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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

# POLYMER IN POLYURETHANE RESIN 412

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Director
Chemicals Notification and Assessment

# FULL PUBLIC REPORT

## POLYMER IN POLYURETHANE RESIN 412

## 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 Polyurethane Resin 412.

## 2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, Polymer in Polyurethane Resin 412 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 names:** | Polyurethane Resin 412 or 415/75 |
| **Number-average molecular weight:** | > 1000 |
| **Method of detection and determination:** | infra-red spectroscopy |

## 3. PHYSICAL AND CHEMICAL PROPERTIES

Polyurethane Resin 412, containing the notified polymer and 25% 2-butoxyethanol, will be imported only as a component of paint formulation products. The polymer itself will never be isolated.

The properties given below are those of Polyurethane Resin 412 unless otherwise specified.

| | |
|---|---|
| **Appearance at 20°C and 101.3 kPa:** | yellowish liquid |
| **Odour:** | characteristic solvent odour |
| **Melting Point:** | not able to be determined due to high viscosity |
| **Specific Density:** | 1140 kg/$m^3$ |
| **Vapour Pressure:** | 0 kPa at 25°C (polymer) |

| | |
|---|---|
| **Water Solubility:** | < 0.1 mg/L (estimated by the notifier) |
| **Partition Co-efficient:** | not applicable (polymer is insoluble in water) |
| **Hydrolysis as a function of pH:** | not applicable (polymer is insoluble in water) |
| **Dissociation Constant:** | not applicable (polymer is insoluble in water) |
| **Flash Point:** | no detectable flashpoint for the polymer resin |
| **Flammability Limits:** | not applicable as the resin has no detectable vapour pressure. |
| **Combustion Products:** | oxides of carbon, nitrogen |
| **Pyrolysis Products:** | oxides of carbon, nitrogen |
| **Decomposition Products:** | oxides of carbon, nitrogen |
| **Autoignition Temperature:** | not applicable |
| **Explosive Properties:** | there are no known explosive properties as a result of heat, shock or friction |
| **Reactivity/Stability:** | should be kept away from oxidising agents and strongly alkaline or acidic materials to avoid exothermic reactions |
| **Particle size distribution**: | not applicable |

**Comments on Physico-Chemical Properties:**

While the polymer contains ester groups, on the side chains, which are potentially hydrolysable, 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 is not expected and 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. Since the polymer is insoluble in water and has no detectable vapour pressure, a relatively low migratory tendency of the chemical into the air, water and soil are to be expected.

## 4. PURITY OF THE CHEMICAL

**Degree of purity:** ≥ 99%

**Toxic or hazardous impurities:** nil

**Non-hazardous impurities (> 1% by weight):** nil

**Maximum content of residual monomers:** < 1%

**Additives/Adjuvants:** nil

## 5. USE, VOLUME AND FORMULATION

Polyurethane Resin 412 is to be used as a component of an industrial coating.

The notified polymer will be imported at a rate of > 1 tonne per annum.

## 6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in an industrial coating in 1 and 4 L containers and transported to the notifier's premises by road. The coating will then be onsold to licensed applicators where it will be mixed and applied to articles by spray.

Categories of workers potentially exposed to the polymer include transport and storage workers, personnel involved in mixing, 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 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.

Transport and storage workers will only be exposed in the event of accidental spillage.

The notifiers recommend that application of the final product be conducted in spray booths equipped with exhaust ventilation and filtering systems due to the presence of organic solvents (< 10%). 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

Polyurethane Resin 412, as a component of industrial coatings, will be available to industrial trade customers only.

The coatings 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 coating procedures. The coating, after being applied to the article , is overlaid by a clear topcoat which forms a highly cross-linked polymer film. Minimal exposure may occur if the coating containing the notified polymer is accidentally exposed due to damage to the overlaying polyurethane film. In such instances the polymer, which has a 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. However. adequate measures are described by the notifier to minimise the risk of public exposure during disposal, or in the event of accidental spillage.

