slow.

No partition coefficient data was provided, but the polymer will be surface active as a consequence of pendant groups. This will make these measurements difficult.

One particular monomeric constituent will be water soluble, while the hydrocarbon residue will tend to adsorb onto the organic components of soils and sediments. No dissociation constant data were provided, but since the polymer contains no inherently acidic or basic groups this is acceptable. A monomer which constitutes less than 10% of the polymer by weight has a pKa of approximately 7, and consequently has little tendency to protonate. Therefore, the material will not behave as a polycation if released into aquatic environments.

#### **4. PURITY OF THE CHEMICAL**

<b>Degree of Purity:</b>	high
<b>Toxic or Hazardous Impurities:</b>	none
<b>Non-hazardous Impurities (&gt; 1% by weight):</b>	none
<b>Maximum Content of Residual Monomers:</b>	< 1%
<b>Additives/Adjuvants:</b>	none

#### **5. USE, VOLUME AND FORMULATION**

The notified polymer is used as a dispersant (3% w/w) in special industrial paints, and also as a dispersant for pigments which are added to paint and coating formulations. In these applications, the notified polymer will constitute around 1.5% of the formulated product.

The notified polymer will not be manufactured in Australia, but will be imported as a 50% blend in water. Annual imports of the notified polymer over the next five years are expected to be 750, 800, 1 000, 1 200 and 1 200 kg, respectively.

Formulation of the paints and coatings will be performed at approximately 5 specialist industrial sites in Australia, where the paints/coatings will also be applied using spray techniques to metal automotive parts, and coils of metal.

#### **6. OCCUPATIONAL EXPOSURE**

The notified polymer in EFKA-4550 will be imported into Australia in 25 L metal cans or 200 L drums. The material will only be used in the paint industry.

Workers involved with the transport and storage of this chemical are unlikely to be exposed to the chemical. Exposure will only arise if accidental spills occur.

Worker exposure during the formulation of paints is expected to be minimal. Formulation of paints consists of dispersing, let down and filling. Production operators typically remove the notified chemical from the drums to a mill base using a pump. Limited dermal exposure is expected for workers involved in disconnecting lines. Potential exposure to the notified polymer will be for 15 to 30 minutes at a time. Following dispersion, the paint (containing the notified polymer at a final concentration of < 1.5%) will be pumped to automated filling lines for packaging.

Workers exposed to the reformulated product will mostly consist of spray painters applying the special paint coatings to surfaces. Given that the final concentration of

the notified polymer in paints will be less than 1.5%, worker exposure is expected to be low. The notifier states that most spray painting will be conducted in ventilated spray booths which are equipped with recirculating systems. In such cases, inhalational, dermal and ocular exposure is expected to be minimal.

Worker exposure to the notified polymer in dried paints is likely to be minimal, as the polymer will be encapsulated as part of the cured paint film.

## **7. PUBLIC EXPOSURE**

The notified polymer in EFKA-4550 will not be available to the general public. Exposure will only occur through exposure to painted surfaces. However, once a paint containing EFKA-4550 has cured and dried, the polymer will be bound into the matrix of the paint.

In the event of a transport accident the physical and chemical properties of the notified chemical will allow significant dispersion primarily as run-off. The degree of dispersion will be dependent on the extent and circumstances of the spill. Spilt material can be readily absorbed onto vermiculite, sand, or other adsorbent and recovered into containers for disposal in accordance with local government regulations. Remaining material is likely to enter the water table or water ways and be extensively diluted.

## **8. ENVIRONMENTAL EXPOSURE**

### **Release**

Some release of the material could occur during activities associated with paint formulation, but the notifier indicates that this will be minimal and amount to approximately 3% of the imported polymer. The material released in this manner is likely to be associated with cleaning solvents which will presumably be recycled for solvent recovery. The discarded polymer will become incorporated with other solid waste from solvent recovery operations and be disposed of to landfill.

