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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYMER IN ACRYLIC WETTING RESIN 953

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

POLYMER IN ACRYLIC WETTING RESIN 953

1. APPLICANTS

Hoechst Australia Limited of 606 St. Kilda Road MELBOURNE VIC 3004 and Croda Herberts Pty Ltd of 15-23 Melbourne Road RIVERSTONE NSW 2765 have submitted a limited notification statement accompanying their application for assessment of Polymer in Acrylic Wetting Resin 953.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, Polymer in Acrylic Wetting Resin 953 is considered to be non-hazardous. Therefore the chemical name, CAS number, molecular and structural formulae and spectral data have been exempted from publication in the Full Public Report and the Summary Report.

Trade name:	Acrylic Wetting Resin 953
Number-average molecular weight:	> 1000
Method of detection and determination:	infra-red spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is imported into Australia as a component in a solvent-based liquid (39% xylene and 13% ethylbenzene) and is never isolated. The properties given below are those of the liquid unless otherwise specified.

Appearance at 20°C and 101.3 kPa:	colourless to light yellow, clear liquid
Odour:	characteristic solvent odour
Boiling Point:	138-146°C
Density:	950 kg/m^3
Vapour Pressure:	the polymer has no detectable vapour pressure. (OECD method 104)
Water Solubility:	< 0.01 g/L at 20°C (polymer)

Partition Co-efficient:	not applicable (the polymer is insoluble in water)
Hydrolysis as a function of pH:	not applicable (the polymer is insoluble in water)
Dissociation Constant	not applicable (the polymer is insoluble in water)
Flash Point:	24°C
Flammability Limits:	not applicable for the polymer, which has no detectable vapour pressure; for the solvents in the product formulation the limits are 1-7%
Combustion Products:	oxides of carbon, hydrogen and nitrogen.
Decomposition Temperature:	> 400°C (polymer)
Decomposition Products:	elemental oxides and eventually small amounts of monomers
Autoignition Temperature:	not applicable
Explosive Properties:	none known
Reactivity/Stability:	should be kept away from oxidising agents and strongly alkaline or acidic materials to avoid exothermic reactions

Comments on Physico-Chemical Properties:

Acrylate polymers of high MW normally are totally insoluble in water and the actual solubility of the polymer is expected to be much less than 1 mg/L.

While the polymer contains ester groups on the side chains, these are not expected to hydrolyse under environmental conditions due to the expected low solubility in water.

It is noted that the polymer contains amine groups in the side chains. However, a dissociation constant for the polymer would be hard to measure due to the lack of solubility in water, though typical basicity is expected, together with an increase in solubility at high pH.

No adsorption/desorption studies have been performed by the manufacturer, as there is currently no suitable method officially approved in the EEC. Since the polymer is insoluble in water, a relatively low migratory tendency of the chemical into the air (no vapour pressure), water and soil are to be expected.

4. PURITY OF THE CHEMICAL

Degree of purity:	> 99%
Toxic or hazardous impurities (> 1% by weight):	nil
Non-hazardous impurities (> 1% by weight):	nil
Additives/Adjuvants:	nil

5. USE, VOLUME AND FORMULATION

Acrylic wetting resin 953 is to be used as a component of an industrial coating. Greater than 1 tonne of polymer will be imported per annum.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported as a component of a resin solution which will be incorporated into locally manufactured coating products. The imported resin will be used in Australia in the manufacture of industrial coatings.

The resin solution will be transported in sealed 200 kg drums by road to the premises of the customer, where formulation will take place. The final products will be sold to industrial trade customers.

Categories of workers potentially exposed to the polymer include transport and storage workers, personnel involved in formulation of the final product, application and equipment cleaning as well as personnel involved in waste disposal.

At the formulator's site it is expected that up to 35 personnel may be exposed to the notified polymer during formulation and repackaging. Of these, 27 are expected to be involved in formulation, 8 in quality control and research and development. These personnel are expected to be exposed for about 2 hrs/day, 12 days/year. Up to 35 personnel may be involved in training and demonstration of the new product for 4 hrs/week for approximately three months. Minimal exposure to other workers may occur, these being involved in supervision, storage, transport and drum recycling.

Formulation of the final product is carried out in a steel mixing vessel by mechanical lifting of the drums to allow gravity feed of the resin solution, followed by addition of pigment, solvents and paint additives. When mixing is complete the vessel is closed, and the mixture is pumped through an enclosed bead mill. The mixture is then pumped into another mixing vessel where the viscosity is adjusted. Finally the mixture is pumped into machinery which fills the finished product into 1 L or 4 L containers.

