

File No: PLC/106

February 1999

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

**2-propenoic acid, 2-methyl, butyl ester, polymer with butyl 2-propenoate, ethenylbenzene,
2-hydroxyethyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate and 2-propenoic
acid**

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 the National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment 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**2-propenoic acid, 2-methyl, butyl ester, polymer with butyl 2-propenoate, ethenylbenzene, 2-hydroxyethyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate and 2-propenoic acid****1. APPLICANT**

Glasurit Pty Ltd of 231-233 Newton Rd WETHERILL PARK NSW 2164 has submitted a limited notification statement in support of their application for an assessment certificate for 2-propenoic acid, 2-methyl, butyl ester, polymer with butyl 2-propenoate, ethenylbenzene, 2-hydroxyethyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate and 2-propenoic acid.

2. IDENTITY OF THE CHEMICAL

Chemical Name: 2-propenoic acid, 2-methyl, butyl ester, polymer with butyl 2-propenoate, ethenylbenzene, 2-hydroxyethyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate and 2-propenoic acid

Chemical Abstracts Service (CAS) Registry No.: 57828-93-0

Other Names: 2-propenoic acid, 2-methyl-, hydroxyethyl ester, polymer with 2-propenoic acid, 2-methyl-, methyl ester, styrene, 2-propenoic acid, butyl ester, 2-propenoic acid, 2-methyl-, butyl ester and 2-propenoic acid

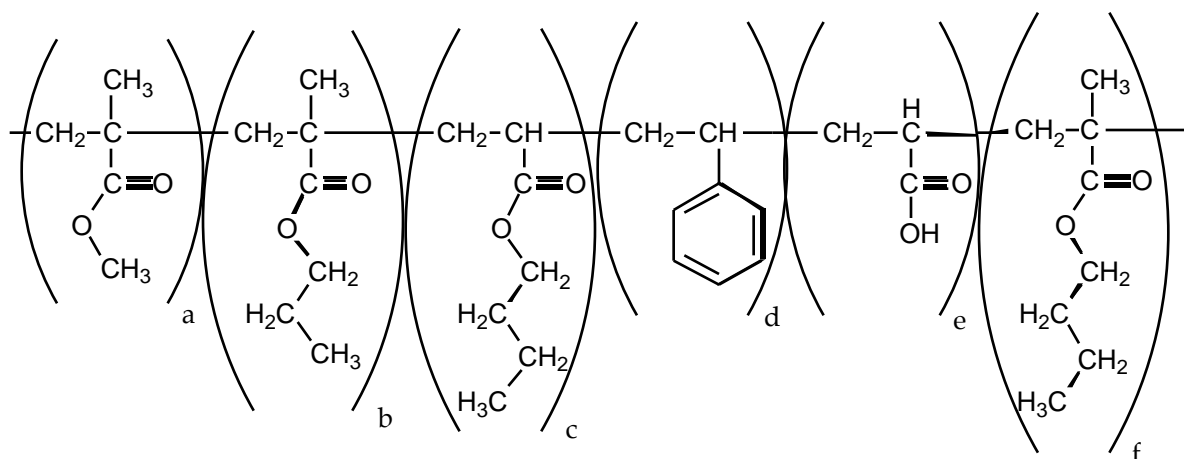
acrylic acid, butyl acrylate, butyl methacrylate, 2-hydroxyethyl methacrylate, methyl methacrylate, styrene copolymer

Trade Name: Glasurit HS-Multiclear 923-255
Cristal Top ZK 56-323F

Molecular Formula: $(C_8H_{14}O_2 \cdot C_8H_8 \cdot C_7H_{12}O_2 \cdot C_5H_8O_2 \cdot C_6H_{10}O_3 \cdot C_3H_4O_2)_x$

Structural Formula:

This depiction of the polymer shows the major structural features of the random copolymer. The ratios of a,b,c,d,e are not known.



**Number-Average
Molecular Weight (NAMW):** 2990

**Weight-Average
Molecular Weight:** 5468

Polydispersity: 1.8

**Maximum Percentage of Low
Molecular Weight Species**
Molecular Weight < 500: 0.004 %
Molecular Weight < 1 000: 3.7 %

Weight Percentage of Ingredients:

<i>Chemical Name</i>	<i>CAS No.</i>	<i>Weight %</i>
2-hydroxyethyl 2-methyl-2-propenoate	868-77-9	27.2 %
methyl 2-methyl-2-propenoate	80-62-6	21.4 %
butyl 2-propenoate	141-32-2	18.1 %
butyl 2-methyl-2-propenoate	97-88-1	13.1 %
2-propenoic acid	79-10-7	1.3 %
ethenylbenzene	100-42-5	18.9 %

Method of Detection and Determination: The polymer is characterised by GPC and identified by IR spectroscopy.

