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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**INCA 300 POLYMER**

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Director
Chemicals Notification and Assessment

# FULL PUBLIC REPORT

## INCA 300 POLYMER

## 1. APPLICANT

Courtaulds (Australia) Pty Ltd of 115 Hyde Road YERONGA QLD 4104 has submitted a limited notification statement in support of their application for an assessment certificate for INCA 300 Polymer.

## 2. IDENTITY OF THE CHEMICAL

The notified chemical 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 formula, molecular weight and impurities have been exempted from publication in the Full Public Report and the Summary Report.

The notified chemical contains no hazardous impurities at levels necessary to classify it as a hazardous substance (1). Therefore, information on the purity of the chemical has been exempted from publication in the Full Public Report and the Summary Report.

| | |
|---|---|
| **Trade Name:** | INCA 300 (60% notified polymer in 30% xylene and 10% butanol solution)<br>KH 0748 |
| **Method of Detection and Determination:** | the notified polymer can be detected by infrared and nuclear magnetic resonance spectroscopy |

## 3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported as a solvent solution in xylene and butanol 3:1 ratio. Therefore, unless indicated otherwise, the physico-chemical properties listed below are of the polymer in xylene and butanol.

| | |
|---|---|
| **Appearance at 25°C and 101.3 kPa:** | dark amber viscous liquid |
| **Odour:** | pungent |
| **Boiling Point:** | 118°C (butanol) |

| | |
|---|---|
| **Density:** | 950 kg/m$^3$ |
| **Vapour Pressure:** | 9.344 kPa at 25°C (xylene) |
| **Water Solubility:** | insoluble |
| **Fat Solubility:** | not determined |
| **Partition Co-efficient (n-octanol/water)** log $P_{OW}$: | not determined |
| **Hydrolysis as a Function of pH:** | not applicable |
| **Adsorption/Desorption:** | not determined |
| **Dissociation Constant** pKa**:** | not determined |
| **Flash Point:** | 23°C (xylene) |
| **Flammability Limits:** | 1.1% LEL (xylene)<br>7.7% UEL (xylene) |
| **Autoignition Temperature:** | not determined |
| **Explosive Properties:** | not expected to be explosive based on low oxygen content (polymer) |
| **Reactivity/Stability:** | stable under room conditions; but contact with strong oxidants and acids should be avoided (polymer) |
| **Thermal Decomposition Product:** | oxides of carbon, oxygen and nitrogen (polymer) |
| **Particle Size Distribution**: | not applicable |

**Comments on Physico-Chemical Properties**

The notifier has indicated a very low solubility in water and high hydrolytic stability is expected for the polymer. No measurement of water solubility was made but the compounds are alkyl-aromatics and are expected to be strongly hydrophobic and exhibit low water solubility. The notified polymer does not contain any functional groups that are likely to hydrolyse under normal environmental conditions.

No measurement of dissociation constant was made. The polymer contains ionisable functional groups but is not expected to dissociate to a significant degree in the normal environmental pH range. The functional groups in the polymer that can ionise

are, phenol ($pK_a$ 10.09 - 10.29 (cresols)), primary amines ($pK_a$ 10.67 (ethylamine)) and secondary amines ($pK_a$ 10.98 (diethylamine)).

Partition coefficient data are not applicable as a polymer of this molecular size (number-average molecular weight (NAMW) >1000) and low solubility is not expected to cross biological membranes. The polymer contains long chain alkyl and benzene groups and is expected to be hydrophobic in nature. It is therefore expected to partition largely to the octanol phase. Low molecular weight species in the notified polymer are expected to be complex phenols and should have low water solubility and partition largely to the octanol phase.

No measurement of adsorption/desorption was made. The notifier has indicated that they expect the material to bind strongly to, or be associated with, organic matter in soil and to have very low mobility and limited effects.

## 4. PURITY OF THE CHEMICAL

**Degree of Purity:** 92.7%

## 5. USE VOLUME AND FORMULATION

The notified polymer will be used as a curing agent for two-component epoxy based industrial coatings. The coatings will be used for protection of steel in industrial and marine environments.

