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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

2-PROPENOIC ACID, 2-METHYL-, POLYMER WITH ETHYL 2-PROPENOATE AND ?-[[[1-METHYL-1-[3-(1-METHYLETHENYL) PHENYL]ETHYL]AMINO]CARBONYL]-Ω-(NONYLPHENOXY) POLY(OXY-1,2-ETHANEDIYL)

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989* 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 Arts, Sport, the Environment, Territories and Tourism and the assessment of public health is conducted by the Department of Health, Housing and Community Services.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

2-PROPENOIC ACID, 2-METHYL-, POLYMER WITH ETHYL 2-PROPENOATE AND ?-[[[1-METHYL-1-[3-(1-METHYLETHENYL) PHENYL]ETHYL]AMINO]CARBONYL]-Ω-(NONYLPHENOXY)POLY(OXY-1,2-ETHANEDIYL)

1. IMPORTER

Zeta Chemical Company, 23 Langlee Avenue, P.O.Box 218, Waverley, NSW 2024.

2. IDENTITY OF THE CHEMICAL

Chemical name: 2-Propenoic acid, 2-methyl-, polymer with ethyl 2-propenoate and ?-[[[1-methyl-1-[3-(1-methylethenyl) phenyl]ethyl]amino]carbonyl]-Ω-(nonylphenoxy)poly(oxy-1,2-ethanediyl)

Chemical Abstract Service (CAS No): 96828-31-8

Trade name: UCAR Polyphobe 102
(an emulsion containing 25% of the notified polymer)

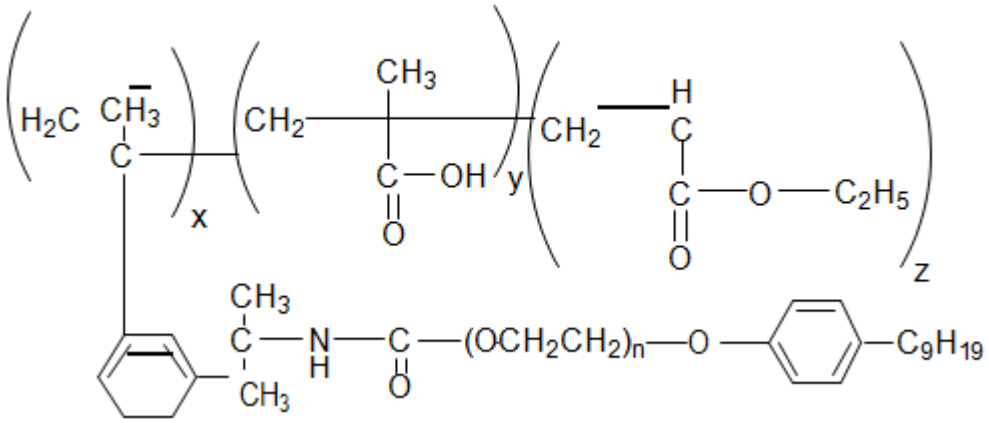
Other names: Polymer of N-(?,?-dimethyl, m-isopropenylbenzyl)-poly(oxy-1,2-ethanediyl)-?-(nonylphenyl)carbamate with methacrylic acid and ethyl acrylate

Acrylic Latex

Molecular formula: $[(C_{13}H_{16}NO)(C_2H_4O)_{50}(C_{15}H_{23}O)]_x \cdot (C_4H_6O_2)]_y \cdot (C_5H_8O_2)_z$

Molecular weight: The number average molecular weight of the polymer in Polyphobe 102 has a range of 10,000 to about 27,000.

Structural formula:



The notifier has applied for exemption from publication of the following items:

. spectral data;

. weight percentage of ingredients;

. identity of reactants

. identity of additives/adjuvants

. percentage weight of additives/adjuvants

Exemption from publication has been granted as ingredients, additives and adjuvants are considered to be non-hazardous.

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be supplied as an emulsion in water. The notified polymer as an emulsion in water has a nonvolatile content of 25% and a water content of 75%. At room temperature and atmospheric pressure the emulsion is a homogeneous, white, milky liquid.

Specific Gravity/Density: 1040 kg/m^3 (water =1000)
(for emulsion Polyphobe 102)
1210 kg/m^3 (water =1000)
(for dried sample)

Comments on Physico-Chemical Properties

The 25% water emulsion would be expected to boil at 100^{O}C.

