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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in Disperbyk-170

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Polymer in Disperbyk-170****1. APPLICANT**

A C Hatrick Chemicals Pty Ltd of 49-61 Stephen Road BOTANY NSW 2019 has submitted a limited notification statement for an assessment certificate for Polymer in Disperbyk-170.

2. IDENTITY OF THE CHEMICAL

Polymer in Disperbyk-170 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: 42311

Trade Name: Disperbyk-170 (contains 32% of notified polymer)

**Number-Average
Molecular Weight:** > 1 000

**Maximum Percentage of Low
Molecular Weight Species**

Molecular Weight < 500: < 1%

Molecular Weight < 1000: < 10%

**Method of Detection
and Determination:** infrared (IR)

3. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance at 20°C
and 101.3 kPa:** polymer is a white solid with no characteristic odour; Disperbyk-170 is a yellowish liquid

Melting Point: > 200°C

Specific Gravity:	ca. 1.0	
Vapour Pressure:	0.1 kPa at 25°C	
Water Solubility:	25 mg/L at pH 4 24 mg/L at pH 7 28 mg/L at pH 9	(OECD TG 105 Shake Flask Method (1))
Partition Co-efficient (n-octanol/water):	not provided	
Hydrolysis as a Function of pH:	not determined	
Adsorption/Desorption:	not determined	
Dissociation Constant:	not provided	
Flash Point:	> 100°C	
Flammability Limits:	does not form flammable vapours	
Autoignition Temperature:	not provided	
Explosive Properties:	not explosive	
Reactivity/Stability:	does not decompose at temperatures $\leq 150^{\circ}\text{C}$	

Comments on Physico-Chemical Properties

The moderate water solubility is the result of the salt form of the polymer.

The company has stated that partition coefficient was not applicable due to the polymer being not soluble in water. The high molecular weight of the polymer is likely to prevent it from crossing biological membranes and this test would be difficult to perform and interpret.

The company has not determined hydrolysis. The polymer contains a number of hydrolysable ester groups but hydrolysis under environmental conditions is not expected due to relatively low solubility.

No data was provided for adsorption/desorption. The EPA expects that as the solvent evaporates from the polymer solution it will become more and more viscous and sticky and will readily bind to the soil, thereby becoming immobilised.

No data was provided for dissociation constant. The polymer is a salt of certain functionalities which are expected to show typical moderate basicity.

4. PURITY OF THE CHEMICAL

Degree of Purity: ~93.9%

Toxic or Hazardous Impurities:

<i>Chemical name:</i>	acetic acid, butyl ester
<i>Synonyms:</i>	butyl acetate, n-butyl acetate
<i>CAS No.:</i>	123-86-4
<i>Weight percentage:</i>	< 0.1
<i>Toxic properties:</i>	mild skin and eye irritant; occupational exposure standard TWA 150 ppm (713 mg/m ³) (2)
<i>Chemical name:</i>	2-propanol, 1-methoxy-, acetate
<i>Synonyms:</i>	2-methoxy-1-methyl ethyl acetate
<i>CAS No.:</i>	108-65-6
<i>Weight percentage:</i>	< 1%
<i>Toxic properties:</i>	causes central nervous system (CNS) depression; exposure standard 110 mg/m ³ (20 ppm) (3)

The other toxic or hazardous impurities are at very low levels and/or are not considered to significantly increase the toxicity of the notified chemical.

Non-hazardous Impurities < 0.1%
(> 1% by weight):

No reference to toxic properties of this chemical could be found in Worksafe Australia's *List of Designated Hazardous Substances* (4), Toxline (3) or Sax and Lewis (5).