The notified polymer, as a component if INCA 300 (60% notified polymer, 30% xylene and 10% butanol, will not be manufactured in Australia but will be imported in quantities of up to 40 tonnes per annum for the next five years.

## 6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported, as part of INCA 300, in 200 L drums and transported to Courtaulds Yeronga site in Queensland where it will be stored in a bunded site. Four to 6 workers (including dock, waterside workers) will be involved in transport and handling of the material from the wharf to the warehouse. At the Yeronga site, the drum will be decanted using semi automated equipment into sealed 1500 L mixing vessels where the notified polymer will be blended with other ingredients. Once the mixing is completed the product is automatically pumped to filling machines for packaging into 1 L or 5 L steel tanks. Local exhaust ventilation will be used to capture emissions during decanting, mixing and filling operations. Five to 10 workers (including decanting, mixing, quality control and supervision) will be involved during the above reformulation of the notified polymer.

The product containing the notified polymer will be used by 100 to 200 professional applicators on marine vessels and industrial steel sheeting. External surfaces are applied by either roller or airless spray (where the liquid is atomised under pressure) in spray booth wherever possible. When larger vessels are sprayed in dry docking

facilities or ship maintenance yards, spraying will be discontinued in windy conditions. Internal holds will be coated in a similar fashion extractor fans will be used to remove solvent fumes. Large components will be coated in sheds with controlled ventilation.

## 7. PUBLIC EXPOSURE

The public will not come into contact with INCA 300 Polymer treated steel, and the notifier has stated that no leaching from the polymer matrix is expected to occur. Minor public exposure may result from disposal of unused resin, or accidental spillage of INCA 300 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

Empty containers, mixing vessels and transfer lines are cleaned with a suitable solvent and recycled where possible. Waste generated during the reformulation process is expected to be approximately 200 kg per year (0.5%). The formulated product containing the notified polymer will be distributed to industrial customers only.

INCA 300 Polymer will be used in a two component epoxy-based industrial coating for the protection of marine vessels and industrial steel sheeting. This type of product is mixed with the second component in a ratio of either 1 in 4 or 1 in 5. Application will be by spray booth wherever possible. Large components will be coated in sheds with controlled ventilation. Ships are expected to be sprayed in dry-docks or ship maintenance yards.

The coating material will mainly be applied by an airless-spray process where the liquid is atomised using pressurised equipment. Such an application method achieves greater spray efficiency compared to traditional compressed air methods. Estimated losses during application by the use of spray booths will be 1.5% (approx 600 kg/year) of the notified material.

Where application is to be carried out on larger components losses may be up to 5% for ventilated confined spaces, 5-10% for outdoor application in static air and over 20% in windy conditions. Assuming outdoor application under moderate wind conditions, loss at 10% during application and a mixing ratio of 1 in 4, as much as 1000 kg per year could be lost to waste. This waste may be collected and disposed of to landfill or may dry onto dry dock or slipway facilities.

### Fate

The notified polymer will be recycled where possible. The highest environmental exposure of the notified polymer is likely to be as overspray from the application of

the epoxy during normal use. Droplets are expected to dry to inert particles. These are expected to be largely confined to spray booths or closed sheds with controlled ventilation. Limited amounts may be applied in exposed areas and overspray from these sources is expected to dry to an inert particle of cured material.

This material may also be applied to larger vessels as part of routine maintenance and application is expected to be carried out in dry docking facilities or external locations. Products containing INCA 300 Polymer are expected to be applied to external surfaces by either roller or airless spray. Wastage and overspray may be as high as 10%. Spraying would be discontinued in windy conditions. Internal holds would be coated in a similar fashion but would require the use of extractor fans to remove solvent fumes. No polymer is expected to be lost by the use of extractor fans due to the low volatility of the polymer.

During the construction of new ships the material would be applied to the exterior, decks and superstructure of the vessel by airless spray. Application would take place in purpose built construction yards. Overspray would be expected to be contained in the vicinity of the ship along with other waste materials. The polymer should dry to an inert particle and be collected and disposed of with other waste material according to local regulations.