Data on Flash point, Flammability limits, Autoignition temperature and Explosive properties are not required for a polymer of this type.

The vapour pressure for a polymer of this molecular weight would be negligible.

The polymer emulsion is completely miscible with water, but after drying the notified polymer itself is insoluble.

By analogy with similar polymers, this polymer will be essentially insoluble in water and data on Hydrolysis as a function of pH, Partition Coefficient, Adsorption/Desorption and Dissociation Constant are not required.

Particle size is not relevant for the notified polymer.

4. METHODS OF DETECTION AND DETERMINATION

Infrared spectroscopy may be used to detect the notified polymer in Polyphobe 102.

5. PURITY OF THE CHEMICAL

The "as supplied" form of the notified chemical substance is an emulsion of 25% polymer with 75% water.

5.1 TOXIC OR HAZARDOUS IMPURITIES

(including isomers and by-products)

CHEMICAL NAME	CAS NO.	APPROX.WT %
ethyl 2-propenoate (ethyl acrylate)	140-88-5	.001
2-propenoic acid, 2-methyl- (methacrylic acid)	79-41-5	.01
2-propanone (acetone)	67-64-1	.05 est.
2-propanol, 2-methyl- (tert-butanol)	75-65-0	.05 est.
methanal (formaldehyde)	50-00-0	.005
ethanal (acetaldehyde)	75-07-0	.001

The stated weight percentages are based on the as supplied mixture of 25% of the notified polymer and 75% water.

6. INDUSTRIAL USE

The notified polymer in Polyphobe 102 will be used as a thickener and flow control agent for water based formulations. The notified chemical will be imported in range of 10-100 tons in the first year, and 100-1000 tons in year two to year five.

Potential users of the notified polymer will include manufacturers of paints, papers, inks, adhesives etc. Paints containing Polyphobe 102 will be applied inside homes and buildings and application will be done by brush, roller and airless spray. Clean up of the paints containing the notified polymer will be possible in water.

7. OCCUPATIONAL EXPOSURE

The notified polymer will be imported into Australia as an emulsion in water. The notified polymer will be supplied in metal drums and exposure of the workers during the storage, handling, transportation and disposal of empty drums is expected to be insignificant under normal circumstances.

The notified polymer in Polyphobe 102 will be used in the manufacture of water-based formulations for products such as paints, latexes, papers, adhesives etc. The projected number of customer manufacturing lines will be 20. Trace components and residual monomer vapours may be irritating to eyes, skin, mucous membranes, respiratory tract, and may produce symptoms of headache and nausea in poorly ventilated areas.

Workers dealing with the notified chemical should read and understand the Material Safety Data Sheet and label.

Once the notified polymer gets transformed into a water based formulation, it will have a maximum content of 5% of the emulsion (1.25% of the notified polymer).

8. PUBLIC EXPOSURE

The notified polymer in Polyphobe 102 is non-volatile and therefore there would be negligible release of the polymer to the atmosphere. The formulated product on drying forms a relatively inert and stable film in which the notified polymer is bound and will become an integral part of the matrix.

The most likely mode of exposure to the public is through use of paints and other products containing the notified polymer in Polyphobe 102. Exposure to the notified polymer in Polyphobe 102, as a minor additive present at approximately 5% in formulations is expected to be minimal.

9. ENVIRONMENTAL EXPOSURE

. Formulation, handling and disposal

The notifier indicates that the formulation will be carried out at Dulux plants in WA and either NSW or Qld, and includes a simple blending process followed by filtration and packaging. Spills and other formulation wastes are expected to generate a relatively low 40 kg of waste annually at each formulation plant, which will receive the following treatments:

. in NSW, wash water from white batches will be retained and recycled, while coloured solutions will be treated by flocculation, settling and sludge filtration, clean water being discharged to sewer and sludge consigned to landfill;

. in Qld, aqueous wastes will be treated by a licensed contractor, probably with kiln dust to form a non leaching solid to be landfilled; and

. in WA, waste water will be flocculated and allowed to settle, with supernatant discharged to sewer and sludge reworked into low grade products.

The primary need for disposal will occur with unused inventory or product which is spoiled by freezing or microbial attack, in which case the emulsion may be incinerated, or landfilled after the addition of absorbents for consolidation.