Residues of the polymer are removed by washing the equipment with solvents. Wash solvent is sent to a solvent recycler, who will reclaim the solvent for future use.

Dust and vapour extraction systems will be in use in the formulation area, all mixing vessels are closed, except when ingredients are being added and the mills used have water cooling jackets to minimise solvent losses due to heating.

The notifiers recommend that application of the final product be conducted in spray booths equipped with exhaust ventilation and filtering systems. Respirators with a remote air supply would normally be used as isocyanate hardener is added to the final product immediately prior to application.

7. PUBLIC EXPOSURE

Acrylic wetting resin 953 will be incorporated into industrial coating products and will be available to industrial trade customers only.

The coating will be applied in spray booths, and the public will not be exposed to the notified polymer. Adequate measures are described by the notifier to ensure the general public are not exposed to the notified polymer during the formulation or coating procedures. Minimal exposure may occur if the coating on the article is accidentally exposed due to damage to the overlying coating. In such instances the polymer, which has a very high number average molecular weight, will be immobilised in the hardened coating and should pose negligible hazard to the public.

Minor public exposure may result from disposal of unused resin, or accidental spillage of the notified polymer during transport and storage, and during formulation. However, adequate measures are described by the notifier to minimise the risk of public exposure during formulation, disposal, or in the event of accidental spillage.

8. ENVIRONMENTAL EXPOSURE

. Release

The polymer should not enter the environment during manufacture of the final products. The resin is to be stored in a bunded area which will prevent accidental spills from leaving the storage area. These spills should be cleaned up according to the directions in Material Safety Data Sheets (MSDS). During the formulation of the coating, the polymer will be in a sealed vessel except during transfer from the drums of resin and in packing of the final product. All on-site drains lead to a first flush system to prevent entry of polluted water into either the stormwater drainage system or the sewage system.

The finished products will be mixed with isocyanate hardener before being applied to articles by high volume-low pressure spray guns. All spray painting is to be done in spray booths. The hardener will form a crossed-linked polyurethane film on curing (drying).

The high volume-low pressure spray guns are approximately 75% efficient, with approximately 25% overspray . The overspray is either trapped in air filters or in a water traps in the spray booths. The air filters containing the collected dry overspray, are bagged from time to time and then disposed of by a waste disposal contractor according to statutory requirements. The material trapped in the air filters should dry out and cure to an inert cross-linked polymer. The water traps use a chemical coagulating agent to precipitate the overspray which is collected in a sump. The sludge from the sump is periodically removed and disposed of by a waste disposal contractor according to statutory requirements (landfill).

. Fate

The fate of the polymer is either to be bound to an article or disposed of by landfill/incineration. When the paint containing the polymer is cured, an inert film is formed which will remain with the article. Any fragments/chips of the cured paint that occur due to chipping, accidents etc. will be inert and form part of the sediments.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1000 according to the *Industrial Chemicals (Notification and Assessment) Act, 1989* (the Act) and no data were submitted for the notified polymer.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The notifier has not presented any ecotoxicity results for the polymer. This is acceptable as ecotoxicity tests are not required for a polymer with NAMW >1000 according to the Act.

The polymer is not expected to exhibit ecotoxicity effects as a result of the high molecular weight and expected low water solubility (1).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

During the formulation of the final product, the environmental controls should limit environmental exposure to near zero and limit the environmental hazard to a negligible level.

The coating containing the polymer will be formulated for use in high volume low pressure spray guns which it is claimed by the company to obtain approximately 75% spray efficiency. Therefore of the total amount of the polymer imported, approximately 25% will be lost as overspray. This overspray is expected to be collected in either air filters or in water traps. As there is a large number of different users, it is not possible to quantify the amount of polymer trapped in each of these systems, however, almost all of the overspray is expected to be collected for disposal.

As the waste trapped in the air filters is expected to dry out and cure before disposal, the hazard from this material is expected to be negligible when it is landfilled or incinerated. Any spray droplets not trapped by the air filters will dry out and polymerise to an inert particle which will then partition to the sediments.

The polymer waste trapped in the sludge from the water traps is expected to be landfilled with the sludge. The polymer is unlikely to leach due to the expected insolubility in water and will stay in the landfill. The waste water from the water trap, which may contain very small amounts of the polymer, is expected to be discharged to the sewer, where it will be diluted by several factors of magnitude and be trapped in the solids at the sewage treatment works. These solids are normally disposed of by landfill or incineration. The side chains on the polymer could hydrolyse in landfill but this process will be extremely slow due to the low solubility in water.