Material may also go to landfill either directly from spillage or as waste from spray booths. This waste will be cured and inert and is expected to be immobile. Steel cans used for package and supply to industrial users may be disposed of to landfill or maybe recycled. Residues are expected to be cured or desiccated and inert.

Although the notified material contains a high proportion of material with a molecular weight <1000 the low molecular weight species are expected to be complex phenols of the UVCB type formed as reaction products. Given the types of compounds and the structure of the notified polymer, such compounds are expected to react with and bind to the cured polymer and to be trapped in the polymer matrix. Once bound they are not expected to leach and should not have any effect on the environment.

Hydrolysis of the material is unlikely under normal environmental conditions and the polymer should undergo limited biodegradation. Given the application and type of use no bioaccumulation of the cured polymer is expected because of its expected $P_{ow}$ and low water solubility (1), and its very large molecular size which is likely to inhibit membrane permeability and prevent uptake during exposure (2,3).

## 9. EVALUATION OF TOXICOLOGICAL DATA

### 9.1 Acute Toxicity

No toxicology data are required under the Act for polymers where the NAMW exceeds 1000. Nevertheless, some tests have been conducted on INCA 300 containing the notified polymer, and were submitted as part of the notification statement.

**Summary of the acute toxicity of INCA 300**

| *Test* | *Species* | *Outcome* | *Reference* |
|---|---|---|---|
| Acute oral toxicity | Rat | $LD_{50}$ > 2000 mg/kg | (4) |
| Skin Irritation | Rabbit | moderate irritant | (6) |

### 9.1.1 Oral Toxicity (4)

| | |
|---|---|
| *Species/Strain:* | Sprague-Dawley rat |
| *Number/Sex of animals:* | 5 males, 5 females |
| *Observation period:* | 14 days |
| *Method of administration:* | gavage |
| *Clinical observations:* | no clinical signs or abnormalities at necropsy were noted |
| *Mortality:* | none |
| *Morphological findings:* | none |
| *Test method:* | based on OECD Guidelines for Testing Chemicals (5) |
| *$LD_{50}$:* | > 2000 mg/kg |
| *Result:* | low oral toxicity |

### 9.1.2 Skin Irritation (6)

| | |
|---|---|
| *Species/strain:* | New Zealand White rabbits |
| *Number/sex of animals:* | 2 males, one female |
| *Observation period:* | 7 days |
| *Method of administration:* | a neat sample of INCA 300 was applied under occluded dressing for 24 hours |

**Draize (7) Scores:**

| *Animal* | *Time after decontamination* | | | |
|---|---|---|---|---|
| | *60 min* | *1 day* | *2 days* | *3 days* |
| **ERYTHEMA** | | | | |
| 1 | 1 | 2 | 2 | 1 |
| 2 | 1 | 2 | 1 | 1 |
| 3 | 1 | 2 | 2 | 2 |
| **OEDEMA** | | | | |
| 1 | 0 | 2 | 1 | 1 |
| 2 | 0 | 1 | 1 | 1 |
| 3 | 1 | 1 | 2 | 1 |

*Test Method:* in accordance with OECD Guidelines for Testing Chemicals (5)

*Result:* moderate irritant in the rabbit

### 9.4 Overall Assessment of Toxicological Data

INCA 300 containing 60% notified polymer, 30% xylene and 10% butanol showed low oral toxicity ($LD_{50}$ >200 mg/kg) in rats. When tested in rabbits it was a moderate skin irritant.

On the basis of submitted data, the notified chemical would not be classified as hazardous in accordance with Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (8) in relation to acute lethal effects (oral) and skin irritancy.

## 10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data are not required for polymers of NAMW >1000 according to the Act as they are not transported readily across membranes and therefore cannot affect living organisms. Although the notified material contains a high proportion of material with a molecular weight <1000 these compounds are expected to be complex phenols of UVCB type and are expected to bind to the cured polymer and be trapped in the polymer matrix. They are not expected to leach and should not have any effect on the environment.