Maximum Content of Residual Monomers: < 6.1

Additives/Adjuvants: formulation Disperbyk-170 contains the notified polymer and 58% propylene glycol monomethyl ether acetate (CAS# 108-65-6) and 10% n-butyl acetate (CAS# 123-86-4)

Neither of the additives are listed on Worksafe Australia's *List of Designated Hazardous Substances* (4). However n-butyl acetate is listed as a skin, eye and mucous membrane irritant on Toxline (1). An occupational exposure standard for n-butyl acetate of TWA of 150 ppm (713 mg/m³) is listed in Worksafe Australia's *Exposure Standards for Atmospheric Contaminants in the Occupational Environment* (2). The formulation is not classified as hazardous according Worksafe Australia's

Approved Criteria for Classifying Hazardous Substances (12) on the basis of the composition of the formulation. It is however classified as a dangerous good according to the *Australian Dangerous Goods Code* (6) due to its flammability.

5. USE, VOLUME AND FORMULATION

Disperbyk-170 will be imported from Germany at a rate of 1-5 tonnes per year over the first five years (ie. ca. 0.3 - 1.6 tonnes of the notified polymer). The notified polymer is never isolated as a defined entity but always remains in solution in a mixture of organic solvents. The notified chemical will be in the final paint product at a concentration of ~1%. The major use of the paints will be in coil coating formulations for the manufacture of colour-bond metal sheets. About 5% of paint will also be used in spray formulations, where the end use products would be car bodies or general industrial articles such as white goods. The notified polymer will only be used in the manufacture of industrial paints which will not be sold to the public. The notifier states that the notified polymer formulation, Disperbyk-170, is marketed world wide.

6. OCCUPATIONAL EXPOSURE

The notified chemical is never isolated from the formulation, Disperbyk-170. The notified polymer is only imported into Australia as the formulation, Disperbyk-170. Disperbyk-170 is supplied to the notifier's customers for reformulation into paints. It is either sent direct from the wharf or from the notifier's warehouse. Occupational exposure during warehousing and transport is therefore unlikely and will only occur in the event of accidental release.

Although the formulation will be made available to the general paint industry the primary customer will be Dulux who will use the Disperbyk-170 to formulate paint which will then be supplied to Broken Hill Proprietary (BHP) for painting their "Colourbond" steel products.

Occupational exposure to the notified polymer will be greatest during reformulation into paint. Two main groups of employees will be potentially exposed to the polymer these are laboratory personnel involved in development of paints and those involved in paint manufacture.

The paint manufacturing process involves blending and mixing the Disperbyk-170 with other ingredients. The mixers are equipped with exhaust ventilation to capture volatiles. Following blending, batch adjustment and filtration the paint is used to fill 200 L drums under exhaust ventilation.

The final paint formulation contains ~1% of the notified polymer. Potential exposure may occur during paint application at BHP's facilities. The actual application process is automated and takes place in an area with effective ventilation. Prior to application the paint is thinned using solvents and heat is used to cure the paint resulting in a relatively inert matrix containing the notified polymer. The paint is applied to "Colourbond" with rollers. The paints may also be spray applied, this will

occur in a spray booth with fume extraction and down draft ventilation.

The notified polymer is at its most concentrated in the formulation Disperbyk-170; it is at a concentration of ~32%. Worker exposure to the notified polymer will be highest when in contact with the formulation Disperbyk-170 and subsequently reduced when exposed to the final paint formulations containing the notified polymer at ~1%. The main exposure pathway to the notified polymer during paint formulation and roller application will be dermal although eye exposure may occur due to splashing or due to exposure to aerosols. Inhalational exposure to the polymer may occur during paint application as a spray. The formulation Disperbyk-170 is moderately volatile but this is mainly due to the solvents rather than the notified polymer. Atmospheric exposure standards for n-butyl acetate are applicable.

The low concentration (~1%) of the notified polymer in the paint formulations and the necessity for respiratory protection due to the solvents used will mean that actual inhalational exposure will be low.

7. PUBLIC EXPOSURE

Disperbyk-170 will be distributed by road directly from the wharf or from A C Hatrick Chemical's warehouses to manufactures of paint products. No public exposure is expected to occur during storage or distribution of the notified polymer.

