

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT
SCHEME**

POLYMER OF LOW CONCERN

FULL PUBLIC REPORT

KETJENLUBE 2300

Under subsection 38(5) of the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), the Director of Chemicals Notification and Assessment publishes this assessment report by giving a copy of it to:

- . the Chief Executive Officer of the National Occupational Health and Safety Commission (Worksafe Australia);
- . the Secretary of the Department of the Environment, Sport and Territories;
- . the Secretary of the Department of Health and Family Services; and
- . the Director of the Department of Occupational Health Safety and Welfare, Western Australia

This assessment report will not be available for inspection by the public.

Director
Chemicals Notification and Assessment

June 1997

FULL PUBLIC REPORT**KETJENLUBE 2300****1. APPLICANT**

Akzo Nobel Chemicals Ltd of 6 Grand Avenue CAMELLIA NSW 2124 has submitted a notification statement accompanying their application for assessment of a synthetic polymer of low concern, Ketjenlube 2300.

2. IDENTITY OF THE CHEMICAL

Ketjenlube 2300 is not considered to be hazardous based on the nature of the polymer and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data and the details of the polymer composition have been exempted from publication in the Full Public Report.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	yellow liquid almost odourless
Melting Point:	< -10°C
Density:	960 kg/m ³ at 20°C
Water Solubility:	< 1 mg/kg (estimate)
Partition Co-efficient (n-octanol/water):	not determined
Hydrolysis as a Function of pH:	not determined
Flammability Limits:	flash point > 220°C
Autoignition Temperature:	not determined
Explosive Properties:	not determined
Reactivity/Stability:	stable under ambient temperatures

Particle Size Distribution: not applicable

Comments on Physico-Chemical Properties

The water solubility of the polymer was estimated using ASTM Standard D 4839. This test measures the total carbon, inorganic carbon and/or total organic carbon content in water by persulfate oxidation and infrared detection. The range of carbon concentrations that can be determined by this test is between 0.1 mg/L and 4 000 mg/L.

The polymer contains ester groups on the side chains. These are not expected to hydrolyse under environmental conditions due to the expected low solubility in water.

The notified polymer does not contain any functional groups intended or which can be anticipated to undergo further reaction.

The data provided are acceptable for a polymer of low concern according to the Act.

4. PURITY OF THE CHEMICAL

Greater than 97%

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported in the pure form. The polymer will be used as a component of passenger car engine oils at concentrations between 5 and 10%. The formulation of engine oils will take place at one customer site only.

The import volumes will depend on market penetration but it is estimated that up to 60 tonnes per year of the notified polymer will be imported in 200 L drums or intermediate bulk containers (IBCs) (~ 1 000 L).

6. OCCUPATIONAL EXPOSURE

At the wharf, containers or 200 L drums, strapped to pallets, are moved on landing using forklifts. They are transported to the customer site by road on tabletop trucks. The containers are secured by ratchet straps or chains. At the customer site containers are down loaded using forklifts.

Transport and storage personnel involved with handling the products prior to reaching the customer site and after blending would not normally be expected to be exposed to the notified polymer as it is isolated by the packaging. Exposure will only occur in the unlikely event of an accident.

At the customer site the notified polymer is transferred to a storage tank through a hose. Workers, wearing full protective clothing, gloves and eye protection, spend 10 to 15 minutes fastening the ends of the hose, and a further 10 minutes uncoupling

the hose once the transfer is complete.

The finished automotive lubricants are prepared by pumping the notified polymer and other additives from their storage facilities into a blending tank. Six workers will be involved in transfer and blending of the notified polymer. A sample of the product is removed from the blend tank by one or two workers wearing eye protection, coveralls, and gloves to ensure the specifications of the finished lubricant are met. Six workers will be potentially exposed to a 5 to 10% formulation of the notified polymer for 2 to 3 hours for six days per year at both the sampling and analysis stage. During the cleaning process of the blending tank and drums, six workers potentially may be exposed to the notified chemical, in the lubricant for, one hour per day for six days. This exposure may be to any lube oil used to clean the blending tank or to the waste water from the cleaning of the drums.

The finished products are packaged into 1 L, 4 L, 20 L, 205 L, or 1 000 L drums. Workers potentially will be exposed to the finished lubricant during packaging of the drums. The level of exposure should be minimal as the drumming facility uses automated weight scales to fill the drums and worker exposure occurs during fastening and uncoupling of hoses.

Mechanics may be exposed to the notified polymer at a concentration of 5 to 10% while changing automobile engine oil.

The main occupational exposure route for workers involved in blending operations, packaging and changing automobile engine oil will be dermal. Accidental eye contact may also occur during uncoupling of hoses (during blending and packaging) and particularly while mechanics are working under vehicles. Inhalational exposure is unlikely due to the low vapour pressure of the notified polymer.

7. PUBLIC EXPOSURE

The notified polymer will be imported in robust steel drums or IBCs, following which it will be transported by road to the customer's manufacturing plant where it will be stored in a bunded area. The manufacture of engine oils will take place at a single site in Australia, and given that engineering controls and education and training of workers will significantly reduce the potential for occupational exposure, no public exposure to the notified polymer is expected to occur.

Waste notified polymer is expected to be disposed by landfill or incineration. Should significant spillage of the motor oil occur, the exposure will be minimal if the spills are contained and cleaned up by the recommended practices such as application of absorbent materials and disposed as outlined in the Material Safety Data Sheet (MSDS).

Engine oils containing the notified polymer will be packaged in 1 L, 4 L, 20 L, 205 L or 1 000 L drums, and will be sold to the public and the automotive service industry.

8. ENVIRONMENTAL EXPOSURE

. **Release**

The major potential for environmental release of products containing the notified polymer is in the event of spills or leaks during transport and/or handling. The oils can be contained with inert materials and the mixture can be shovelled into a suitable container for disposal.

The formulation of the oil would be a simple blending process. The company estimates that no losses in formulation of the oil should occur. Any losses would be from slops or washings and would be contained in compounds or pits, then treated and disposed according to State and Local regulations either by consignment to landfill or incineration.

The notifier estimates that used containers will contain approximately 5% of the product (i.e. the amount of polymer remaining in the used containers is between 0.25 to 0.5% of the container volume). This corresponds to between 0.5 to 1.0 L in 200 L drums or 2.5 to 5.0 L in IBCs. Thus, a maximum of 3 tonnes of the polymer that will be disposed of in used oil containers according to State and Local government regulations.

. **Fate**

The notified polymer 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.

A small amount will be released to the environment from spills and leaks, but would be widely dispersed. Any of the polymer present in oil slicks on road surfaces would be at concentrations less than 10% and if washed off would be expected to adsorb to soils or sediments adjacent the road.

Around 40% of engine oil sold in Australia is consumed by burning during use or lost from engine leaks. Much of the oil sold in Australia is bought by industry, garages or other service centres. At these locations used oils are collected and disposed of correctly. Only 7% of oils sold in Australia is used by the do-it-yourself (DIY) market, with 12.5% of these sales recovered for recycling or disposal, with the remainder being disposed of in a variety of ways ie dumping with household garbage, buried or stored (1).

It is reported (1) that in Australia, 96% of waste engine oil is correctly disposed of, either used as a fuel, incinerated or landfilled in secure sites, with very little being recycled. Based on these figures and the information above, approximately 24 tonnes of the notified polymer will be consumed, approximately 35 tonnes will be collected as waste oil with the remainder (~1 tonne) being disposed of in a variety of ways (as above) in a dispersed manner.

Any incineration of the notified polymer will produce water and oxides of carbon. Bioaccumulation of the notified polymer is not expected as its large molecular size is likely to inhibit membrane permeability and prevent uptake during exposure (2).

9. EVALUATION OF TOXICOLOGICAL DATA

The Act does not require the provision of toxicological data for polymers of low concern category. However, the following studies on acute oral toxicity, skin and eye irritation for the notified polymer, were provided and are evaluated below.

9.1 Acute Toxicity

Summary of the acute toxicity of Ketjenlube 2300

Test	Species	Outcome	Reference
acute oral toxicity	rat	LD ₅₀ > 2 000 mg/kg	(3)
skin irritation	rabbit	slight irritant	(4)
eye irritation	rabbit	slight irritant	(5)

9.1.1 Oral Toxicity (3)

<i>Species/strain:</i>	rat/Wistar Albino
<i>Number/sex of animals:</i>	5/sex
<i>Observation period:</i>	14 days
<i>Method of administration:</i>	gavage; test substance administered undiluted
<i>Clinical observations:</i>	lethargy; hunched posture; uncoordinated movements; piloerection
<i>Mortality:</i>	none
<i>Morphological findings:</i>	none
<i>Test method:</i>	according to OECD guidelines (6)
<i>LD₅₀:</i>	> 2 000 mg/kg
<i>Result:</i>	the notified polymer was of low acute oral toxicity in a limit test in rats

9.1.2 Skin Irritation (4)

<i>Species/strain:</i>	rabbit (New Zealand White)
<i>Number/sex of animals:</i>	3 males
<i>Observation period:</i>	72 hours

<i>Method of administration:</i>	0.5 ml (756 mg) of test substance was applied to a 6 cm ² area of intact dorsal skin; the test site was covered with semi-occlusive dressing for 4 hours; the test site was irrigated with lukewarm water once dressing removed; skin reactions were assessed at 1, 24, 48 and 72 hours after removal of the dressing and scored according to the method of Draize (7)
<i>Draize scores:</i>	slight erythema observed in one animal up to 24 hours and in two animals up to 48 hours; slight oedema observed in one animal up to 24 hours
<i>Test method:</i>	according to OECD guidelines (6)
<i>Result:</i>	the notified polymer was a slight irritant to rabbit skin

9.1.3 Eye Irritation (5)

<i>Species/strain:</i>	rabbit (New Zealand White)
<i>Number/sex of animals:</i>	3 males
<i>Observation period:</i>	72 hours
<i>Method of administration:</i>	0.1 ml (153 mg) of test substance was instilled into the conjunctival sac of one eye; untreated eye served as a control
<i>Draize scores:</i>	at one and 24 hour time points slight redness of the conjunctival tissues were observed in all three animals; at the 48 hour time point slight erythema persisted in two animals which disappeared in both animals at the 72 hour time point
<i>Test method:</i>	according to OECD guidelines (6)
<i>Result:</i>	the notified polymer was a slight irritant to rabbit eyes

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* Reverse Mutation Assay (8)

<i>Strains:</i>	<i>Salmonella typhimurium</i> TA 1535, TA 1537, TA 98 and TA 100
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<i>Concentration range:</i>	100, 333, 1 000, 3 300 and 5 000 µg/plate
<i>Test method:</i>	according to OECD guidelines (6)
<i>Result:</i>	the notified chemical was not mutagenic in the bacterial strains tested in the presence or absence of metabolic activation provided by rat liver S9 fraction

9.2 Overall Assessment of Toxicological Data

The notified chemical exhibited low acute oral toxicity in rats ($LD_{50} > 2\,000$ mg/kg). The notified chemical was a slight skin and eye irritant in rabbits. No mutagenicity was observed in bacteria.

Based on the limited toxicological studies provided by the notifier, Ketjenlube 2300 would not be classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (9).

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern with a number-average molecular weight (NAMW) greater than 1 000 according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

Due to the proposed use pattern of the notified polymer as a component of engine oils, the anticipated environmental hazard is low. Most of the substance will be burned during use, or recycled. The incineration of the notified substance is expected to generate water and the oxides of carbon.

The main environmental hazard comes from the DIY market when the used oil is not collected. The amount of the notified polymer involved has been estimated at 3.7 tonnes per annum. This amount of chemical will be disposed of with the used oil in various areas soil, landfill or to drains throughout Australia. Due to the expected low solubility in water and high partition coefficient, the notified polymer may be expected to remain in the soil with the oil and should not leach. Disposal to drains will eventually reach water courses, where the notified polymer should remain with the oil phase or be absorbed to sediment/particles and remain with the sediments. In sediments or at landfill the notified polymer is expected to slowly degrade with the oil,

down to monomers, which should decompose further. As ecotoxicological effects are not expected nor is bioaccumulation, the non-appropriate disposal of the notified chemical in the used engine oil is not expected to pose a significant environmental hazard.

Accidental spills during transport or during formulation are expected to be cleaned up according to the MSDS. The instructions in the MSDS are adequate to limit environmental exposure.

11. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

Ketjenlube 2300 has been notified as a synthetic polymer of low concern under section 23 for the purposes of section 24A of the Act. 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. However, based on the toxicology data supplied, the notified polymer may cause slight skin and eye irritant in some individuals.

Exposure during transfer, storage and packaging is only expected to occur in the event of an accident.

Exposure of workers to the notified polymer during blending and cleaning processes is expected to be minimal through the use of closed systems, limited handling and personal protection.

The main occupational risk posed to automobile mechanics is skin irritation, following repeated exposure to the notified polymer in engine oil. Any accidental eye contact is likely to cause discomfort, but no serious damage to eyes.

The distribution, use and disposal of the notified polymer is expected to result in negligible public exposure. In addition, 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.

12. RECOMMENDATIONS

To minimise occupational exposure to Ketjenlube 2300 the following guidelines and precautions should be observed:

- Eye protection should be selected and fitted in accordance with Australian Standard (AS) 1336 (10) and meet the requirements of (Australian and New Zealand Standard) AS/NZS 1337 (11);
- Industrial clothing must conform to the specifications detailed in AS 2919 (12);
- Industrial gloves should conform to the standards detailed in AS 2161 (13);

- All occupational footwear should conform to the standards detailed in AS/NZS 2210 (14);
- Care should be taken to avoid spillage or splashing of the notified polymer;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

13. MATERIAL SAFETY DATA SHEET

The MSDS for the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (15).

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 of Kenjenlube 2300 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. Gobas F.A.P.C., Opperhuizen A & Hutzinger O 1986 Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation. *Environmental Toxicology and Chemistry*
2. Australian and New Zealand Environment Council (ANZEC) 1991, Used Lubricating Oil: Generation, Recovery and Reuse in Australia. *A Technisearch Ltd Report for the Waste and Resources Advisory Committee (WRAC)*,.
3. Dameen, P. 1994, *Acute Oral Toxicity Study of Ketjenlube 2300 in Rats*, Project No. 116729, Hambakenwetering 3, s-Hertogenbosch, Netherlands.

4. Rijoken, P. 1994, *Primary Dermal Irritation/Corrosion Study of Ketjenlube 2300 in Rabbits*, Project No. 116731, Hambakenwetering 3, s-Hertogenbosch, Netherlands.
5. Rijoken, P. 1994, *Primary Eye Irritation/Corrosion Study of Ketjenlube 2300 in Rabbits*, Project No. 116742, Hambakenwetering 3, s-Hertogenbosch, Netherlands.
6. Organisation for Economic Co-operation and Development 1995-1996, *OECD Guidelines for the Testing of Chemicals on CD-Rom*, OECD, Paris.
7. Draize, J.H. 1959, 'Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics', *Association of Food and Drug Officials of the US*, vol. 49, pp. 2-56.
8. van de Waart, E. 1994, *Bacterial Reverse Mutation Study of T-6334*, Project No. 116753, , Hambakenwetering 3, s-Hertogenbosch, Netherlands.
9. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australian Government Publishing Service, Canberra.
10. Standard Australia 1982, *Australian Standard 1336-1982, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia, Sydney.
11. Standard Australia 1984, *Australian Standard 1337-1984, Eye Protectors for Industrial Applications*, Standards Association of Australia, Sydney.
12. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia, Sydney.
13. Standards Australia, 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, Australia.
14. 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.
15. 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.