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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

2-Propenoic acid, -2-methyl hydroxyethyl ester polymer with 2-propenoic acid, -2-methyl methyl ester; styrene; 2-propenoic acid, -2-methyl isodecyl ester; and propenoic acid, butyl ester

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 Health and Family Services.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

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1. APPLICANT

European Automotive Paint Supplies Pty Ltd WAYVILLE SA 5034 has submitted a notification statement accompanying an application for assessment of a synthetic polymer of low concern, 2-Propenoic acid, -2-methyl hydroxyethyl ester polymer with 2-propenoic acid, -2-methyl methyl ester; styrene; 2-propenoic acid, -2-methyl isodecyl ester; and propenoic acid, butyl ester. No request for exempt information was received. Therefore all information relating to the polymer is contained within this report.

2. IDENTITY OF THE CHEMICAL

2-Propenoic acid, -2-methyl hydroxyethyl ester polymer with 2-propenoic acid, -2-methyl methyl ester; styrene; 2-propenoic acid, -2-methyl isodecyl ester; and propenoic acid, butyl ester meets the definition of a Polymer of Low Concern under the Act, and is not considered to be hazardous according to Worksafe Criteria (1), based on the nature of the polymer and the data provided.

Chemical Name:	2-Propenoic acid, -2-methyl hydroxyethyl ester polymer with 2-propenoic acid, -2-methyl methyl ester; styrene; 2-propenoic acid, -2-methyl isodecyl ester; and propenoic acid, butyl ester
Chemical Abstracts Service (CAS) Registry No.:	182479-07-8
Trade Name(s):	Acrylic TSA UNO Glasurit-High-Solid 2K-PUR-Acrylic Car Enamel 22
Molecular Formula:	$(C_6H_{10}O_3.C_5H_8O_2.C_8H_8.C_{14}H_{26}O_2.C_7H_{12}O_2)x$
Structural Formula:	the polymer is a random polymer; the following representational structural formula has been prepared based on the information provided by the notifier.

Number-Average Molecular Weight: 2 100

Maximum Percentage of Low Molecular Weight Species (Polymers and Oligomers)
(Molecular Weight < 1 000): 4.9%
(Molecular Weight < 500): 0.3%

Polymer Constituents:

Name	*CAS Number*	*% Weight*
2-hydroxyethyl methacrylate	868-77-9	27.6
methyl methacrylate	80-62-6	23.5
styrene	100-42-5	20.4
isodecyl methacrylate	29964-84-9	17.3
butyl acrylate	141-32-2	11.2

Means of Identification (List of Spectral Data Available): an infrared spectrum was provided for the notified polymer; major characteristic peaks were found at: 702, 758, 991, 1 148, 1 268, 1 384, 1 452, 1 726, 2 950 3 517 cm^{-1}

Residual Monomers and Impurities:

Name	**CAS Number**	**% Weight**
methyl methacrylate	80-62-6	≤0.2
2-hydroxyethyl methacrylate	868-77-9	≤0.2
isodecyl methacrylate	29964-84-9	≤0.1
styrene	100-42-5	≤0.0
butyl acrylate	141-32-2	0.0

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	colourless liquid with solvent odour
Boiling Point	not determined
Specific Gravity	1.10 at 20°C
Water Solubility:	0.3 $mg.L^{-1}$
Flammability Limits:	not determined for polymer, formulation solvents highly flammable
Autoignition Temperature:	not determined for polymer
Reactivity:	not expected to be reactive

Comments on Physico-Chemical Properties

Water solubility of the polymer has been determined by mixing 500 g of the product with 2 L of distilled water for 24 hours, determining the mass of residue in 1 L of the water phase after evaporation to dryness, and comparing this to a blank without the product.

The polymer has some ester groups but hydrolysis is not expected in the environmental pH range due to the low water solubility.

The polymer is unlikely to undergo photo- or thermal degradation or depolymerisation under the conditions of use. It does not contain reactive functional groups and hence would not be expected to undergo further reaction.

4. PURITY OF THE CHEMICAL

The gel permeation trace shows a broadly spread single peak with approximately 2.3% of material below 1 000 daltons and 20% above 14 000 daltons. The 50% cut-off is is centred at approximately 7 000 daltons.