Paint manufacturers will blend Disperbyk-170 with other paint ingredients in mixers fitted with exhaust ventilation. The blended product will be packaged in 200 L drums and then stored or distributed to industrial paint applicators (formulated paint products will not be sold to the public). The paint is expected to be applied by rollers or spray. Transfer efficiencies during roller applications are anticipated to be 100%, and although transfer efficiencies for paint spraying applications have not been provided, spraying will be conducted in spray booths fitted with fume extraction and down draft ventilation. No public exposure to the notified polymer is expected to occur during the manufacture, storage, distribution or industrial use of paint products.

Disposal of any waste polymer produced during the manufacture of paints will be to secured landfill and is not expected to lead to public exposure.

While the full range of products treated with paints containing the notified polymer is not known, major uses will be the painting of colour-bond metal sheets, car bodies, and general industrial articles such as white goods. Although the public will come into contact with painted surfaces containing the notified polymer, when cured the notified polymer is not expected to leach from painted surfaces, and therefore, no public exposure to the notified polymer is expected to occur.

8. ENVIRONMENTAL EXPOSURE

Release

The polymer will be imported into Australia in steel containers. From the wharf, it will

be transported directly to the customer or warehouse. Release to the environment during transport and handling would only occur during the unlikely event of an accident.

Manufacture and packing of the paint containing the notified substance would take place initially at the formulating and blending plant of Dulux. The process is conducted in a bunded area under exhaust ventilation with the capture of volatiles. Spillages and rinsate from cleanup procedures are treated by a process developed at Dulux, in which the solids and sludge are dried and consigned to landfill and solvents are recycled. Estimates of the notified polymer contained in the polymer to be disposed of to landfill from formulation and filling processes are not given but are not expected to be significant.

At the three BHP sites, Acacia Ridge (Qld), Port Kembla (NSW), and Westernport (Vic), the paint products are applied to metal sheets by the coil coating technique with a high transfer efficiency. Any paint waste generated would be combined with the next batch. The drum residue is incinerated and the drums are recycled. Therefore, negligible loss to the environment from coil coating applications is expected.

In future, use of a very small percentage (~5%) of paints in spray painting applications is also envisaged. Spray painting in exposed areas can lead to losses to the environment of up to 75% as small widely dispersed particles (7). In the loss to soil, water and air the paint formulation containing the polymer will adhere strongly to soil and sediment and become immobilised. Paint formulations containing this polymer product (eg. overspray from spray booths) are likely to be immobile and non dispersive. Mechanical cleanup of dried paint and consignment to landfill is the suggested procedure for spillages at the application sites.

Fate

As the notified substance is a polymer with low water solubility, degradation in or leaching from landfill sites is not expected. Incineration of the notified substance is expected to produce water and oxides of carbon and nitrogen.

Most of the notified polymer is not expected to be released to the environment until it has been fully cured into a solid polymer matrix on the surface of the treated object. Bioaccumulation of the polymer is unlikely due to the high molecular weight of the polymer.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1 000 according to the Act; however, the following toxicity test data were provided by the chemical manufacturer:

9.1 Acute Toxicity

Summary of the acute toxicity of Polymer in Disperbyk-170

Test	Species	Outcome	Reference
acute oral toxicity	rat	LD50 > 5 000 mg/kg	8
skin irritation	rabbit	not an irritant	9
eye irritation	rabbit	not an irritant	11

9.1.1 Oral Toxicity (8)

<i>Species/strain:</i>	Wistar rats
<i>Number/sex of animals:</i>	5/5; two doses and controls
<i>Observation period:</i>	24 hours extended to 14 days
<i>Method of administration:</i>	gavage
<i>Clinical observations:</i>	none
<i>Mortality:</i>	none
<i>Morphological findings:</i>	none
<i>Test method:</i>	in accordance with OECD Guidelines for Testing Chemicals (1)
<i>LD₅₀:</i>	> 5 000 mg/kg
<i>Result:</i>	low acute oral toxicity

