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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Urethane Resin in Croda Supershield CSB 4032

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 Human Services and Health.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Urethane Resin in Croda Supershield CSB 4032

1. APPLICANT

A C Hatrick Chemicals of 49-61 Stephen Road BOTANY NSW 2019 has submitted a limited notification statement in support of their application for an assessment certificate for Urethane Resin in Croda Supershield CSB 4032.

2. IDENTITY OF THE CHEMICAL

Urethane Resin in Croda Supershield CSB 4032 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.

2. IDENTITY OF THE CHEMICAL

Other Names:	urethane resin GP IF 4032
Trade Name:	Croda Supershield CSB 4032
Number-Average Molecular Weight:	> 1 000

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	pale green or grey liquid
Boiling Point:	not available
Specific Gravity:	1.107 at 25°C
Vapour Pressure:	not available
Water Solubility:	insoluble

Partition Co-efficient (n-octanol/water):	not available
Hydrolysis as a Function of pH:	not available
Adsorption/Desorption:	not available
Dissociation Constant:	not available
Flash Point:	not available
Flammability Limits:	not flammable (formulation)
Autoignition Temperature:	not available
Explosive Properties:	not available
Reactivity/Stability:	not readily biodegradable (formulation)

Comments on Physico-Chemical Properties

It is expected that the polymer will have a very low vapour pressure due to its high molecular weight.

The notifier claims that the polymer is likely to be insoluble in water, and due to its complex structure and high molecular weight, any solubility will be insignificant. The notified polymer, a mixed polyurethane polyester with relatively few polar groups, will have low water solubility.

The notifier claims that it is unlikely that the polymer will hydrolyse at neutral pH due to its expected low water solubility. It is noted that the polymer contains a number of ester linkages but hydrolysis in the environmental pH range would be precluded by low solubility.

It is expected that the polymer will have a high partition coefficient. However, due to the polymer's expected low water solubility and molecular weight range, testing to determine the partition coefficient would be very difficult.

Due to the polymer's expected low water solubility, and it being highly viscous and non-volatile, it is expected that migratory tendencies into the air, water and soil would be limited.

The dissociation constant is not applicable as the polymer is expected to have low water solubility. The polymer does not possess any dissociable groups.

4. PURITY OF THE CHEMICAL

Degree of Purity: high

Toxic or Hazardous Impurities: see residual monomers

Non-hazardous Impurities: see residual monomers

Maximum Content of Residual Monomers/Other Reactants:
< 0.5%

All the residual monomers that are listed on Worksafe Australia's *List of Designated Hazardous Substances* (1) are below the threshold values for classification as hazardous. Where the residual monomer is not listed on (1) or Toxline (2) as having hazardous effects it is considered that the concentration in the polymer is so low as to not pose a toxicological threat.

Additives/Adjuvants: imported formulation contains 41% of the notified polymer and the following solvents:

Chemical name:	trimethylolpropane triacrylate
CAS No.:	15625-89-5
Weight percentage:	43%
Toxic properties:	irritant and sensitiser, irritant threshold for hazardous classification, 1%, according to Worksafe Australia's *List of Designated Hazardous Substances* (1)

Chemical name:	hexanedioldiacrylate
Synonyms:	hexamethethylene diacrylate
CAS No.:	13048-33-4
Weight percentage:	16%
Toxic properties:	irritant and sensitiser, irritant threshold for hazardous classification, 1%, according to Worksafe Australia's *List of Designated Hazardous Substances* (1)

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported into Australia in 200 L steel drums as a component of Croda Supershield CSB 4032 (contains 41% notified polymer). This will be reformulated into paint products for professional use only; these products will contain 15.7% of the notified polymer. These paints will be used for high build applications such as rolling stock and agricultural machinery.

Import volumes for the notified polymer are as follows:

Year	1	2 - 4	5
Import Volume (tonnes)	25	25 - 200	200

6. OCCUPATIONAL EXPOSURE

The notified polymer is not manufactured in Australia but imported as a component of the formulation Croda Supershield CSB 4032. The likelihood of occupational exposure prior to reformulation at paint manufacturing facilities is low; exposure is only likely to occur due to accidental spillage.

Occupational exposure to the notified polymer can potentially occur during reformulation and during application of the paint products containing 15.7% of the notified polymer.