## 11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when stored, and applied as described due to the type of application and the localised containment of waste. This containment of waste combined with efficient application techniques will

result in very low release to the environment. While open air application in windy conditions can result in significant losses to the environment (>20%) these losses make application uneconomical and unlikely to occur under these conditions. Assuming outdoor application under moderate wind conditions, loss at 10% during application and a mixing ratio of 1 in 4, as much as 1000 kg per year could be lost to waste. This waste may be collected and disposed of to landfill or may dry onto dry dock or slipway facilities.

Although there is a significant amount of low molecular weight material (<24% under 1000 MW) this material is expected to consist of complex phenols of UVCB type formed as a reaction product. In its cured form this material is expected to bind with and be immobile in the polymer matrix. In liquid, uncured, form this material is strongly hydrophobic and would be expected to partition to sludge and not persist in the aquatic compartment. Due to the end use application and the high molecular weight of the cured polymer and non-leaching of bound material, it is unlikely to be hazardous to aquatic organisms.

The polymer is expected to be strongly bound to the substrate and other components of the coating mixture. Paint on ships or steel is unlikely to be released into the environment under normal conditions.

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

The notified polymer is stable, not explosive under room conditions. High flammability and possible fire hazard of the product containing the notified chemical is attributed to xylene. Based on the submitted data, the major toxicological concerns associated with the formulation containing INCA 300 polymer is its potential for moderate skin irritation.

The notified chemical on the basis of the toxicological data is not classified as hazardous according to criteria of Worksafe Australia. The formulation is classified hazardous due to the presence of 30% xylene.

During the use of the chemical, occupational exposure will be limited to workers involved in the formulation process, which involves decanting, mixing and filling operations. The process will be conducted under local exhaust ventilation. Workers may be potentially exposed via dermal or eye exposure while fitting dosing system connections to the imported drums and filling steel cans.

As the spraying will be carried out in spray booths, sheds with controlled ventilation and in the open air, this would tend to reduce the exposure to the notified polymer as well as to the evaporating solvent, xylene. However, during windy weather spraying carried out in the open air will be discontinued to reduce exposure to spray drift.

Personal protective equipment including impervious gloves, cartridge respirators and safety glasses with side shield should be adequate to minimise exposure during decanting, filling operations and spraying.

The potential for minor public exposure exists during transport, and disposal of the polymer following an accidental spill. This is minimised by the recommended practices for disposal, or, in the event of accidental spillage practices stipulated in the Material Safety Data Sheet (MSDS).

## 13. RECOMMENDATIONS

To minimise occupational exposure to the notified polymer the following guidelines and precautions should be observed:

- During decanting, filling operations and spraying the following personal protective equipment which conforms to Australian Standard (AS) or Australian/New Zealand (AS/NZS) should be worn:

  Safety glasses with side shields should be selected and fitted in accordance with AS 1336 (9) to comply with AS/NZS 1337 (10),

  Cartridge respirators should be selected and used in accordance with AS/NZA 1715 (11) to comply with AS/NZA 1716 (12),

  Impermeable gloves conforming to AS 2161 (13) and AS 3765.1 (14),

  All occupational footwear should conform to AS/NZS 2210 (15);

- Spillage of the notified chemical should be avoided;

- Good personal hygiene should be practised to minimise the potential for ingestion; and

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

## 14. MATERIAL SAFETY DATA SHEET

The attached MSDS for "solution of polyamine adduct" containing INCA 300 Polymer was provided in accordance with the *Code of Practice for the Preparation of Material Safety Data Sheets* (16)..

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


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3. Gobas *et al.* 1986. *Environmental Toxicology and Chemistry*, **5**, 637-646.

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6. Cuthbert J.A., Jackson D, 1990, *Project Number 245684 - Acute dermal irritation test performed on INCA 300,* Inveresk Research International Ltd, Scotland.

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9. Standards Australia 1994, *Australian Standard 1336-1994*, *Eye protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney.

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

11. 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, Standards Association of New Zealand Publ, Wellington.

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