Table 2: Product Constituents

Constituent	*Trade Name*	*CAS No.*	*% Weight*
notified polymer	Acrylic TSA UNO	182479-07-8	30-60
xylene	not applicable	1330-20-7	10-30
solvent naptha, petroleum, light aromatic	solvesso 100	64742-95-6	1-10
butyl acetate	not applicable	123-86-4	10-30
methyl isobutyl ketone	not applicable	108-01-1	1-10

*non-hazardous materials to 100%

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported into Australia by sea, as a component of a new range of automotive repair lacquers, the Glasurit 22-line. The polymer will comprise 30 to 60% by volume of the imported products. Import volume of the notified polymer would be 12 to 36 tonnes per annum for the first five years.

The notified polymer will not be reformulated in Australia. It will be supplied to the users in the originally imported cans of 1 and 3 L capacity. The product will be used for painting vehicles at crash repair shops. The notifier estimates that up to about 1 000 automotive crash repair shops, mostly in metropolitan areas of major cities, may use the product.

6. OCCUPATIONAL EXPOSURE

The product will be unpacked from shipping containers, as part of a mixed load and transported for storage at paint supply warehouses. Orders will be dispatched in the original packaging to customer repair shops around Australia via road transport as needed. At each individual repair shop, an operator will unload the containers of lacquer containing the new chemical. Exposure of receivers and transport personnel should only occur in the event of accidental spillage.

Operators at each customer facility will be involved in using the new product for spray panel repair. The product will be mixed with hardener and reducer just prior to use. Generally, 1 L of lacquer will be added to 500 mL of hardener and 150 mL of reducer. The mixture is sprayed on to the repair vehicle using high pressure paint spray guns. The majority of a painter's time is reportedly spent in the preparation of the surface to be sprayed. It is estimated by the notifier

that, a painter will have the potential to be exposed to the new polymer for a maximum of five hours per week.

The prepared mixture is sprayed onto the repair vehicle using a high pressure paint spray gun. At most commercial sites spray painting procedures are carried out inside a spray booth with a fume extraction system in place. This ensures that the presence of the product in the workplace environment is kept to a minimum. Repair workers would be wearing recommended protective clothing and appropriate respiratory protection to minimise their potential for dermal or inhalation exposure to solvents.

7. PUBLIC EXPOSURE

There is little potential for public exposure to the notified polymer during import, storage, transport or use of the end product. Minor public exposure to the notified polymer may result from accidental spillage during transport, but such exposure should be minimised if the containment and disposal procedures set out in the Material Safety Data Sheet (MSDS) are followed.

Disposal of painted vehicle panels in waste disposal facilities when the vehicle is finally disposed of is unlikely to involve any significant public health hazard since the resin forms a durable hard coating bonded to the metal body of the vehicle and is unlikely to be absorbed across biological membranes.

8. ENVIRONMENTAL EXPOSURE

Release

The polymer will be released to the environment in two ways:
(a) as the finished paint on vehicles and
(b) in the form of waste from overspray during application, washing of spray equipment, residues in empty cans, minor spills, etc.

The notifier estimates the total waste from all sources to be about 30% resulting in an annual waste of 3.6-10.8 tonnes of the polymer. Spray waste held on protective material such as paper and minor spills adsorbed on to adsorbent material such as sand, soil or vermiculite would be disposed of to either landfill or incineration. Small amounts of the polymer from washing of spray guns etc will enter the sewer. This would be adsorbed on to the sludge which in turn will be landfilled or incinerated.

Fate

As an acrylic, the polymer in the paint applied to vehicles will remain encapsulated in a durable matrix without undergoing degradation. Like other acrylic polymers, it is expected to have minimum mobility in the soil environment because of the very low solubility and high molecular weight. Residues consigned to landfill will therefore remain immobile. Incineration would destroy the polymer by conversion to CO_2 and water.

The low solubility and expected high octanol-water partition coefficient indicate that the chemical has the potential to bioaccumulate. However, significant exposure of aquatic organisms is not expected and polymers with MW greater than 1 000 are too large to cross biological membranes.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern with a NAMW greater than 1 000 according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

Up to 11 tonnes of the notified polymer can be lost per annum as waste generated mainly during automotive spray painting operations. As an acrylic, the polymer is expected to present a low hazard to the environment when disposed of to the landfill because of its lack of mobility and inability to cross biological membranes. Polynonionic polymers with molecular weights above 1 000 are considered to be of low concern (3). The use of the polymer in vehicle paint will result in its encapsulation in a durable and cross-linked acrylic resin of negligible environmental hazard.

11. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

Submission of toxicological data is not required for polymers of low concern, according to the Act. As the notified polymer meets the criteria for notification under this category, it is unlikely to pose a toxicological hazard, based on the molecular weight, levels of low molecular weight species, and concentrations of residual monomers.

The occupational health risk posed to waterside, warehouse and transport workers is negligible, as exposure is not expected to occur under normal circumstances, and the polymer should not represent a toxicological hazard for the reasons outlined above. It should be noted, however, that the imported product, Glasurit Clear Coat 923-155, is classified as a dangerous good according to the *Australian Code for the Transport of Dangerous Goods by Road and Rail*, (4) and appropriate precautions should be taken during transport, storage and handling (see notifier's MSDS).

The polymer solution contains solvents which may cause concern for occupational health. It has been classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1) due to the presence of xylene (10-30%) is listed on the Worksafe *List of Designated Hazardous Substances* (2) and have the potential to cause skin, eye and respiratory irritation. The recommended short term exposure limit (STEL) set by the National Occupational Health and Safety Commission for xylene is 150 ppm and butyl acetate (10-30%) is 200 ppm (5). Xylene vapour is absorbed rapidly through the lungs and more slowly through the skin and is neurotoxic causing neurophysiological dysfunction at high doses (6). Recent studies in Taiwanese paint workers showed significant association between increased exposure to solvents including xylene and butyl acetate and performance loss on neuropsychologic tests (7). Despite engineering

controls to limit exposure, car refinishing spray painters in Scandinavia have recently been shown to have transient increase in DNA strand breaks during the working week (8). This evidence shows that high standards of respiratory and dermal protection are absolutely necessary for workers in the automotive spraying industry, who are exposed to these solvents.

Paints containing the notified polymer will rarely be sold to the public and no public exposure is likely to occur during plant manufacture and application. The public may be exposed to the polymer solution and basecoat in the event of accidental spillage during transport; adequate practices for clean-up and disposal are provided in the MSDS. The public will also come into contact with the notified polymer as a component of heat cured, inert paint when it has been applied to motor vehicles. There will be negligible public health risk based on its physico-chemical properties and use pattern. Based on the above information, it is unlikely that the notified polymer will pose a significant hazard to public health when used in the proposed manner.

12. RECOMMENDATIONS

To minimise occupational exposure to 2-Propenoic acid, -2-methyl hydroxyethyl ester polymer with 2-propenoic acid, -2-methyl methyl ester; styrene; 2-propenoic acid, -2-methyl isodecyl ester; and propenoic acid, butyl ester, the following guidelines and precautions should be observed:

- It is good work practice to wear industrial clothing which conforms to the specifications detailed in Australian Standard (AS) 2919 (9) and occupational footwear which conforms to Australian and New Zealand Standard (AS/NZS) 2210 (10) to minimise exposure when handling any industrial chemical;

- Spillage of the product containing the notified polymer 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.

In addition, the National Health and Safety Commission document *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards* (4) should be used as a guide in the control of workplace exposure to potentially hazardous components of the end use product, Glasurit Clear Coat 923-155. Engineering control of ventilation to limit exposure levels of solvents is required. Appropriate personal protective equipment should be worn where necessary to minimise exposure to these chemicals (see notifier's MSDS) and workplace monitoring for these components should be carried out on a regular basis. Workers should also be aware of the flammable nature of some of these components.

13. MATERIAL SAFETY DATA SHEET

The MSDS for a product containing the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (11).

This MSDS was provided by the notifier 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 notifier.

14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act secondary notification will be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

15. REFERENCES

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

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

3. Nabholz, J.V., Miller, P., and Zeeman, M. (1993). *Environmental Risk Assessment of New Substances under the Toxic Substances Control Act Section Five*. In W G Landis, J S Hughes and M A Lewis (Eds), *Environmental Toxicology and Risk Assessment, American Society for Testing and Materials*, ASTM STP 1179, Philadelphia. pp 40-55

4. Federal Office of Road Safety 1992, *Australian Code for the Transport of Dangerous Goods by Road and Rail*, 5th edn, Australian Government Publishing Service, Canberra.

5. National Occupational Health and Safety Commission 1995, 'Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NOHSC:1003(1995)]', in *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards*, Australian Government Publishing Service, Canberra.

6. Langman J 1994, *Xylene: its toxicity, measurement of exposure levels, absorption, metabolism and clearance*. Pathology vol 26(3). pp 301-309.

7. Tsai SY *et al* 1997, *Neurobehavioural effects of occupational exposure to low-level organic solvents among Taiwanese workers in paint factories*. Environmental Research. vol 73(1-2). pp146-155.

8. Fuchs J *et al* 1996, *Transient increase in DNA strand breaks in car refinishing spray painters.* Scandinavian Journal of Work, Environment and Health vol 22(6). pp 438-443.

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

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

11. 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.