Details of the formulation of the polymer in Polyphobe 102 into other products such as adhesives and paper products are not provided.

. Use

The polymer will initially be used in household paints, which is expected to result in immobilisation of the bulk (at least 94%) through incorporation in an inert coating. Up to 5% may find its way to landfill with container residues, while an estimated 1% might get highly diluted and washed into drains around Australia when brushes and rollers will be cleaned.

Use in adhesives, inks or paper coatings is expected to similarly immobilise the polymer in the dried coatings, with minimal amounts discharged to the environment. However, this needs to be confirmed before the notified chemical will be used in such products.

Fate

The notified polymer in Polyphobe 102 discharged to sewer may remain in colloidal suspension or be removed with sludge during treatment. In the former case, the notified chemical will be discharged to the wider aquatic environment where it will be mobile and likely to persist due to its lack of reactive functional groups and insolubility. However, possibilities such as oxidative cleavage of the polymer chain or ester hydrolysis indicate that the notified polymer will eventually degrade.

Similar considerations lead to the expectation that residues consigned to landfill will slowly degrade. Significant leaching appears unlikely, although the notified polymer, as a colloidal suspension, may move with bulk water flow.

10 EVALUATION OF TOXICOLOGY DATA

10.1 Acute toxicity

The acute toxicity studies have been conducted with the notified polymer in Polyphobe 102 as an emulsion of 25% of the notified polymer with 75% water.

Table 1 Summary of acute toxicity of Polyphobe 102

Test	Species	Outcome	Reference
Oral	Rat	LD50: >5000 mg/kg	1
Skin Irritation	Rabbit	moderately irritant	2
Eye Irritation	Rabbit	moderately irritant	3

10.1.1 Oral Toxicity (1)

This study was carried out in accordance with the *Good Laboratory Practice Standards: 21 CFR Part 58* (4).

Polyphobe 102 was administered by oesophageal intubation to a group of 10 (five males and five females) albino (Sprague-Dawley derived) rats at a dose level of 5000 mg/kg. The animals were observed for 14 days. No deaths occurred during the study. No treatment related signs of toxicity were observed. Gain in bodyweight was unaffected. Necropsy revealed no gross pathological changes.

Results of this study indicate an acute oral LD_{50} of >5000 mg/kg in rats of both sexes for Polyphobe 102.

10.1.2 Skin Irritation (2)

This study was carried out in accordance with the *Good Laboratory Practice Standards: 21 CFR Part 58* (4).

A single dose of 0.5 ml of the undiluted Polyphobe 102 was applied by a 2.5 ml syringe onto a small surgical-gauze patch. The patch was placed on the shaved dorsal skin area on each of six New Zealand White rabbits (three males and three females). Four hours post-exposure, the dressings were removed and the skin reaction assessed according to the Draize Scale (5) at 1/2-1, 24, 48 and 72 hours after the removal of the dressing. Moderate erythema and oedema persisted for 72 hours following application in five of the animals. No deaths occurred during the study. Necropsy was not performed on any of the animals.

The results from this study indicate that Polyphobe 102 is a moderate skin irritant.

10.1.3 Eye Irritation (3)

This study was carried out in accordance with the *Good Laboratory Practice Standards: 21 CFR Part 58* (4).

A single dose of 0.1 ml of Polyphobe 102 was instilled in the conjunctival sac of one eye of each of six New Zealand White rabbits (three males and three females). The other eye of each animal remained untreated and served as the control. The eyes were examined 1, 24, 48 and 72 hours post-exposure and irritation scored according to the Draize scale (5). The examination of the eyes revealed corneal opacity, iritis and conjunctival irritation persisting for less than 4 days in all the animals. No evidence of corrosion was noted. No deaths were noted during the study and no systemic toxicity was evident.

The results of this study indicate that Polyphobe 102 is a moderate irritant to the rabbit eye.

10.2 Overall Assessment of Toxicology Data

Polyphobe 102 has very low acute oral toxicity (oral LD_{50} in rats: >5000 mg/kg). Animal tests show that Polyphobe 102 is a moderate eye and skin irritant (rabbit).

11. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer will be imported as an aqueous emulsion. Polyphobe 102 is to be used as a thickener and flow control agent for water based paints, adhesives and paper products. These products may be used professionally or sold to the public.

The most likely mode of exposure is by skin or by eye contact after splash or a spill. The notified polymer does not have significant vapour pressure but exposure of the upper respiratory tract by inhalation of the spray while spray painting is possible.

Animal tests show that the emulsion containing the notified polymer is a moderate skin and eye irritant. Therefore it is expected to be moderately irritating to the respiratory tract. Workers formulating products and handling the 25% polymer /75% water emulsion should minimise splashing and spills and avoid skin and eye contact with the emulsion.

Workers and the public handling products containing the notified polymer should take precautions to minimise splashes and spills which would result in skin or eye contact. Those spraying paints containing the notified polymer should take precautions to prevent inhalation of mists. Engineering controls, personal protection measures and good housekeeping practices should be observed to minimise exposure to the notified polymer in Polyphobe 102 and its residual monomers.

The major scenario of exposure of the public will be by use of paints for household painting. As painting is undertaken infrequently, long term exposure is not likely.

The notifier states that information on the notified polymer in Polyphobe 102 on human health shows no evidence of adverse effects.

12. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicity testing is not required for high molecular weight polymers as they are not transported readily across biological membranes.

13. ASSESSMENT OF ENVIRONMENTAL HAZARDS

The notified polymer is a high molecular weight polymer with minimal chemical reactivity and no obvious ecotoxicological potential. It will be used in aqueous based coating products and become essentially immobile after incorporation in the dried coating. Small amounts will be discharged to sewer around Australia when paint brushes are washed, resulting in widespread but low level environmental exposure of the aquatic compartment. The predicted environmental hazard is minimal.

14. RECOMMENDATIONS FOR SAFETY PROCEDURES TO CONTROL OCCUPATIONAL EXPOSURE

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

. engineering control procedures such as local exhaust ventilation should be used in polymer handling operations and during formulation of products like paints, inks and adhesives;

. suitable personal protective equipment which comply with Australian Standards (AS) should be worn such as:

- air purifying respirators suitable for gases (AS 1716), *Respiratory Protective Devices* (6), for spray painting and during formulation of the products where mists will be generated;

- safety glasses (AS 1337) - *Eye protectors for Industrial Applications* (6);

- impervious elbow length gloves (AS 2161) - *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)* (7);

- appropriate impervious protective clothing (AS 3765) - *Clothing for protection against Hazardous Chemicals* (8);

. good work practices should be implemented to avoid splashings or spillages during formulating and using products;

. good housekeeping and maintenance should be practised. Spillages should be cleaned up promptly using absorbents;

. a copy of the Material Safety Data Sheet (MSDS) for the notified polymer and for products containing the notified polymer should be easily accessible to employees.

15. RECOMMENDATIONS FOR MATERIAL SAFETY DATA SHEET (MSDS)

The MSDS for the notified polymer has been compiled according to Worksafe Australia format (9).

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of Polyphobe 102 shall be required if any circumstances stipulated under subsection 64(2) of the Act arise.

Further information on the likely environmental impact from the proposed uses in adhesives, inks and paper products should be forwarded to the Director when such proposals become concrete, in order to ascertain whether secondary notification is required. No other specific conditions are prescribed.

17. REFERENCES

1. Hill Top Biolabs Project No. 89-3619-21 (A)(1989) *Acute Oral Toxicity in Rats - Limit Test* of 44-251 (Polyphobe 102)

2. Hill Top Biolabs Project No. 89-3619-21 (B)(1989) *Primary Skin Irritation Study in Rabbits* of 44-251 (Polyphobe 102)

3. Hill Top Biolabs Project No. 89-3619-21 (C)(1989) *Eye Irritation Study in Rabbits* of 44-251 (Polyphobe 102)

4. Food and Drug Administration (1987) *Good Laboratory Regulations; Final Rule. 21 CFR Part 58;* Food and Drug Administration. Fed Reg 52: 33768-33782.

5. Draize, JH (1959) *Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics,* Food and Drug Administration Austin, Texas.

6. Australian Standard 1337 - 1984 *Eye protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney (1984).

7. Australian Standard 2161 - 1978 *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney (1978).

8. Australian Standard 3765-1990 *Clothing for Protection Against Hazardous Chemicals*, Standards Association of Australia Publ., Sydney (1990).

9. National Occupational Health and Safety Commission *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. Edition, Australian Government Publishing Service Publ., Canberra (1990).