## 8. ENVIRONMENTAL EXPOSURE

### . Release

Products containing the polymer are to be stored in a bunded area which will prevent an accidental spills from leaving the storage area. These spills should be cleaned up by collecting and containing with non-combustible absorbent materials. At the initial site of use 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 applied to articles by high volume-low pressure spray guns in spray booths. The high volume-low pressure spray guns are approximately 75% efficient, with approximately 25% overspray . Most of the overspray is either trapped in air filters or in a water trap. 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 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. As a result of the use of coagulating agents and the low solubility in water, the concentration of polymer in the waste water is expected to be low (< 1 ppm).

The used containers are expected to be sent to a drum recycler, who will either dispose of the cans or re-use them. In either case the residue coating containing the notified polymer is expected to be disposed of according to statutory requirements, eg. landfill or incineration.

**. Fate**

The fate of most of the polymer is either to be bound to an article or disposed of according to statutory requirements, normally by landfill or incineration. After coatings containing the polymer are applied to the articles, a clear topcoat is then applied, which when cured forms an inert, highly crossed linked polyurethane film. This sandwiched paint film will remain with the article. Any fragments/chips of the cured coating 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. Ecotoxicity tests are not required for a polymer with MW > 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

The environmental hazard from the polymer, when sealed under the topcoat and cured, is rated as negligible.

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. The air filters and the sludge from the water traps are expected to be disposed of by incineration or landfill. Any spray droplets not trapped by the air filter will dry out and polymerise to an inert particle which will then partition to the sediments. The waste water from the water trap is expected to be discharged to the sewer, where it will be diluted by several factors of magnitude and/or partition to the sludge and trapped in the solids at the sewage treatment works. The solids are disposed of by landfill or incineration.
Incineration of the polymer will generate oxides of carbon and nitrogen as well as water. The environmental hazard can be rated as negligible. As the polymer is expected to be insoluble in water, the polymer waste consigned to landfill is unlikely to leach and will stay in the landfill. The polymer could hydrolyse but this process will be extremely slow due to the low solubility in water. The environmental hazard from the disposal of paint waste containing the polymer is rated as low.

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

## 12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETYEFFECTS

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 low molecular weight species. The majority of these, however, have a NAMW between 1000 and 500 and may be expected to be poorly absorbed.

The notified chemical will arrive in Australia as a component of industrial coatings. As the polymer is available in liquid form, skin and eye contact will be the main sources of occupational exposure during 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 preparation. 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 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 likely low hazard of the notified polymer. However the Material Safety Data Sheet (MSDS) for the product, carries exposure standards for 2-butoxyethanol which is toxic through skin, eye and inhalation routes. Therefore, eye and skin contact, as well as inhalation of the product should be avoided.

The notified polymer will be incorporated into Polyurethane Resin 412 which will form part of imported industrial coatings. The coatings are to be used in spray booths and are not available to the general public. Minimal public exposure may result following accidental removal of an overlaying polyurethane film. However, the polymer, which has a 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 transport, and disposal of the polymer if accidentally spilt. This is minimised by the use of the recommended practices (in the MSDS) during storage and transportation.

## 13. RECOMMENDATIONS

To minimise occupational exposure to Polyurethane Resin 412 which contains the notified polymer the following recommendations should be followed:

. If engineering controls and work practices are insufficient to reduce exposure to Polyurethane Resin 412 to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards/New Zealand Standards (AS/NZS) for respiratory protection, AS/NZS 1715 and AS/NZS 1716 (2, 3), for eye protection, AS 1336, AS/NZS 1337 (4, 5), impermeable gloves, AS 2161 (6) and protective clothing, AS 2919 (7) should be worn.

. The appropriate exposure standards for the solvent: 2-butoxyethanol, TWA 25 ppm (8) should be observed.

. Safe work practices should be implemented to avoid spillages and splashing.

. Good housekeeping and maintenance should be practised. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal.

. The workplace should be well ventilated.

. Good personal hygiene should be observed.

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

## 14. MATERIAL SAFETY DATA SHEET

The attached MSDS were provided for Polyurethane Resin 415/75 and Basislack, Wasserverduennbar (paint containing the notified polymer).

These MSDS were provided by Hoechst Australia Ltd and Croda Herberts Pty Ltd as part of their notification statement. They are 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 Polyurethane Resin 412 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. 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.

3. 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.

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

5. 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.

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

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

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