Spectral Data: IR: 3511, 2954, 2874, 1729, 1600, 1453, 1385, 1168, 1146, 1075, 1028, 962, 905, 845, 760, 702 cm^{-1}

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported as a component (40 % (w/v)) of a paint solution. Solvents include up to 10 % (w/v) xylene and 10 % (w/v) ethylbenzene. The reported properties are those of the solution.

Appearance at 20°C and 101.3 kPa: clear colourless solution with a characteristic solvent odour

Boiling Point: not stated

Specific Gravity: 1.026 at 20°C

Water Solubility: < 0.02 mg/L at 25°C

Partition Co-efficient (n-octanol/water): not determined

Hydrolysis as a Function of pH: not determined

Adsorption/Desorption: not determined

Dissociation Constant: the polymer contains a small percentage of carboxylic acid groups likely to have a pK_a around 4

Flash Point: 23°C

Autoignition Temperature: 200 - 300°C

Explosive Properties: not expected to be explosive

Reactivity/Stability: the polymer is expected to be stable

Comments on Physico-Chemical Properties

The notifier indicated that the polymer is present in a colourless solution. The structure of the polymer does not indicate any reactive properties. Under the conditions of use the polymer will not undergo photo or thermal degradation.

A water solubility study indicated that the water solubility of the polymer was significantly less than 1 mg/L. In the study, the polymer was agitated in water for 24 hours, then the solution was decanted, condensed and the residual mass compared with a blank sample.

The ester linkages of the acrylate groups are inherently susceptible to hydrolytic cleavage, but hydrolysis would not be expected, because contact between the ester groups and water will be precluded by the low solubility of the polymer. The polymer contains a small percentage of free carboxylic acid groups likely to have typical acidity.

4. PURITY OF THE CHEMICAL

Degree of Purity: 40 % in paint solution

Toxic or Hazardous Impurities:

The identities of the hazardous components of the product, Glasurit HS-Multi-Klarlack, containing the notified polymer, are disclosed in the Material Safety Data Sheet (MSDS) for this product.

<i>Chemical name:</i>	xylene (mixed isomers)
<i>CAS No.:</i>	1330-20-7
<i>Weight percentage:</i>	2.5 – 10 %
<i>Toxic properties:</i>	R20/21 Harmful by inhalation and in contact with skin R38 Irritating to skin

<i>Chemical name:</i>	ethylbenzene
<i>CAS No.:</i>	100-41-4
<i>Weight percentage:</i>	2.5 – 10 %
<i>Toxic properties:</i>	R20 Harmful by inhalation

The identity of the other components in the paint have not been disclosed.

**Maximum Content
of Residual Monomers:**

<i>Chemical Name</i>	<i>CAS No.</i>	<i>Weight %</i>
2-hydroxyethyl 2-methyl-2-propenoate	868-77-9	0.19 %
methyl 2-methyl-2-propenoate	80-62-6	0.18 %
butyl 2-propenoate	141-32-2	0.00 %
butyl 2-methyl-2-propenoate	97-88-1	0.57 %
2-propenoic acid	79-10-7	0.00 %
ethenylbenzene	100-42-5	0.00 %

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia, but will be imported from Germany in an organic solvent mixture containing xylene and ethylbenzene. The MSDS supplied with the notification indicates that the new polymer would comprise 40 % (w/v) of the resin solution. The product is to be imported in either 5 L or 1 L cans. The notifier indicated that during the first 5 years the anticipated annual import quantities for the resin solution containing Glasurit HS-Multi Clear 923-255 is 10 - 100 tonnes annually – this equates to between 4 - 40 tonnes of the polymer itself. A more precise figure of 12 - 20 tonnes of notified polymer is also given by the notifier.

The notified polymer is intended as a component of clear coat lacquer for spray painting of automotive crash repairs, and will be sold under the name of Glasurit HS-Multi Clear 923-255. The resin will be stored in the imported 5 L or 1 L cans in a Sydney warehouse and will be sold to automotive repair shops in Australia. The stock will be dispatched to the commercial user by road transport as needed.

Preparation of the ready-to-spray mixture will be completed at the customer facility by the operator immediately prior to application. The quantity of the lacquer required for each application can vary up to 3 L for a full vehicle respray. Application of the lacquer to vehicles is performed in a spray booth with a fume extraction system.