9.1.2 Skin Irritation (9)

<i>Species/strain:</i>	New Zealand white rabbits
<i>Number of animals:</i>	5
<i>Observation period:</i>	7 days
<i>Method of administration:</i>	powdered material applied to shaved skin, covered with gauze which was then wetted; material removed after 4 hours
<i>Draize scores (10):</i>	0 ^a see Attachment 1 for Draize scales
<i>Test method:</i>	in accordance with OECD Guidelines for Testing Chemicals (1)
<i>Result:</i>	not a skin irritant

9.1.3 Eye Irritation (11)

Species/strain: New Zealand white rabbits

Number of animals: 6

Observation period: 7 days

Method of administration: as powder into conjunctival sac of one eye

Draize scores (10) of unirrigated eyes:

Time after instillation															
Animal	1 day			2 days			3 days			4 days			7 days		
Cornea	o ^a	a ^b		o ^a	a ^b		o ^a	a ^b		o ^a	a ^b		o ^a	a ^b	
1	0	0		0	0		0	0		0	0		0	0	
2	0	0		0	0		0	0		0	0		0	0	
3	0	0		0	0		0	0		0	0		0	0	
4	0	0		0	0		0	0		0	0		0	0	
5	0	0		0	0		0	0		0	0		0	0	
6	0	0		0	0		0	0		0	0		0	0	
Iris															
1		0			0			0			0			0	
2		0			0			0			0			0	
3		0			0			0			0			0	
4		0			0			0			0			0	
5		0			0			0			0			0	
6		0			0			0			0			0	
Conjunctiva	r ^c	c ^d	d ^e	r ^c	c ^d	d ^e	r ^c	c ^d	d ^e	r ^c	c ^d	d ^e	r ^c	c ^d	d ^e
1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0

¹ see Attachment 1 for Draize scales

^a opacity ^b area ^c redness ^d chemosis ^e discharge

Test method: in accordance with OECD Guidelines for Testing Chemicals (1)

Result: not classified as an irritant according to the criteria of Worksafe Australia (12)

9.2 Overall Assessment of Toxicological Data

The notified chemical has a low oral toxicity to rats ($LD_{50} > 5\,000\text{ mg kg}$). There are no results available for dermal toxicity or long term oral toxicity. It is not an eye and skin irritant in rabbits and only produced short term conjunctival indications in the rabbit eyes in the irritation study. On the basis of the these tests the notified chemical would not be classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (12).

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

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

The polymer molecule contains a quaternary ammonium functionality. Such polymers have been shown to be toxic to fish. However, very little exposure of the aquatic compartment to this polymer is likely.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is incorporated into the paint and applied to solid substrates. Such painted objects will be consigned to landfill or recycled at the end of their useful life and the coating containing the notified substance will share their fate.

The main environmental exposure arises from landfill disposal of recovered waste paint containing the notified polymer. Such material will be bound to soil and remain immobile in the environment. However, minimal amounts are expected to be disposed to landfill and overall, environmental hazard is expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW $> 1\,000$ and should not, therefore, be able to cross biological membranes and cause adverse health effects. The levels and types of residual monomers are unlikely to render the polymer hazardous. The percentage of low molecular weight species are also unlikely to render the polymer hazardous (4). The hazardous impurities including 2-methoxy-1-methyl ethyl acetate ($<1\%$) and butyl acetate (0.1%), are at low concentrations and consequently will be present at extremely low levels in paint products and are therefore not expected to present a toxicological threat. The toxicological data submitted indicate that the polymer has low oral toxicity in rats ($LD_{50} > 5\,000\text{ mg/kg}$) and is not classified as an eye or skin irritant in rabbits and overall would not be classified as hazardous according to the criteria of Worksafe Australia (12).