The processes involved in paint formulation include:

- lab development, which will involve personnel for periods of 8 hours/day for 10 days/year.
- paint makeup, which will involve personnel for periods of 3 hours/day; frequency dependent on market acceptance of the polymer formulation.
- quality control (QC) testing, which will involve personnel for periods of 6 hours/day; frequency dependent on market acceptance of the polymer formulation.
- filling, which will involve personnel for periods of 6 hours/day; frequency dependent on market acceptance of the polymer formulation.

All the above processes will occur under exhaust ventilation with the capture of volatiles using scrubbers. Staff will be provided with personal protective equipment including goggles and solvent resistant gloves.

Paint products containing the notified polymer will be applied using the airless spray technique. This will occur in spray booths with fume extraction and downdraft ventilation which will reduce worker exposure.

The main exposure pathways during reformulation of the notified polymer will be dermal and possibly ocular. Inhalational exposure to both the notified polymer and solvent fumes will be minimised by the use of exhaust ventilation and scrubbers for volatiles. In addition the notified polymer is not considered volatile. During spray application dermal, ocular and inhalational exposure is possible during both

premixing and application. The use of fume extraction and downdraft ventilation and respiratory protection will minimise this exposure in spray booths.

7. PUBLIC EXPOSURE

The notified polymer or paint containing the notified polymer will not be available to the public, but the public may come into contact with the products coated with the paint. Although paint application may occur in the open environment, the low volatility of the notified polymer will minimise public exposure both during reformulation and application.

The waste polymer will largely be disposed of to landfill. Due to the polymer's insolubility and cured form, groundwater contamination is unlikely. Waste disposal is therefore not expected to result in significant public exposure.

8. ENVIRONMENTAL EXPOSURE

Release

Paint formulation will be carried out under exhaust ventilation with the capture of volatiles. Spills at the site will be contained by onsite bunding. Notified polymer losses during the paint manufacturing process are estimated to be 2% (up to 4 tonnes per year of the polymer at maximum import volumes). One of the proposed paint manufacturers has developed a solvent recovery process whereby waste resin and paint are processed to reclaim the solvent. It is anticipated that waste resin and paint at the other paint manufacturing sites will be collected and disposed of to landfill by a licensed waste contractor (this may include solvent recovery prior to disposal).

During application by the airless spray technique, it is expected that up to 2% of the polymer will be lost through overspray (up to 4 tonnes per year of the polymer at maximum import volumes). However, release of this paint will generally be confined within spray booths with fume extraction. The notifier has advised that up to 10% of the total paint used could be applied in an open environment. After application, the paint will dry (cure) to form a coating to protect the surface. Paint application equipment will be cleaned by circulating a compatible solvent, eg xylene, through the system. Losses through overspray and cleaning will be collected in drums by the applicator and sent to a solvent recycler for treatment. Waste resin and paint resulting from this process will be sent to landfill. Spraying of the paint in the open environment will see the overspray deposit on the ground surrounding the site of application, where it is expected to remain.

Drums containing the notified polymer will be sent to a drum reconditioner who will incinerate the drum prior to the actual recycling for other uses. There will be a maximum of 2% of polymer left in the drums.

Fate

The majority of the notified polymer is not expected to be released to the environment until it has been fully cured into a solid polymer matrix. When the polymerised polymer is disposed of, either as a residue or as a coating, no hydrolysis, movement, leaching, biodegradation or bioaccumulation of the polymer is expected. The paint containing the polymer will share the fate of the substrate to which it is applied.

Uncured (non-polymerised) polymer disposed of to landfill should remain immobile in the landfill due to the polymer's expected low solubility in water.

Incineration of the polymer is expected to produce water, and oxides of carbon and nitrogen. Any chips or flakes of the cured paint that occur (due to stone chips, accidents, wear and tear, *etc*) will be inert, diffuse and form part of the soil/sediments.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided, which is acceptable for polymers of number-average molecular weight (NAMW) greater than 1 000 according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology data were provided, which is acceptable for polymers of NAMW greater than 1000 according to the Act.

Due to the polymer's high molecular weight, the majority of it is not anticipated to cross biological membranes (3,4).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The main environmental exposure of the polymer arises from the landfill disposal of recovered dry waste paint from the manufacturing and application processes. It is estimated that up to 8 tonnes per year of the polymer may be consigned to landfill at maximum projected import volumes (due to 2% wastage through paint manufacture and 2% overspray in application). However, such material will be cured, or bound to soil, and remain immobile in the environment. The environmental hazard from such disposal is expected to be low.