During application of the coatings to the substrates a high proportion of formulated coating (up to 50%) may be lost through overspray. However, the notified polymer will be a component of coating formulations, which will be used in highly automated facilities dedicated to high volume spray application of surface coatings. These facilities are fitted with recirculation pumps and other equipment which allow reuse of the unused material, so that overall wastage and loss of the formulation is small.

Since the spray application activities will be performed at specialist industrial sites the small quantities of material, which are lost as a consequence of clean up operations, will be disposed of to landfill after it has solidified. In some cases where solvents are used to clean up spray equipment and paint application areas the released polymer will be associated with the solvents which will be recycled for solvent recovery. The residual solid waste polymers are granulated and placed into landfill.

The notifier indicates that around 1% of the polymer (amounting to a maximum of 12 kg per year) is expected to be left as residual in the paint drums. The empty drums are sent for drum recycling where the residual polymer is removed using suitable solvents and recovered for production of general purpose drum enamels.

### **Fate**

When placed into landfill there is little possibility for release through leaching since the polymer will be incorporated into a solid matrix. Although the material is completely soluble in water it is unlikely to pose a hazard to aquatic life due to the high molecular weight which precludes the crossing of biological membranes.

When placed into landfill, the material is expected to be subject to slow biological and abiotic degradation processes and contribute to production of landfill gases such as methane, ammonia, nitrogen and hydrogen.

The fate of the remainder of the polymer will be associated with that of the metal objects to which it has been applied as a constituent of the coatings. This would be either disposal to landfill or as part charge for blast furnaces during metal recycling operations. In the latter case the notified material would be completely destroyed with production of water vapour, and compounds of carbon and nitrogen.

## **9. EVALUATION OF TOXICOLOGICAL DATA**

No toxicological data were provided, which is acceptable for polymers of NAMW greater than 1 000 according to the Act.

## **10. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

No ecotoxicological data were provided, which is acceptable for polymers of NAMW greater than 1 000 according to the Act.

## **11. ASSESSMENT OF ENVIRONMENTAL HAZARD**

The environmental hazard from the notified polymer is estimated to be low.

Residuals remaining in the paint drums will be removed during drum refurbishment and be mixed with other waste polymers and incorporated into general purpose enamels for recycled drums.

Losses during paint formulation are expected to be small, and while spray application of the paint may result in up to 50% loss, most of this will be recovered for reuse within the plant.

Any material which is disposed of to landfill will not be mobile and will be subject to slow degradation processes.

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

Although the information provided for the notified chemical is inadequate to characterise its toxicological hazard, the low monomer residues together with the high number average molecular weight of the polymer, provides substantial assurance of the likely low toxicological hazard presented to workers and the public by the notified chemical.

Worker exposure to the notified polymer is expected to be minimal. The notifier states that reformulation of paints will only occur in well-established specialist paint manufacturers that employ state-of-the-art engineering controls. Application of the paints will be carried out in spray booths, thus inhalation exposure to the polymer in these processes will be minimal. The low concentration of polymer in the final paint products (1.5%) ensures that occupational exposure is minimal. This combined with the expected low hazard of the notified polymer, and the use of engineering controls indicates that the occupational health and safety risks are likely to be minimal.

Exposure to the public will only occur via exposure to surfaces covered in paints containing the notified polymer. Therefore, the notified polymer is expected to pose minimal risk to public health since the polymer becomes fixed in the matrix of the cured paint.

## **13. RECOMMENDATIONS**

To minimise occupational exposure to the polymer in EFKA -4550, the following guidelines and precautions should be observed:

- Industrial clothing should conform to the specifications detailed in AS 2919 {Standards Australia, 1987 #18};
- All occupational footwear should conform to AS/NZS 2210 {Standards Australia/Standards New Zealand, 1994 #24};
- Spillage of the notified chemical should be avoided, spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- 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 MSDS for the product containing the notified chemical was provided in

accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* {National Occupational Health and Safety Commission, 1994 #13}.

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

## **15. REQUIREMENTS FOR SECONDARY NOTIFICATION**

Under the Act, secondary notification of the notified chemical 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. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia, Sydney.
2. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear*, Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.
3. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, Australian Government Publishing Service, Canberra.