Incineration of the polymer will generate oxides of carbon and nitrogen as well as water. The environmental hazard when the polymer is incinerated can be rated as negligible.

The environmental hazard from the cured polymer is rated as negligible.

The overall environmental hazard from use of the polymer can be rated as low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

As the notified polymer has a number-average molecular weight (NAMW) > 1000, it is unlikely to be able to cross biological membranes and cause systemic effects. The polymer contains one hazardous impurity. This is present at a level well below the cut-off concentration necessary to classify the polymer as a hazardous substance according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (2) and is therefore not expected to cause any significant toxicological concerns. The polymer contains no low molecular weight species.

The notified chemical will arrive in Australia as a component of a solvent based resin. As the polymer is available in liquid form, skin and eye contact will be the main sources of occupational exposure during formulation, preparation, equipment loading and equipment cleaning. Inhalational exposure during these activities is unlikely as the polymer vapour pressure is expected to be low at room temperature. Inhalational exposure during application, however, will be significant as the spray process will generate aerosols.

The use of dust/vapour extractors will minimise worker exposure during formulation. During application of the final product a well ventilated spray booth for spray applications will reduce worker exposure to overspray. Therefore, worker exposure to the notified chemical should be low when the coating product is formulated and used in the proposed manner.

The risk of adverse occupational health effects is expected to be low, due to low exposure levels and the low hazard of the notified polymer. Precautions taken to protect against the solvents should protect against the notified polymer.

The notified polymer will be incorporated into industrial coatings and used in spray booths, and will not be available to the general public. Minimal public exposure may result following accidental removal of overlying coatings. However, the polymer, which has a very high number average molecular weight, will be immobilised in the hardened coating and as such would pose a negligible public risk. The potential for minor public exposure exists during formulation, transport and disposal of the polymer if accidentally spilt. This should be minimised by using the recommended practices (in the MSDS) during formulation, storage and transportation.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified polymer in Acrylic Wetting Resin 953 the following guidelines and precautions should be observed:

. If engineering controls and work practices are insufficient to reduce exposure to a safe level, then:

- The appropriate respiratory device should be selected and used in accordance to Australian Standard/New Zealand Standard (AS/NZS) 1715 (3) and should conform to AS/NZS 1716 (4).

- Eye protection should be selected and fitted in accordance to Australian Standard (AS) 1336 (5) and meet the requirements of AS/NZS 1337 (6).

- Industrial clothing should conform to AS 2919 (7).

- Industrial gloves should conform to AS 2161 (7).

- All occupational footwear should be selected in accordance with and conform to AS/NZS 2210 (9).

The appropriate exposure standards for the solvents: xylene TWA 80 ppm, ethylbenzene TWA 100 ppm (10) should be observed.

Particular care should be taken to avoid spillage or splashing of the notified chemical.

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

A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The attached MSDS was provided for the product Acrylic Wetting Resin 953, which contains the notified polymer.

This MSDS was provided by Hoechst Australia Ltd and Croda Herberts Pty Ltd as part of their notification statement. It is reproduced as a matter of public record. The accuracy of this information remains the responsibility of Hoechst Australia Ltd and Croda Herberts Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Acrylic Wetting Resin 953 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. J. V. Nabholz, P. Miller and M. Zeeman, "Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act TSCA Section Five", in *Environmental Toxicology and Risk Assessment*, W. G. Landis, J. S. Hughes and M. A. Lewis (Eds), pp 40-55

2 National Health and Safety Commission, *Approved Criteria for Classifying Hazardous Substances*, NOHSC:1008 (1994), AGPS, Canberra, Australia

3. Standards Australia, Standards New Zealand, 1994, *Australian/New Zealand Standard 1715 - 1994 Selection, Use and Maintenance of Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.

4 Standards Australia, Standards New Zealand, 1991, *Australian/ New Zealand Standard 1716 - 1991 Respiratory Protective Devices,* Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.

5. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.

6. Standards Australia, Standards New Zealand 1992, *Australian/ New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.

7. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing,* Standards Association of Australia Publ., Sydney, Australia.

8. Standards Australia, 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves*), Standards Association of Australia Publ., Sydney, Australia.

9. Standards Australia, Standards New Zealand 1994, *Australian/ New Zealand Standard 2210 - 1994 Occupational Protective Footwear, Part 1: Guide to Selection, Care and Use. Part 2: Specifications,* Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.

10. National Occupational Health and Safety Commission, 1991, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, Australian Government Publishing Service Publ., Canberra, Australia.