The main environmental hazard would arise through spillage in transport accidents that may release quantities of the uncured polymer to drains and waterways. However, the polymer would quickly become immobile on association with soil/sediment. Adequate control procedures are outlined in the material safety data sheet (MSDS).

The polymer is unlikely to present a hazard to the environment when it is used in heavy duty coatings for steel. Such painted panels will be consigned to landfill or recycled at the end of their useful life. Chips or flakes of the cured basecoat will form part of the sediments. The environmental hazard from such exposure of cured basecoat is expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological data were provided for the polymer. The NAMW of the polymer is greater than 1 000 which would largely preclude transmission across biological membranes and be of low toxicological concern. The level of individual residual monomers is low (< 0.5%). The maximum concentration of low molecular weight polymers with a NAMW greater than 1 000 is approximately 0.1%. The toxicity of these low molecular weight polymers is unknown and potentially they are transmissible across biological membranes, however their presence is not expected to be of toxicological significance due to the low concentrations. On the basis of the polymer composition, including residual monomers, there is no basis for classification of the polymer as hazardous according to the criteria of Worksafe Australia (5). The formulation, containing the notified polymer and approximately 60% organic solvents is classified as hazardous as both of the organic solvents are irritants and sensitisers and exceed the threshold for hazardous classification according to the Worksafe criteria. The likely route of exposure to these solvents would be dermal and inhalational. The manufacturer has not stated an atmospheric exposure standard for the formulation or the solvents and none are listed by Worksafe Australia.

The notified polymer will not be manufactured in Australia and will only be imported as a component (~40%) of Croda Supershield CSB 4032. Occupational exposure is unlikely during warehousing or transport, it is more likely to occur during reformulation into paint products and during application of these products. These paints will contain 15.7% of the notified polymer.

At all stages in the paint manufacturing process exhaust ventilation and fume extraction are employed, these in conjunction with the low volatility of the polymer and the use of personnel protective equipment will minimise occupational exposure. Occupational exposure to the polymer during airless spraying will also be limited when applied in spray booths with downdraft ventilation and fume extraction. The hazardous nature of the solvents used in conjunction with the notified polymer in the paint product indicates that appropriate dermal and respiratory protection is required during application. With the use of the appropriate personnel safety equipment the risk through occupational exposure to the notified polymer is low.

Public contact with steel coated with paint containing the notified polymer may occur; however, the notified polymer will be incorporated into the cured paint and its adhesion to the substrate and physico-chemical properties of the dry coating will preclude absorption of the notified polymer across biological membranes.

13. RECOMMENDATIONS

To minimise occupational exposure to Urethane Resin in Croda Supershield CSB 4032 the following guidelines and precautions should be observed:

- Industrial clothing should conform to the specifications detailed in Australian Standard (AS) 2919 (8) and AS 3765.1 (9);
- All occupational footwear should conform to Australian/New Zealand Standard (AS/NZS) 2210 (11);
- 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 MSDS should be easily accessible to employees.

The following safety equipment should be used when handling the imported formulation Croda Supershield CSB 4032:

- Safety goggles should be selected and fitted in accordance with AS 1336 (6) to comply with AS/NZS 1337 (7);
- Impermeable gloves or mittens should conform to AS 2161 (10);

In addition during spray application of paints containing the notified polymer it is advisable to use an appropriate respiratory device which should be selected and used in accordance to (AS/NZS) 1715 (12) and should conform to AS/NZS 1716 (13) to minimise inhalational exposure to the notified polymer and other components of the paint.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the imported formulation containing the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (14).

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. Toxline Silver Platter 1995, *Toxline SilverPlatter CD-ROM database, January 1994-June 1996*, Silver Platter International N.V.

2. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.

3. Anliker, R., Moser, P. & Poppinger, D., 1988. "Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors". *Chemosphere* vol.17(8), pp 1631-1644.

4. Gobas, F.A.P.C, Opperhuizen, A. & Hutzinger O., 1986. "Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation". *Environmental Toxicology and Chemistry* vol.5, pp 637-646.

5. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(1994)], Australian Government Publishing Service, Canberra.

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

7. 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.

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

9. Standards Australia 1990, *Australian Standard 3765.1-1990, Clothing for Protection against Hazardous Chemicals Part 1 Protection against General or Specific Chemicals,* Standards Association of Australia Publ., Sydney.

10. Standards Australia 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding electrical and medical gloves),* Standards Association of Australia Publ., Sydney.

11. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear,* Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.

12. 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.

13. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices,* Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.

14. 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.