6. OCCUPATIONAL EXPOSURE

The cans of product containing the notified chemical will be imported in shipping containers as part of a mixed load. The containers will be transported to a paint supply warehouse where the product will be stored and dispatched as required. Two dock workers and one transport worker will be involved in handling the product containing the polymer, two times a month. These workers would not be expected to be exposed to the notified polymer except in

the case of an accident involving rupture of the cans.

At the warehouse, the individual cans will be unpacked and dispatched as required. Individual customers will generally only purchase one or two cans at a time. The individual cans are dispatched by road transport. The warehouse and courier workers would again only be exposed in the event of an accident.

The notifier estimates that the polymer will be used by up to 1000 spray painters on a regular basis.

At each crash repair shop, one operator would be involved in using the product containing the notified chemical. The product will be mixed with hardener and reducer just prior to use, then loaded into a high pressure spray gun or high volume low pressure spray gun. These steps will be carried out manually and therefore there is a risk of dermal exposure to spills and drips. This procedure is estimated by the notifier to take between 5 and 10 minutes per application.

The spraying of the automobile will be carried out in a laminar flow downdraft spray booth which is designed to rapidly remove aerosol particles and solvent vapour from the atmosphere. Several possible booth designs may be used. In a dry floor booth, the overspray will be collected in filters contained in the floor of the booth; any unremoved particulates will reach the exhaust stack with the solvent vapours. In a wet floor booth, overspray will collect in a pool of water below the grill floor or in a wet scrubber in the exhaust and will be removed with a filter. The residual solids will be disposed of to secure landfill. The spray booths are subject to AS/NZS/4114.1:1995 *Spray Painting Booths – Design, Construction and Testing* and AS/NZS/4114.1:1995 *Spray Painting Booths – Selection, Installation and Maintenance*.

The notifier estimates that the application of the paint will take between 10 and 45 minutes per automobile, depending on the size of the job. The volume of lacquer required per car is expected to be 2 –3 L, with approximately 500 mL required for touch-up jobs.

Residual paint mixture will be washed from the equipment manually, using recycled paint solvent.

Once residual final paint mixture has dried, the notified polymer will be irreversibly bound within the cured matrix and not separately available for either exposure to workers, or for dermal absorption.

The notifier states that generally a spray painter would be exposed to the notified polymer for a maximum of 5 hours per week.

Local exhaust ventilation will normally be provided where natural ventilation is inadequate to keep the solvent vapour concentrations below the recommended exposure levels. Spray painters will wear appropriate personal protective equipment at all times; neoprene, nitrile or PVC gloves and overalls while mixing the paint, and, in addition, a full face shield and respirator while inside the spray booth.

7. PUBLIC EXPOSURE

There is negligible potential for public exposure to the notified polymer arising from use, waste disposal, or transport. Public exposure through environmental dispersion of the polymer is also unlikely.

The uncured polymer is only used in an industrial environment. The notified polymer will only enter the public domain incorporated into automotive finish lacquers, where it will be cross-linked as a component of a continuous unreactive film. Although there will be public contact with the lacquer on automobiles, the notified polymer will not be bioavailable.

8. ENVIRONMENTAL EXPOSURE

Release

The new polymer will be exclusively used as a component of an automotive repair lacquer. The polymer has the potential for environmental release during the thinning process for lacquer preparation and during application. Such environmental release losses are expected to be minimal since the polymer is non-volatile and overspray would be trapped in the spray booth and soaked up with inert absorbent material.

The notifier estimates a 70% consumption of the final product in its end use pattern and a 30% wastage as a result of the application procedures and residue remaining in packs after use. Taking into account an import volume of 10-100 tonnes of the new product, 3-30 tonnes of waste is estimated to be produced per year. Given a 40% polymer content in the product, the maximum amount of new polymer that may be released into the environment is estimated as 1.2-12 tonnes per year. Most of this would be contained within the control equipment at the automotive repairer, and would be collected and disposed of appropriately, most likely to landfill.

Once applied to the metal panels of vehicles the notified polymer will be incorporated in an inert film and would not present a significant hazard. Any fragments, chips or flakes of the lacquer will be of little concern as they are expected to be inert. The metal panels coated with the polymer are likely to be either recycled for steel reclamation or placed into landfill at the end of their useful life.

Fate

When deposited into landfill as overspray, residue in used paint cans or on discarded panels, the organic components of the lacquer including the new polymer would be inert and immobile, but could nevertheless be expected to be very slowly degraded through the biological and abiotic processes operative in these facilities. When recycled the polymer would be destroyed in the blast furnaces and converted to water vapour and oxides of carbon.