The notified polymer is only imported as part of a formulation, Disperbyk-170 which contains a high percentage of solvents. The formulation is flammable and is classified under the *Australian Dangerous Goods Code* (6) as 3 [Y] (flammable liquid). One of the solvents, n-butyl acetate, is a mild eye, skin and mucosal membrane irritant (2) but is not listed by Worksafe Australia on the *List of Designated Hazardous Substances* (4) although an atmospheric exposure standard of TLV 150 ppm applies (2). Therefore on the basis of the composition of Disperbyk-170, the formulation is not classified as hazardous according to the criteria of Worksafe Australia (12).

There is a low risk of adverse health effects from the notified polymer to workers during transport, storage or application of paint formulations. There is some risk of mild irritation associated with exposure to the solvents used in the formulation Disperbyk-170 indicating that contact with the formulation should be minimised. The paint formulations which contain Disperbyk-170 consists of ~1% of the notified polymer.

Although public contact with the painted surfaces containing the notified polymer may occur, the high NAMW for the polymer suggests that if contact were to occur, absorption is unlikely, and therefore there is negligible risk to public safety.

13. RECOMMENDATIONS

To minimise occupational exposure to the Polymer in Disperbyk-170 the following guidelines and precautions should be observed when using Disperbyk-170 to formulate other products. These recommendations take into account the other ingredients within the formulation Disperbyk-170 and the fact that the notified polymer is never isolated from this mixture:

- Safe practices, which should be followed when handling any chemical formulation include:
 - minimising spills and splashes;
 - practising good personal hygiene; and
 - practising good housekeeping and maintenance including bunding of large spills which should be cleaned up promptly with absorbents and put into containers for disposal.

It is expected that, in the industrial environment, protective clothing conforming to and used in accordance with Australian Standard (AS) 2919 (13) and protective footwear conforming to Australian/New Zealand Standard (AS/NZS) 2210 (14) should be worn as a matter of course. In addition it is advisable when handling chemical formulations containing significant proportions of the notified polymer to wear chemical-type goggles, selected and fitted according to AS1336 (15) and meeting the requirements of AS/NZS 1337 (16)), impermeable gloves (AS 2161) (17) should also be worn.

- A copy of the Material Safety Data Sheet (MSDS) should be easily accessible to employees.
- When reformulating using Disperbyk-170, good general and local exhaust ventilation should be provided especially where this occurs in open systems. Where this is not available then the appropriate respiratory device should be selected and used in accordance with Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (18) and should conform to AS/NZS 1716 (19).

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (20).

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. Toxline Silverplatter database on CD-ROM, January 1994 - December 1995.
4. National Occupational Health and Safety Commission, 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.
5. Sax, N I & Lewis, R J, 1989. *Dangerous Properties of Industrial Materials*, Van Nostrand Reinhold, New York.

6. Federal Office for Road Safety, 1992. *Australian Code for the Transport of Dangerous Goods by Road and Rail*, 5th Edition, Australian Government Publishing Service Publ., Canberra.
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15. Australian Standard 1336-1982. *Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, 1982.
16. Australian Standard 1337-1984. *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, 1984.
17. Australian Standard 2161-1978. *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, 1978.
18. 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.

19. Standards Australia/ Standards New Zealand, 1991. *Australian/New Zealand Standard 1716 - 1991 Respiratory Protective Devices*. Standards Association of Australia Publ., Sydney, Australia.
20. National Occupational Health and Safety Commission, 1994. *National Code of Practice for the Completion of Material Safety Data Sheets*, [NOHSC:2011(1994)], AGPS, Canberra.

Attachment 1

The Draize Scale for evaluation of skin reactions is as follows:

Erythema Formation	Rating	Oedema Formation	Rating
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising)	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale for evaluation of eye reactions is as follows:

CORNEA

Opacity	Rating	Area of Cornea involved	Rating
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

Redness	Rating	Chemosis	Rating	Discharge	Rating
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS

Values	Rating
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe