

File No: PLC/12

Date:

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

**POLYMER OF FORMALDEHYDE, ALKYLPHENOL, EPOXYALKANE AND
OXYALKYLENE**

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989*, as amended 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 Commonwealth Environment Protection Agency and the assessment of public health is conducted by the Department of Health, Housing, Local Government and Community Services.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

Under subsection 34(2) of the Act the Director of Chemicals Notification and Assessment is to publish this Report in the Chemical Gazette on .

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Director
Chemicals Notification and Assessment
November 3, 2000

FULL PUBLIC REPORT

FULL PUBLIC REPORT**POLYMER OF FORMALDEHYDE, ALKYLPHENOL, EPOXYALKANE AND OXYALKYLENE****1. APPLICANT**

Ethyl Asia Pacific Company, Level 12, 20 Berry Street, North Sydney, NSW 2060.

2. IDENTITY OF THE POLYMER

Other name: Polymer of formaldehyde, alkylphenol, epoxyalkane and oxyalkylene

Trade name: HiTEC 1217

Number average molecular weight: 2885; dispersity of 1.36 (GPC)

MWn < 1000: 2.08%

MWn < 500: Nil

Means of identification:

Infrared spectrum.

3. PHYSICAL AND CHEMICAL PROPERTIES

The physical and chemical properties listed below are that of the product HiTEC 1217 containing 0.2 to 5% w/w of the notified polymer prepared in heavy aromatic naptha unless otherwise stated, as the polymer is manufactured in this form and is never isolated.

Appearance at 20°C and 101.3 kPa: Off-white to slightly amber viscous liquid

Odour: Characteristic

Boiling Point: Not determined

Density: 960 kg/m³

Water Solubility: < 1 mg/L at 20°C (estimated)

Hydrolysis: Not determined

Viscosity: 130-180 cSt @ 100°C

Flammability Limits: Not determined

Autoignition Temperature: Not determined

Explosive Properties:	Not explosive
Reactivity/Stability:	Reacts with strong oxidising agents

Comments on Physico-Chemical Properties

The notifier expects hydrolysis not to occur under the anhydrous conditions prevailing in the crankcase. Also, the polymer is expected to be stable at ambient temperatures but be combusted along with other oil ingredients as a consequence of their use. Further, the polymer is expected not to contain any functional groups likely to undergo further reaction. The EPA agrees with this assessment.

Water solubility was not measured by the relevant OECD test for substances with solubilities below 10 ppm. However, the company did try to demonstrate the substance's insolubility with a simple test. The substance was added to water, stirred while heated, then allowed to cool. An emulsion, which did not break when cooled, was observed. After breaking the emulsion by centrifugation, the material remained largely not dissolved and was estimated to be <1 ppm. Although the criteria for determining water solubility was not strictly met, the notified substance is prepared in a petroleum solvent and is never isolated so that the solubility of the polymer itself can not be accurately measured. The EPA is satisfied with the above attempt.

4. PURITY OF THE CHEMICAL

Purity: > 98%

5. INDUSTRIAL USE

The polymer will be used as a demulsifying agent in engine oils.

The projected imported volume is 1.0-2.0 tonnes per annum for the first five years.

6. OCCUPATIONAL EXPOSURE

The polymer will be imported in 205 litre drums and 18,000 litre ISO containers as a component in lubricating oil additive packages. The concentration of the notified polymer in the product is <0.5%.

The product containing the polymer will be transported by road to the blending site. Nine workers will be exposed to the notified polymer at the blending site for:

- . two hours per day during sampling;
- six hours per day during loading, unloading and drum filling ; and
- . six hours/day during blending in an enclosed area

for a maximum of 255 days per year.

The product containing the polymer enters and leaves the blender through a closed pumping system controlled by injectors. The process is automated and operated by remote control.

7. PUBLIC EXPOSURE

There is potential for public exposure to the notified polymer when addition and replacement of motor oils occur. However, this will be low as only 0.04% of the polymer is present in the oil product.

8. ENVIRONMENTAL EXPOSURE

• Release

The formulation of the additive would be a simple blending process. The company estimates that losses in formulation would be about 1.5 kg from a 10 tonne batch of finished product (0.015%). The losses would be from slops or washings and would be contained in compounds or pits, then treated and disposed.

• Fate

The additive will be used in engine oils and will share their fate. Therefore, some will be combusted and destroyed in use, while the majority will share the fate of recycled oil. Also, a minor component will be released to the environment from spills and leaks, but would be widely dispersed. Any additive present in oil slicks on road surfaces would be at low concentrations (0.04%) and if washed off would be expected to adsorb to soils or sediments adjacent the road.

The notifier claims that 96% of collected used oil in Australia is combusted as fuel oil blends, notably in cement kilns. Further, significant aquatic exposure to the polymer is not expected if good industrial and public practice is followed. The ANZEC report (1) on used lubricating report confirms this. However, using the ANZEC report, the EPA has estimated that 35% of the oil used for automotive purposes will not be collected and could be disposed of in an inappropriate manner¹. A worst case scenario would be if all of this uncollected oil was dumped into a sewer in some country centre. This, however, would give a concentration of only about 400 $\mu\text{g.L}^{-1}$ per day². For a major city, the amount would only be about 4 $\mu\text{g.L}^{-1}$ per day.

Bioaccumulation is unlikely, given the high molecular weight and low solubility of the polymer. It is also expected not to degrade, or to be mobile, in landfills.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern. No toxic effects are anticipated from a neutral polymer with low water solubility and high molecular weight.

¹ No figures are available for how much automotive oil was collected for re-use, but an estimate of about 35% of all oil sold is not collected and possibly disposed of in an inappropriate manner. Therefore, this percentage will be specifically applied to automotive oils

² Given 35% of oil not collected, then of the 2 tonne imported 700 kg of the additive would also not be collected (i.e. 35% x 2000 kg). Per day, this would be 1.9 kg.d^{-1} (i.e. 700 kg/365 d). The dilution at a rural town could reasonably be expected to be about 5 ML, while for a city, say Melbourne, it would be 500 ML. This would give final concentrations of the additive of 383 μg and 3.8 $\mu\text{g.L}^{-1}$ per day.

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer will be used as an oil additive and the main exposure will be from inappropriate disposal of oil. Calculations show an extremely high dilution for the polymer is still expected even if all of the 35% of oil not collected in Australia was disposed of to a country sewer. Further, the low water solubility and high molecular weight suggests that the polymer will not be biologically active as it will not cross membranes.

11. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

Polymer of formaldehyde, alkylphenol, epoxyalkane and oxyalkylene has been notified as a synthetic polymer of low concern under section 23 for the purposes of section 24A of the *Industrial Chemicals Notification and Assessment Act 1989*.

The notified polymer has a number average molecular weight well above 1000 and, as such, is not expected to cross biological membranes. As a result adverse health effects would not be expected to result from exposure to the polymer.

The polymer would not be classified as a hazardous substance on the basis of the levels of residual monomers.

Exposure of workers to the polymer during importation, transport, blending and storage is expected to be low as a result of engineering controls and the use of robust containers.

The low expected intrinsic toxicity of the polymer and low exposure suggests that the occupational health risk is minimal. Material Safety Data Sheet states the product containing the polymer to be an eye, skin and respiratory irritant. No data were submitted to verify these statements.

There is potential for public exposure to the notified polymer when engine oils containing it are used. However, the properties of the chemical and the very low concentrations present in oil suggest there should be negligible absorption and therefore low risk to public safety.

The polymer meets the criteria for a synthetic polymer of low concern specified in regulation 4A of the Act and can therefore be considered to be of low hazard to human health.

12. RECOMMENDATIONS

To minimise occupational exposure to Polymer of formaldehyde, alkylphenol, epoxyalkane and oxyalkylene the following guidelines and precautions should be observed:

- . if engineering controls and work practices are insufficient to reduce exposure to a safe level, the following personal protective devices which complies with Australian Standards (AS) should be worn such as eye protection (AS 1336, AS 1337) (2,3), impermeable gloves (AS 2161) (4), and respiratory protection (AS 1715, AS 1716) (5,6) and overalls should be worn.
- . good work practices should be implemented to avoid spillages.
- . good personal hygiene should be adopted.
- . a copy of the Material Safety Data Sheet should be easily accessible to employees.

13. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for HiTEC 1217 containing the notified polymer was provided in Worksafe Australia format (7). This MSDS was provided by Ethyl Asia Pacific Company as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Ethyl Asia Pacific Company.

14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Polymer of formaldehyde, alkylphenol, epoxyalkane and oxyalkylene shall 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. Australian and New Zealand Environment Council 1991. Used lubricating oil: Generation, recovery and reuse in Australia. Prepared by Technisearch Ltd for the Waste and Resources Committee (WRAC).
2. Australian Standard 1336-1982, *Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, 1982.
3. Australian Standard 1337-1984, *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, 1984.
4. Australian Standard 2161-1978, *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, 1978.
5. Australian Standard 1715-1991, "Selection, Use and Maintenance of Respiratory Protective Devices", Standards Association of Australia Publ., Sydney, 1991.
6. Australian Standard 1716-1991, "Respiratory Protective Devices", Standards Association of Australia Publ., Sydney, 1991.
7. National Occupational Health and Safety Commission, *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. edition, AGPS, Canberra, 1990.