9. EVALUATION OF TOXICOLOGICAL DATA

The polymer in Glasurit HS-Multi Clear 923-255 has been notified as a Polymer of Low Concern. Polymers which satisfy the criteria for this category are unlikely to have significant toxic effects because of the high molecular weight and the absence of reactive functional groups. For this reason toxicological studies are not required as part of the notification process.

The notifier states that there have been no reports of adverse symptoms in humans exposed to the notified polymer.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers of low concern with a NAMW > 1000 according to the *Industrial Chemicals (Notification and Assessment) Act*.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The majority of the polymer would be encapsulated in an inert film after application. It is possible that up to 30% (i.e. a maximum of 12 tonnes per annum) of the polymer could be released as a consequence of lacquer preparation and application. This is expected to be primarily in automotive repair facilities. The procedures in place at the repair facility ensure that any released material is properly contained and disposed of, most likely to landfill.

The polymer is unlikely to present a hazard to the environment when it is incorporated into the lacquer and applied to solid substrates. The physical characteristics of low water solubility and low volatility suggest that the mobility of the polymer in the environment will be very limited.

The low environmental exposure of the polymer as a result of the proposed use indicates the overall environmental hazard should be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Occupational Health and Safety

There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the lacquer containing this polymer. The greatest exposure is in the mixing and use of the paints.

The lacquers including the pre-prepared paint containing the notified polymer could contain a wide variety of additional ingredients once fully mixed. This is likely to introduce human health hazards because, apart from a range of potentially toxic solvents, there may be components containing resins with pendant isocyanate groups. The spraying procedure also produces a dense aerosol which would adversely affect human health even in the absence of additional hazardous components. It is also probable that professionals involved in the spray painting industry will use a number of different paint formulations.

For these reasons, the notified polymer must be assessed for the contribution it makes to the hazards associated with spray application of the lacquer. The presence of many potential and actual hazardous substances in the formulations requires the use of stringent engineering controls, such as a correctly constructed and maintained spray booth, and of a high level of personal protective equipment, such as impermeable overalls and gloves and a full face shield and respirator. The use of the paint containing the notified polymer should be in accordance with the NOHSC *Draft National Code of Practice for Spray Painting* (National Occupational Health and Safety Commission, 1991). The level of protection from exposure afforded by the standard protective measures will provide adequate protection from the notified polymer, which is likely to be less intrinsically toxic than most of the solvents, pigments and other paint resins.

Once the applied final paint mix has hardened, the polymer will not be separately available for exposure or absorption.

There are NOHSC exposure standards for ethylbenzene and xylene, identified as ingredients in the pre-prepared paint Glasurit HS-Multi Clear 923-255. The employer is responsible for ensuring that these exposure standards, and exposure standards pertaining to other final paint mix additives, are not exceeded in the workplace.

The lacquers containing the notified polymer are flammable due to their solvent content. Precautions must be taken to avoid sources of ignition, e.g. use of earthing leads. Operators should wear antistatic overalls and footwear.

Similar considerations apply in the cleaning of spray equipment and disposal of the polymer. The wastes containing the notified polymer may be hazardous materials on the basis of the solvent and other resin content, and the precautions used on the basis of these additional materials should be adequate for protection from the notified polymer. In addition, much of the polymer will be crosslinked and hardened by the time of disposal and this will immobilise the notified polymer.

Public Health

There is negligible potential for public exposure to the notified polymer arising from use in lacquers for use in the automotive crash repair industry. There may be public contact with the notified polymer on the lacquered surface of automobiles, but its adhesion to the substrate and the physico-chemical properties of the cured lacquer will be sufficient to preclude absorption across the skin or other biological membranes. Therefore, based on its use pattern

and physico-chemical characteristics, the notified chemical will not pose a significant hazard to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to the polymer in Glasurit HS-Multi Clear 923-255 the following guidelines and precautions should be observed:

- Employers should ensure that NOHSC exposure standards for all of the components of the final paint mix are not exceeded in the workplace;
- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia, 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992);
- Industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia, 1987) and AS 3765.2 (Standards Australia, 1990);
- Impermeable gloves or mittens should conform to AS 2161 (Standards Australia/Standards New Zealand, 1998);
- All occupational footwear should conform to AS/NZS 2210 (Standards Australia/Standards New Zealand, 1994);
- 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.

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* (National Occupational Health and Safety Commission, 1994).

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

National Occupational Health and Safety Commission (1991) Draft National Code of Practice for Spray Painting. Australian Government Publishing Service, Canberra.

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.

Standards Australia (1987) Australian Standard 2919-1987, Industrial Clothing. Standards Association of Australia, Sydney.

Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia, Sydney.

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Standards Association of Australia, Sydney.

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

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.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.